Women's Empowerment and Child Stunting in India: An Investigation

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Abstract

Child stunting is associated with substantial impediments to human development and loss in human capital. An important factor contributing to the prevalence of stunting, a manifestation of malnutrition among children, is believed to be women's lack of empowerment. This paper, therefore, aims to describe the trends and variations in child stunting in India using data from the National Family and Health Survey. This study also seeks to find the factors associated with child stunting, with particular focus on the influence of women's empowerment. We analyzed stunting across various socioeconomic groups, and applied chi-square tests and logistic regression modeling to determine whether any significant association existed between the different dimensions of women's empowerment and child stunting. We found that the financial autonomy of women is one of the factors which is associated with a reduction in the odds of being a child stunted. Other reasons that decrease the odds of child stunting are maternal health, measured by body mass index, and the number of antenatal visits during pregnancy. Women's empowerment can, therefore, play an essential role in improving child nutrition.

Keywords

Women's empowerment; child stunting; India; NFHS

Introduction

Among the seventeen Sustainable Development Goals (SDGs) adopted by all United Nations Member States in 2015, the second goal, 'Zero Hunger', is calling for the end of all forms of global hunger and malnutrition by 2030. One of the targets of this particular goal is the achievement of a reduction in the stunting among children under five years of age. Stunting among children refers to the impaired growth and development that children experience from poor nutrition, repeated infections, and lack of adequate psychosocial stimulation (WHO, 2015, 2016). Children are defined as stunted if their height for their age is more than two standard deviations below the WHO Child Growth Standards median (WHO, 2010). In 2017, 22.2%, or 150.8 million children under five years of age were globally affected by stunting, out of which more than half resided in Asia, and more than one third in Africa (UNCF, WHO, & WBG, 2018). In 2015-16, 38.4% of children under five years of age in India were stunted. Although the prevalence of stunting varied across districts, high stunting districts were mostly clustered in the northern and central regions of the country as per the latest National Family and Health Survey 4 (NFHS 4). Over the past two decades, there has been a reduction in stunting rates, though the decline has been slow.

Stunting is found to lead to severe short-term and long-term consequences for the overall development of children. A lower height-for-age ratio for young children leads to delay in the start of schooling, fewer years of schooling, lower test scores in school, and shorter height as young adults (Alderman et al., 2006; Shariff et al., 2000). Stunting is also found to be associated with deficits in cognition ability as well as poorer emotional and behavioral outcomes in late adolescence (Crookston et al., 2011; Walker et al., 2007). Stunting limits developmental potential, thereby leading to a loss of human capital. Hence, the eradication of stunting is imperative for the long-term economic development of societies and, most importantly, for the betterment of the life of every child.

An important factor contributing to the prevalence of malnutrition among children is believed to be women's lack of empowerment. An analysis of the literature by Cunningham et al. (2015) revealed that while the relationship varied across the different domains of women's empowerment, women's empowerment was associated with child nutritional status in South Asia. Women play a vital role in the development of their children, and the improved status of women can lead to significantly better health outcomes for themselves as well as for their children. Ramalingaswami et al. (1996) drew attention to the Asian Enigma, suggesting that South Asia, and not Africa, is the most malnourished region, with the reason being the lower status of women in Asian societies. They indicated that promoting gender equality, impartial opportunities, and rights for women will defeat child malnutrition. The studies have established a positive association between the empowerment of women and children's health outcome as well as a reduction in child stunting (Cunningham et al., 2017; Imai et al., 2014; Shroff et al., 2009)

To the best of the authors' knowledge, this study is a unique attempt to use the pooled data of the National Family Health Survey, India (NFHS-3 [2005-2006], and NFHS-4 [2015-2016]) to identify the association between women's empowerment and child stunting. The findings are essential as they show a significant association of empowering women with the reduction of child stunting. These findings make a strong case that the indirect interventions through gender-focused policies like improving the educational status of women, encouraging women to be financially independent, and increasing the autonomy of women in various domains can go a long way in reducing child stunting. This paper aims to describe the trends and variations

in child stunting using data from NFHS-3 and NFHS-4. This study also seeks to find the determinants of child stunting, with particular focus on the effect of women's empowerment on child stunting. This paper can be divided into two parts: first, a review of the literature on the issue along with that on variables indicating women's empowerment; and second, to determine the effect of these variables on child stunting.

Literature review

Negative effects of stunting

Stunting is one of the most prevalent effects of child malnutrition, and in recent times has become a global health priority. Factors that contribute to stunting among children include poor maternal health and nutrition, inadequate infant and young child feeding practices, and repeated infections (WHO, 2014). Studies from various countries have reported that stunted children are less likely to be enrolled in school, and more likely to register late, drop-out, repeat grades, and have lower grades as well as poor cognitive performance when compared to non-stunted children (Beasley et al., 2000; Glewwe et al., 2001; Grantham-McGregor et al., 1997; Jamison, 1986; Victora et al., 2008). Victora et al. (2008) revealed that stunting in the first two years of life leads to irreversible damage, including reduced adult height, reduced economic productivity, and lower offspring birth weight (for women). Children with lower height-for-age reported poor psychological functioning in late adolescence, specifically higher levels of anxiety, depressive symptoms, and low self-esteem (Walker et al., 2007). Moreover, stunting has been associated with increased morbidity and mortality, reduced neurodevelopmental function, and an elevated risk of chronic disease in adulthood, posing a threat to human development (Black et al., 2008).

Determinants of stunting

Numerous studies have identified various demographic and socioeconomic determinants of child stunting. Child age and sex, wealth index, and the number of antenatal care visits by the mother were found to be significantly associated with child stunting (Aguayo et al., 2015; Fenske et al., 2013). These papers suggested that the odds of stunting were higher for boys, children from lower wealth quintiles, and for those whose mothers received few or no antenatal cares visits. Stunting was found to be more prevalent where there were more younger children under the age of five years old living in the same household (Kamal, 2011; Ramos et al., 2015). This aspect can be attributed to the fact of having to share food with the other family members as well as the possibility of lesser time for the mother to provide equal care to each of the many children. Short maternal stature, lack of complementary feeding, low maternal weight, lack of maternal education, mother's age at marriage, place of delivery, ethnicity, and pregnancy intentions were also found to be strong correlations with child stunting (Abuya et al., 2012; Kim et al., 2017; Singh et al., 2011). Behrman (1988), Horton (1988), Pande (2003), and Swamy et al. (2012) employed empirical analysis to establish that birth order can also have a negative association with children's health outcomes. From 2001 to 2011, Nepal experienced the fastest recorded reduction in stunting in the world. A study confirmed that the four factors which led to this were improved access to health services (particularly during pregnancy), increase coverage and use of toilets, improvements in levels of education (particularly among mothers), and wealth accumulation (Cunningham et al., 2017). In India,

social factors, including castes and regions, also have an impact on nutritional outcomes (Imai et al., 2014; Pal, 1999; Thorat & Sadana, 2009).

An analysis of the trends in child stunting in the South Asian countries of Bangladesh, Nepal, India, and Pakistan found higher rates of stunting among children who had poor diets, had mothers with low educational attainment, or who lived in poor households (Krishna et al., 2017). They also found that the largest declines in stunting were seen in higher wealth quintiles. Another study in South Asia concluded that child stunting could be prevented by improving child feeding, women's nutrition, and household sanitation (Aguayo & Menon, 2016). Open defecation, diseased environments, and the status of women have also been found to have an association with stunting (Coffey et al., 2013).

Women's empowerment: Concept and indicators

The word 'empowerment' has acquired significant importance in development literature. Alsop et al. (2006) defined empowerment as "the process of enhancing an individual's or group's capacity to make purposive choices and to transform those choices into desired actions and outcomes". Different authors and organizations have defined 'empowerment' in varied ways, as discussed by Alkire and Foster (2007), where they synthesized the literature on the issue of 'empowerment'. Similarly, women's empowerment has been defined in different manners. Kabeer (1999) discussed that women's empowerment refers to the processes that give women the ability to make critical life choices that have been denied the same. According to Duflo (2012), women's empowerment can be defined as "improving the ability of women to access the constituents of development – in particular health, education, earning opportunities, rights, and political participation". Hence, the concept of women's empowerment is related to processes and actions to give women agency to make meaningful life choices.

The definitions discussed above clearly highlight the multidimensionality of the concept of women's empowerment. Hence, when it comes to women's empowerment, the methodological issues are quite involved in the sense that defining and operationalizing empowerment is quite challenging given the variance in definitions (Ibrahim & Alkire, 2007; Malhotra, 2003). Most studies have defined women's empowerment as a multidimensional concept. They have suggested or used various socioeconomic, cultural, political, interpersonal, political factors, and indicators to measure women's agency to quantify their empowerment (Duflo, 2012; Malhotra, 2003; Malhotra & Schuler, 2005). Operationally, indicators used for women's empowerment in various studies and papers have included, amongst others, factors related to the financial independence of women, mobility of women, decision-making capability of women, and the attitude of women towards domestic violence amongst others (Afridi, 2010; Do & Kurimoto, 2012; Gupta & Yesudian, 2006; Imai et al., 2014; Kishor & Gupta, 2004; Pratley, 2016; Shroff et al., 2009).

In the context of women's empowerment and its relation to the health of children and mothers, the empirical literature is primarily based on demographic studies and health surveys, with indicators of women's empowerment based on the data collection in their modules on women's status (Pratley, 2016). Women's freedom of movement and decision-making authority are among the most used parameters to measure women's empowerment (Afridi, 2010; Imai et al., 2014; Shroff et al., 2009). Pratley (2016) discussed that these indicators usually are focused on women's mobility, their say in households' decisions, their perception of domestic violence, and the decisions regarding their health. Gupta and Yesudian (2006) also

used NFHS data-based indicators to study the status of women's empowerment in an Indian context. The literacy, education, employment, and exposure to mass media of women can additionally be considered as indicators of women's empowerment (Kishor & Gupta, 2004). Literacy and education enhance a woman's knowledge and awareness, making her aware of her rights and provide employment opportunities. Freedom to use discretionary money and contribute to the management of household finances was found to be a key determinant of women's empowerment, as it affected a mother's purchasing decisions and resources allocated to food or childcare (Carlson et al., 2015; Pratley, 2016; Shroff et al., 2009).

Women's empowerment and its relationship with welfare outcomes

Maternal autonomy and empowerment positively affect child nutritional care and educational outcomes (Afridi, 2010; Imai et al., 2014; Pratley, 2016; Shroff et al., 2009). The families in which mothers were more educated and had greater authority showed less discrimination against educational investments in daughters (Afridi, 2010). Imai et al. (2014) examined whether mother's empowerment, measured as mother's bargaining power relative to father's, had any statistical association with children's nutritional status. They found that education, access to health care and sanitation, and the absence of domestic violence improved health outcomes for children. Physical autonomy, i.e., the lack of need for permission to visit the market, was found to be associated with child stunting where women with higher physical autonomy were less likely to have stunted children (Shroff et al., 2009). The authors' explanation for this result was that freedom provides a forum for the exchange of information that helps the mother gain knowledge and advice beneficial for the care and nutrition of her children. In recent years, the view that women's empowerment facilitates social and health development of society is being increasingly recognized. An example of this idea is Maharashtra, a state in the western peninsular region of India, experienced one of the quickest declines in stunting where the stunting rate declined by 15 percentage points between 2006 to 2012. One of the primary drivers of the decline was improved education and the empowerment of women (Haddad et al., 2014). A study of the tribal and rural communities in the South Indian state of Karnataka revealed that women's empowerment variables, such as their freedom of movement and decision-making power, were significantly associated with child nutrition (Sethuraman et al., 2006).

This paper is one of the first attempts to study the impact of women's empowerment on child stunting using the latest round of large scale, nationally representative National Family and Health Survey-4 dataset and pooling data with an earlier NFHS-3 round. The objective is to study what implications women's empowerment can have on child development in terms of stunting. The research hypothesis is that the more empowered women are, the lower the odds of children being stunted. In a largely patriarchal system prevalent in almost every region of India, our study assumes essential significance as the findings of this study may have policy implications for empowering Indian women to address the issue of child malnutrition, which continues to be a health challenge.

Data and methodology

Data

In India, large-scale, representative surveys, namely, the NFHSs, were conducted in rounds to collect information on health, social, demographic, and other important variables for the

years 1992-1993, 1998-1999, 2005-2006, and 2015-2016. For our analysis, we have used the last two rounds, i.e., 2005-2006 and 2015-2016. The latest round comprised around 0.6 million households, 0.7 million women in the age group of 15-49 years, and 0.12 million men between the age of 15 and 54. Likewise, the third round, i.e., 2005-2006, encompassed 0.1 million households, 0.125 million women, and around 0.075 million men of the same age group as in the previous survey. In both rounds, for each woman, the data of her youngest child, who was less than five years old, were used in our analysis to capture the most recent trends in stunting. The survey was carried out under the guidance of the Ministry of Health and Family Welfare, Government of India. The data is publicly available on the website of the Demographic and Health Surveys (www.dhsprogram.com). There is no identifiable information of the respondents, making the data anonymous. Hence, the ethics statement for using this dataset is not required as this study is utilizing an anonymized secondary dataset.

Methods

In this paper, we try to determine the association between women's empowerment and child health, while controlling for all other socioeconomic relevant factors, as indicated by the stunting of the child. First, we analyzed stunting across various socioeconomic groups. Furthermore, to find out whether any significant association exists between the different dimensions of women's empowerment and child stunting, we used the chi-square tests to test if two variables are related using contingency tables. For our analysis, we used the logistic regression model on pooled data from these two NFHS rounds with a sample size of 39,573. In the equation form, the logistic model can be represented as:

$$O_i = \ln \frac{p_i}{1-p_i} = \alpha_0 + \alpha_i Y_i$$

where O depicts the odds ratios' log, p denotes the probability of occurrence of an event, and Y_i are the explanatory variables. For our analysis, the ratio $\frac{p_i}{1-p_i}$ represents the odds of a child being stunted. The explanatory variables are the characteristics of women, partners, and households, with indicators of women's empowerment, and zones of Indian states, as discussed below.

Variables

The stunting variable for this analysis is based on the variable given in the NFHS. The original variable is "height/age standard deviation" (WHO, 2006). The WHO defines stunting as the condition when height/age is less than two standard deviations of the WHO reference standards.

In the present analysis, we selected four dimensions of women's autonomy for our study, out of which three are given by Gupta and Yesudian (2006). The indicators were selected on the basis of the literature review, along with the variables available in the NFHS. Gupta and Yesudian (2006) conceptualized three dimensions of women's autonomy, and the corresponding indices, which we have borrowed for our analysis with some modifications, namely the Freedom of Mobility Index, Household Autonomy Index, and Attitude towards Domestic Violence Index. These modifications have been done due to the updation of the questionnaire in the latest round of surveys and the literature review. The fourth indicator, the Financial Autonomy Indicator, is related to a woman's say in the spending of money earned by her or her partner.

1. Freedom of Mobility Indicator: This indicator takes into consideration the say a woman has with respect to her mobility (Gupta & Yesudian, 2006). The questionnaires contained a question asking women who in their household decides if the woman could visit their family or relatives. The indicator took the value 1 if women were part of the decision process and 0 if they had no participation in the decision.

2. Household Autonomy Indicator: This indicator devised by Gupta and Yesudian (2006), was aimed to evaluate a woman's participation in decisions pertaining to the household and herself. Following the authors, we consider two questions where women were asked if they had participated in decisions related to their health and the purchase of large household items. The indicator took a value of 1 only in the case when the women had a say in both the decisions. In all other cases, the indicator took a value of 0. Women with scores 0 and 1 were then categorized as having no household autonomy and having household autonomy, respectively.

3. Attitude towards Domestic Violence Indicator: Gupta and Yesudian (2006) also devised the attitude towards domestic violence indicator. Round 3 and 4 of the survey asked women if they felt it was alright if husbands/partners beat their wives/partners in the following situations: if the wife goes out without telling the husband; if the wife neglects the children; if the wife argues with husband; if the wife refuses to have sex with the husband; if the wife does not cook food properly. Justifying wife-beating even for a single reason suggests that the woman accepts gender inequality and considers her husband free to use physical dominance to control her. Following Gupta and Yesudian (2006), if a woman answered that beating is not justified under any situation, she is labeled as a woman who does not support domestic violence. On the other hand, if a woman supported beating in any of the mentioned situations, she is considered as a woman who supports domestic violence.

4. Financial Autonomy Indicator: This indicator was aimed at gauging a female's involvement in the management of household finances. In rounds 3 and 4 of NFHS, women were asked who is responsible for making decisions regarding spending of the money earned by her and her husband/partner. Using these two questions, an indicator took the value of 0 or 1. Women who were not involved in any decisions in the above two questions were categorized as having no financial autonomy (score 0). Women with an affirmative response in either one of the two questions, or both questions, were considered as having financial autonomy and were given a score of 1 (see Appendix 1 for the summary of the indices).

The main focus of this study was to observe the association of women's empowerment on child stunting. Besides including the above mentioned four indices of women's empowerment as independent variables, we have also tried to control for other socioeconomic and demographic variables based on the literature discussed in the preceding section. We have included indicators of child characteristics, i.e., variables related to the child including sex (Male or Female), current age (Less than 1 year, 1-2 years or 3-4 years), and the birth order number of the child (First child, Second, Third, or higher birth order). Household-level variables, namely current place of residence (Rural or Urban), social group to which the household belongs (Scheduled Castes, Scheduled Tribes, Other Backward Castes, or General), the religion followed by the household members (Hindu, Muslim, Christian, Sikh, Buddhists or Other), wealth index (Poorest, Poorer, Middle, Richer, or Richest), and whether the household practices open defecation (Yes or No) were also taken as independent variables.

Other characteristics related to women were also used, including their age (15-19 years, 20-29 years, 30-39 years, or 40-49 years), and level of education attained (None, Primary, Secondary, or Higher). Furthermore, independent variables capturing the mother's body mass index (Underweight, Normal weight, or Overweight), number of antenatal visits made during the time of pregnancy (<=3 visits or >3 visits), media exposure, i.e., whether they either read newspapers or magazines, listen to the radio or watch television (Yes or No), and whether they are currently working (Yes or No), were also considered in our analysis. In addition, information of the woman's husband or partner, i.e., their age relative to the respondents' (Woman older than the husband, Woman same age as of the husband, or Husband older than the woman), and the highest education level attained by the husband or partner (None, Primary, Secondary or Higher), was also included in the model. The descriptive statistics for the variables are given in Table 1.

Table 1: Descriptive statistics of the respondents (in percent)

		Pooled Data
Place of Residence	Rural	65.6
	Urban	34.4
Social Group	Scheduled Caste	21.0
	Scheduled Tribe	9.4
	Other Backward Caste	44.8
	General	24.8
Religion	Hinduism	80.8
	Islam	13.8
	Christianity	2.4
	Sikhism	1.7
	Buddhism	1.0
	Others	0.5
Wealth Index	Poorest	17.7
	Poorer	19.5
	Middle	20.5
	Richer	21.1
	Richest	21.2
Respondent's Highest Education Level	No Education	29.4
	Primary	12.8
	Secondary	45.8
	Higher	11.9
Partner's Highest Education Level	No Education	23.6
	Primary	15.6
	Secondary	48.2
	Higher	12.7
Occupation	Not Working	69.8
	Working	30.3
Age in 5-year groupings	15-19	17.8
	20-29	34.1
	30-39	26.8
	40-49	21.3

Source: Authors' calculation using NFHS III and IV data

Further, given the geographical vastness of the country, following NFHS, 29 states and seven union territories of India have been divided into six different zones. The description of these zones is:

1. Northern Zone: Haryana, Punjab, Himachal Pradesh, Rajasthan, Jammu & Kashmir, Delhi, Chandigarh.
2. North-East Zone: Assam, Sikkim, Nagaland, Meghalaya, Manipur, Mizoram, Tripura, Arunachal Pradesh.
3. Central Zone: Uttarakhand, Uttar Pradesh, Chhattisgarh, Madhya Pradesh.
4. Eastern Zone: Bihar, Jharkhand, Odisha, and West Bengal.
5. Western Zone: Gujarat, Maharashtra, Goa, Dadra & Nagar Haveli, Daman, and Diu.
6. Southern Zone: Andhra Pradesh, Karnataka, Kerala, Tamil Nadu, Telangana, Andaman and Nicobar Islands, Lakshadweep, Puducherry.

Results and discussions

We analyzed the data to find variation in stunting across various socioeconomic groups and also across the different Indian states. From Table 2, we observe that stunting among children remains high in India even though stunting declined to 36% in 2015-2016, as compared to 45% in 2005-2006, therefore suggesting a 9 percentage point decline in stunting. Though rural areas have a higher percentage of stunting as compared to urban areas, the value declined over the period for both urban and rural areas. With respect to social groups, stunting was the highest amongst Scheduled Tribe households, followed by Scheduled Caste households, while it was the lowest for the respondents belonging to the General category. In the case of religion, stunting was most prevalent in Buddhist and households with other religion categories, while the lowest for Sikhism. Overall, stunting has declined across all social groups and religions. Stunting was the least for the wealthiest households, and stunting continued to increase as we moved down the wealth index with the highest stunting recorded for the poorest households. Stunting was less prevalent in children with more educated parents. In the case of occupation, children with working mothers have a higher prevalence of stunting as compared to those with non-working mothers. Stunting among children with older mothers was higher as compared to those with younger mothers.

Table 2: Trends & variation of child stunting as per women's status (in percent)

		Stunting	
		2005-06	**2015-16**
Place of Residence	Rural	47.6	38.6
	Urban	37.5	29.7
Social Group	Scheduled Caste	51.0	40.2
	Scheduled Tribe	51.6	41.6
	Other Backward Caste	45.8	36.2
	General	37.4	29.1
Religion	Hinduism	45.1	36.1
	Islam	46.5	37.6
	Christianity	36.6	27.8
	Sikhism	28.5	22.5
	Buddhism	53.6	41.9

	Others	57.0	40.4
Wealth Index	Poorest	56.9	48.3
	Poorer	51.2	41.2
	Middle	46.5	34.9
	Richer	38.6	28.6
	Richest	24.9	22.0
Respondent's Highest Education Level	No Education	53.9	48.1
	Primary	46.9	41.3
	Secondary	36.4	31.4
	Higher	19.2	20.6
Partner's Highest Education Level	No Education	55.2	48.3
	Primary	51.0	41.1
	Secondary	42.0	33.4
	Higher	25.0	22.2
Occupation	Not Working	42.5	34.4
	Working	50.9	39.2
Age in 5-year groupings	15-19	45.0	30.8
	20-29	43.6	35.4
	30-39	47.4	37.4
	40-49	58.4	47.9
Total		45.0	36.0

Source: Author's calculation using NFHS III and IV data

Stunting and women's empowerment

In this section, we will discuss the effect of women's empowerment on child stunting by using simple cross-tabulations & chi-square test. Households where women have financial autonomy have a lower percentage of child stunting as compared to those households where women have no financial autonomy. Similarly, stunting was lower for households where the respondents have household autonomy, though the difference is not as significant as financial autonomy. Households where women have freedom of mobility show a lower ratio of child stunting (Table 3). Also, households where women do not support domestic violence (positive attitude) have a lower percentage of child stunting. Further, chi-square tests, the results of which are given in Table 4, suggest that there is an association between the four indicators of women's empowerment and child stunting.

Table 3: Stunting across different indicators of women's empowerment

		Stunting	
Women's empowerment		**2005-06**	**2015-16**
Financial Autonomy	No	55.5	42.6
	Yes	45.7	34.7
Household Autonomy	No	44.9	36.3
	Yes	45.0	34.5
Freedom of Mobility	No	45.5	37.2
	Yes	44.5	34.3
Attitude towards Domestic Violence	Negative	47.0	36.6
	Positive	43.1	34.0

Source: Authors' calculation using NFHS III and IV data

Table 4: Chi-square tests: Stunting and various indicators of women's empowerment

Stunting	Financial Autonomy			Stunting	Household Autonomy		
	No	Yes	Total		No	Yes	Total
No	707	25,648	26,355	No	15,835	20,376	36,211
Yes	675	15,559	16,234	Yes	10,510	11,742	22,252
Total	1,382	41,207	42,589	Total	26,345	32,118	58,463
Pearson chi²(1) = 69.65		Pr = 0.0		Pearson chi²(1) = 68.27		Pr = 0.0	

Stunting	Freedom of Mobility			Stunting	Attitude towards Domestic Violence		
	No	Yes	Total		No	Yes	Total
No	11,515	24,697	36,212	No	16,187	20,614	36,801
Yes	7,857	14,394	22,251	Yes	10,866	11,807	22,673
Total	19,372	39,091	58,463	Total	27,053	32,421	59,474
Pearson chi²(1) = 76.72		Pr = 0.0		Pearson chi²(1) = 87.81		Pr = 0.0	

Source: Authors' calculation using NFHS III and IV data

Factors associated with stunting

In this section, we discuss the results of the logistic regression. The children of women with financial autonomy had fewer odds of being stunted than children of women with no financial autonomy (Table 5). The odds of stunting are lower for households where the women did not support domestic violence and had freedom of mobility, but these results are insignificant. Overall, we found that financial autonomy showed a significant association with a reduction in child stunting. Women's control of their income increases their bargaining power at home, giving them a sense of empowerment. Through participation in decisions related to income spending, women influence household purchasing decisions as well as the allocation of resources within the household. There is evidence that income in the hands of the mother leads to improved child health due to increased expenditure on food, childcare, child clothing, etc. (Lundberg et al., 1997; Thomas, 1990). Through control over income and spending, as discussed by Carlson et al. (2015) and Shroff et al. (2009), women can direct resources towards children and, as a result, can reduce the prevalence of child stunting.

A female child had lower odds of being stunted as compared to a male child. The results related to boys having greater odds are somewhat surprising, given the son preference is usually seen in India (Clark, 2000; Das Gupta et al., 2003; Fred et al., 1998). These findings call for more granular analysis of data on the regional level to assess which states are contributing to this phenomenon. Further, the focused studies in the states where such trends are observed may shed more light. Also, as the age of the child increases, so does the likelihood of stunting. The later birth order of the child also increases the odds of child stunting. Behrman (1988), Horton (1988), Pande (2003), and Swamy et al. (2012) found that birth order can have a negative association with children's health outcomes. These two results may indicate, as found by Ajao et al. (2010), the neglect on the part of the parents towards their children's nutritional requirement as the number of children in the family increases. This result may further be because of constraints faced in intrahousehold allocations. Moreover, as found by Aguayo et al. (2016), the cumulative nature of nutrition deprivation in infancy and early

childhood can be another reason for the rise in odds of stunting among younger children. However, only more focused research can help unearth the inter-play of various reasons.

Rural areas had lower odds of stunted children as compared to the urban areas. Also, children from general, Other Backward Caste (OBC) and Scheduled Tribe (ST) category households have lower odds of stunting as compared to Scheduled Caste (SC) household children. Among the former three categories, higher odds of children stunting are observed for OBC and ST households. This is in line with the studies which find that SC, ST, and OBC households are at a disadvantage with regards to child nutrition (Imai et al., 2014; Pal, 1999; Thorat & Sadana, 2009). In the case of religion, children from Muslim households have higher odds of stunting as compared to the children from the Hindu religion in both periods, which shows the relatively lower health condition of children of the Muslim households in line with findings of Pal (1999). Odds of stunting significantly decreases as the households' wealth level increases, which is a proxy variable for the economic condition of the households. Higher wealth allows households to allocate resources for the better nutritional requirement of their children, which decreases their odds of stunting. The households where open defecation was practiced had higher odds of stunting as compared to the households that used proper toilet facilities.

With the increase in the age of women, odds of child stunting decreased (higher aged women will have more experience regarding the nutritional requirements of their child). In line with the findings of Singh et al. (2011), women's education level also plays a significant role in determining the stunting with the odds of stunting being lower for households where the mother has completed an either secondary or higher level of education. A more educated mother provides better health care to her children, as she has better information and knowledge about access to health care services and the nutritional requirements of her child. The working status of women does not play any significant role in determining their child's odds of stunting. As far as body mass index is concerned, the child of an underweight mother has higher odds of being stunted as compared to the case where the mother belongs to the standard weight or overweight categories. Also, the odds of stunting, in line with Aguayo et al. (2015) and Fenske et al. (2013), are lower for the child when the mother has made more than three antenatal visits during the time of pregnancy. These results show the importance of antenatal visits. With respect to the indicator related to exposure to media of women, we found that odds of stunting are lower for households where the respondents are using either radio, television, or newspaper as compared to the households with uninformed women.
The odds of stunting is lower when the husband or partner is of the same age or older than the respondent, as compared to when they are younger than the respondent. The education of the husband or partner plays a very similar role to the respondent's case. With an increase in the education level of the husband or partner, the odds of child stunting decreased, which shows more awareness on the parents' part regarding their child's nutritional status. Currie (2009), based on a review of literature, also found that parental education has a positive impact on health outcomes. As compared to the Northern zone of India, the Eastern, Southern, and North-Eastern zones of India have significantly lower odds of child stunting while Western and Central zones have higher odds of child stunting.

Table 5: Determinants of stunting

Variable/Categories		Stunting (Odds Ratio) [Confidence Interval]
Financial Autonomy [Base - No]	Yes	0.876** (0.056) [0.773 - 0.992]
Household Autonomy [Base - No]	Yes	1.015 (0.030) [0.959 - 1.076]
Freedom of Mobility [Base - No]	Yes	0.979 (0.032) [0.918 - 1.043]
Attitude towards domestic violence [Base - Negative]	Positive	0.974 (0.023) [0.931 - 1.019]
Sex of Child [Base - Male]	Female	0.905*** (0.020) [0.867 - 0.945]
Age of Child [Base - Less than 1 year]	1-2 years	3.301*** (0.10) [3.105 - 3.510]
	3-4 years	2.948*** (0.102) [2.755 - 3.154]
Birth order of child [Base - First child]	Second child	1.097*** (0.033) [1.034 - 1.164]
	Third or higher birth order	1.204*** (0.040) [1.129 - 1.285]
Place of Residence [Base - Urban]	Rural	0.892*** (0.026) [0.843 - 0.945]
Social Group [Base - Scheduled Caste]	Scheduled Tribe	0.886*** (0.036) [0.819 - 0.959]
	Other Backward Caste	0.870*** (0.027) [0.818 - 0.924]
	General	0.774*** (0.028) [0.721 - 0.831]
Religion [Base - Hindu]	Muslim	1.124*** (0.040) [1.048 - 1.205]
	Christian	1.092* (0.056) [0.988 - 1.208]
	Sikh	0.764*** (0.075) [0.631 - 0.925]
	Buddhist	1.062 (0.104) [0.877 - 1.286]
	Other	1.386*** (0.146) [1.128 - 1.703]
Wealth Index [Base - Poorest]	Poorer	0.904*** (0.032) [0.842 - 0.97]
	Middle	0.766*** (0.031) [0.707 - 0.829]
	Richer	0.656*** (0.032) [0.597 - 0.721]

	Richest	0.481*** (0.028) [0.428 - 0.539]
Open defecation [Base - No]	Yes	1.085*** (0.034) [1.021 - 1.154]
Mother's Age in 5-year groupings [Base - 15-19 years]	20-29	0.820*** (0.052) [0.724 - 0.929]
	30-39	0.739*** (0.051) [0.645 - 0.846]
	40-49	0.805** (0.073) [0.674 - 0.961]
Mother's Highest educational level [Base - no education]	Primary	0.975 (0.036) [0.908 - 1.047]
	Secondary	0.858*** (0.029) [0.803 - 0.917]
	Higher	0.651*** (0.039) [0.579 - 0.731]
Mother currently working [Base-No]	Yes	0.996 (0.026) [0.947 - 1.048]
Mother's Body mass index [Base - Underweight]	Normal weight	0.837*** (0.021) [0.796 - 0.88]
	Overweight	0.679*** (0.028) [0.626 - 0.737]
Antenatal visits during pregnancy [Base - 3 visits or less]	More than 3 visits	0.878*** (0.023) [0.834 - 0.924]
Mother's Exposure to the media [Base - No]	Yes	0.933** (0.029) [0.879 - 0.991]
Husband or partner age [Base - Women older than husband]	Same age	0.807** (0.070) [0.681 - 0.957]
	Husband older than the woman	0.846*** (0.055) [0.745 - 0.96]
Husband or partner educational level [Base - no education]	Primary	0.990 (0.038) [0.919 - 1.066]
	Secondary	0.882*** (0.030) [0.825 - 0.942]
	Higher	0.739*** (0.039) [0.666 - 0.818]
States of India: 6 Zones [Base - Northern]	North East	0.718*** (0.036) [0.651 - 0.792]
	Central	1.156*** (0.043) [1.074 - 1.245]
	Eastern	0.909** (0.037) [0.839 - 0.986]
	Western	1.183*** (0.056) [1.078 - 1.299]
	Southern	0.845*** (0.040) [0.769 - 0.927]

Year	0.763*** (0.020) [0.726 - 0.803]
Constant	1.207 (0.151) [0.944 - 1.543]
Observations	39,573

*Robust standard error (see form in parentheses) ***p<0.01, **p<0.05, *p<0.1*
Source: Authors' calculation using NFHS III and IV data

Conclusion

As India aspires to join the status of developed country in the near future, an issue as fundamental as child malnutrition remains a problem, notwithstanding the progress made to combat the issue. The various government schemes and initiatives continue to be fine-tuned to eradicate the prevalence of child malnutrition in the country. However, a more holistic treatment of the problem is required.

Our analysis shows that the financial autonomy of women can play an essential role in fighting child stunting and improving overall child health outcomes. The measures should, hence, include encouraging women to pursue higher education, facilitation of women's entry to the job market through focused policies, easy availability of nurseries, better maternity benefits, and maternity leave at the workplace. The education of women and their partners is also key to the elimination of child stunting. Other aspects that have a considerable influence on stunting is maternal health, measured by body mass index and number of antenatal visits during pregnancy. The exposure of the mother to the media regarding the need as well as the ways to take care of her health can also lead to a reduction in the incidence of child stunting.

Further, it is seen that children belonging to economically better performing states are less likely to be stunted. Hence, financially resource-poor states need to be supported through focused schemes to reduce the wide prevalence of stunting in these states. More specifically, households that lie at the lower end of the wealth spectrum in these states need to be specifically targeted. Open defecation is also a major cause of stunting, and hence the government needs to focus on better implementation of schemes that aim to make India open-defecation free. The results also show that odds of stunting are higher for children born later in the birth order showing that reducing family size can as well be an effective strategy to reduce child malnutrition. Further, children born in households belonging to certain socioeconomic groups that show higher odds of stunting need to be focused upon to ensure that they are provided with resources and guidance to raise healthy children.

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Appendix

Appendix 1: Women's empowerment Indices			
S.No.	**Indicator**	**Questions**	**Categories**
1.	Freedom of Mobility	Who usually makes decisions about visits to your family or relatives? □ mainly you □ mainly your husband □ you and your husband jointly □ someone else	Respondent does not take part in decision **> No freedom of mobility (0)** Respondent takes part in decision **> Freedom of mobility (1)**
2.	Household Autonomy	Who usually makes decisions about health care for yourself? Options as above Who usually makes decisions about making major household purchases? Options as above	Respondent doesn't take part in both decisions or either of decision **> No household autonomy (0)** Respondent takes part in both decisions **> Household autonomy (1)**
3.	Attitude Towards Domestic Violence	In your opinion, is a husband justified in hitting or beating his wife in the following situations**:** if wife goes out without telling husband; if wife neglects the children; if wife argues with husband; if wife refuses to have sex with husband; if wife doesn't cook food properly	Respondent thinks it is justified in some/all cases **> Supports domestic violence (0)** Respondent thinks it is justified in no case **> Against domestic violence (1)**
4.	Financial Autonomy	Who decides how the money you earn will be used? Options as above Who decides how your husband's earnings will be used? Options as above	Respondent doesn't take part in any decision **-> No financial autonomy (0)** Respondent takes part in either one or both decisions **-> Financial autonomy (1)**

Source: Based on Gupta and Yesudian, 2006