Women's Education and Child Stunting Reduction in India

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Women’s Education and Child Stunting Reduction in India

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In spite of India’s healthy economic growth during the last two decades, about 40 percent of all children in India today are stunted. Though the problem has received widespread attention in the public health literature on stunting in India, very few studies have attempted to explicitly account for the progressive stages of stunting among children. The purpose of this study was to examine the effects women’s education on various levels of stunting among Indian children. Data from the National Family Health Survey (2005–2006) was used to test three separate models of stunting with selected determinants of women’s capabilities and variables controlling for several environmental factors related to stunting. Generalized ordinal regression method was employed to analyze the data. Factors such as availability of diverse sources of water, increases in mother’s level of education, age at first birth, wealth status and urban residence significantly reduced the odds of being stunted.

Keywords: stunting, mother’s education, environmental factors, structural correlates
Introduction

The extent of malnutrition among children in India entering into the twenty-first century was referred to as a matter of national shame by political elites and human right workers as nearly 42 percent of children below five years of age were found stunted (Measham & Chatterjee, 1999). Stunting refers to inadequate growth and development that children suffer from due to dietary insufficiency, infections, and poor psychosocial stimulation. The percentage of Indian children below age 5 who suffer from stunting is almost 20 times the percentage of stunted children in a standard well-nourished population of children. According to the World Health Organization (WHO), nearly 165 million children under age 5 are stunted (de Onis, 2013). By age 5 or 6 when children enroll in primary schools in India, they have already been long exposed to the risk of stunting. Prior studies suggest that there is a direct link between childhood stunting and lower test scores, loss of economic productivity, reduction of schooling, and increased risk of degenerative disease, such as diabetes (Chambers & von Medeazza, 2014; Chang, Walker, Grantham-McGregor, & Powell, 2002).

The objective of this paper is to examine the role of selected determinants on various levels of stunting. Research on stunting has extensively focused on the presence or absence of stunting among children (Bartlett, 2003; Buzigi, 2018; Muhoozi, Atukunda, Mwadime, Iversen, & Westerberg, 2016). However, stunting levels may either worsen or improve depending on the impact of proximate determinants that precipitate the onset of stunting. These determinants may offer differing degrees of protection from the onset to severe through moderate levels of stunting. Though the immediate determinants are well known, prior studies on the impact of widely recognized factors on various levels of stunting (such as low, moderate and severe) are few and far between (Phuka et al., 2008; Stevens et al., 2012; Tiwari, Ausman, & Agho, 2014). Identifying determinants that offer protection against children suffering from stunting is of immediate importance to policy makers, particularly in regards to allocation of resources to stunting intervention programs and projects.
Literature Review

Literature on childhood stunting in India has focused on three dimensions—nutritional deficiencies, environmental factors, and socio-economic determinants. Bhutta et al. (2008) reviewed a number of studies on interventions targeted at yielding nutrition-related outcomes among children. They found that interventions designed to improve nutrition could significantly reduce child stunting and also child mortality between birth and 36 months. Furthermore, they argue that about a fifth of the existing burden of stunting could be prevented through improvements in nutrition and iodine uptake, brought about by expanding community engagement and delivery strategies necessary to reach populations at greatest risk of stunting (Bhutta et al., 2013). Behavioral changes leading to improved nutritional intake play a key role in improving the efficacy of nutritional interventions. Fabrizio, van Liere, and Pelto (2014) found that nutritional interventions that effectively identify cultural barriers and enablers to optimal feeding practices as well as assess intermediary behavior changes are essential to bring about changes with respect to adequate consumption of nutrition.

Large-scale nutrition-sensitive programs that enhance the coverage and effectiveness of nutrition-specific interventions will require investments to boost agricultural production, while at the same time keeping prices low and increasing incomes (Ruel, Alderman, & Maternal and Child Nutrition Study Group, 2013). Improving women’s education and maternal health also appears to play a significant role in stunting prevention. Espo et al. (2002) found that maternal short stature and small birth size significantly increased the likelihood of stunting. Other variables independently associated with severe stunting include inappropriate complementary feeding, high morbidity, male gender, and home delivery. SES variables also play a crucial role in infantile growth faltering, leading to stunting (Jones et al., 2008). A cross-national multi-factorial study (Smith & Hadad, 2015) which examined the role of income growth found that in addition to income growth, other factors such as women’s education, and gender equality significantly influenced the prevalence as well the severity of stunting in most developing countries. There is also some evidence that household connections of water supply and
higher levels of community coverage for sanitation significantly influence childhood stunting (Wolf et al., 2018).

A comprehensive study (Kim, Mejia-Guevara, Corsi, Aguayo, & Subramanian, 2017) of child stunting in South Asia identified 13 significant correlates, namely complementary feeding, breastfeeding, feeding frequency, dietary diversity, maternal height, body mass index (BMI), education, age at marriage, child vaccination, access to improved drinking source, sanitation facilities, household indoor air quality, and household wealth. Broadly, these correlates relate to socioeconomic conditions and nutritional deficiencies. One major drawback of existing studies is that they assume stable household environmental conditions in which child-feeding practices remain unaltered, regardless of children’s nutritional intake requirements for physical and mental growth. It is not known if the effects of the selected set of determinants of childhood stunting remain the same across low, medium, and high levels of stunting. Changes in the effects of factors call for appropriate changes in stunting intervention strategies.

Most studies attempt to isolate factors that differentiate the stunted from those not stunted (Pande, 2003). However, one weakness of this approach is that it subsumes various levels of stunting, such as extremely stunted under the broad category of the stunted (Crookston et al., 2010). Consequently, the effect of the selected variables in the models of stunting is expected to be similar for the stunted as well as the extremely stunted. Very few studies have evaluated the empirical validity of this expectation. The purpose of this study is to assess the effect of selected socioeconomic variables on several degrees of stunting and to test vulnerability theory.

**Theoretical Framework**

Vulnerability theory offers an adequate framework to seek explanations for the occurrence of stunting among children (Davis, 2013). Vulnerability is a latent and intrinsic condition that predisposes individuals and groups to varying levels of susceptibility to losses in physical, social, and economic realms (Cutter et al., 2008). In particular, individuals and groups who face several constraints in terms of availability of resources and choices (often because of discrimination and marginalization) are more likely to suffer from loss of health and adequate...
opportunities for growth from very early stages of their lives. In the case of children, individual-level vulnerabilities that characterize their caregivers are likely to have both immediate and ongoing effects on the likelihood of stunting among children. Vulnerability theories of stunting focus on ecological, social, and cultural aspects of stunting. Of the three, the ecological aspect has recently emerged as a leading explanation of stunting among children in India. Spears, Ghosh, and Cumming (2013) find that the lack of toilets, combined with inadequate availability of clean water, facilitates fecal transmission of parasites in the child’s nutrients, resulting in stunting.

The social theories of stunting have focused on various aspects of maternal vulnerabilities (Som, Pal, & Bharati, 2007) with repercussions for children’s health. Becker (1981) presents three types of inputs necessary for child health: quality and quantity of child’s nutritional intake, level of accessibility and availability of health care systems, and the quality and quantity of mother’s time devoted to child care. The extent of the mother’s inputs is determined by her socioeconomic and demographic characteristics. More specifically, the mother’s characteristics are grouped into three socioeconomic variables: mother’s education, wealth status, and age at motherhood, which are found to be significantly associated with the level of stunting among children in India.

Among the three mother’s characteristics of substantive interest in the model, the one with the strongest empirical support for its association with stunting level is mother’s education. Since women are primarily responsible for children’s well-being in Indian households, women’s capacity to make intra-household resource allocation decisions plays a crucial role in preventing child malnutrition. Women’s capacity to make nutrition-related decisions is positively associated with their educational level (Imai, Annim, Kulkarni, & Gaiha, 2014; Ishwarji et al., 2018; Menon, Headey, Avula, & Nguyen, 2018; Panigrahi, Das, & Sahoo, 2018). Level of stunting is found to decrease with an increase in years of a mother’s education.

A second characteristic of interest is mother’s age at first birth, which affects young women’s opportunities to not only achieve physical maturity but also to learn parenting skills (Finlay, Özaltin, & Canning, 2011; Raj et al., 2010; Reynolds, Wong & Tucker, 2006; Tiwari et al., 2014; Villar & Belizán, 1982).
A third characteristic, wealth status of the household, is also associated with likelihood of stunting. One of the most common explanations of malnutrition in India is poverty and low per capita income. Studies show that stunting levels decrease considerably with increases in mother’s wealth (Kumar, Kumari, & Singh, 2014).

Cultural theories, on the other hand, have underscored the importance of religion on stunting levels in India (Sabharwal, 2011). Religious institutions exert significant influence on several aspects of growth from birth to death (Brainerd & Menon, 2015; Purohit, Sahu, & Godale, 2017; Yadav, Ladusingh, & Gayawan, 2015). In India, there exists considerable difference in stunting levels among children between Hindus and Muslims during early childhood (Brainerd & Menon, 2015). These differences have been associated with religious beliefs with regard to feeding practices during early childhood. However, very few studies have assessed the effectiveness of all three theories on various levels of stunting in India. This study focuses on the importance of a mother’s characteristics on stunting levels while considering both ecological and cultural variables.

**Control Variables**

Perhaps one of the most important cultural variables related to stunting levels in India is religion (Brainerd & Menon, 2015). Other variables related to the ecological and the cultural aspects of stunting—place of residence (urban or rural), source of water supply, type of toilet facility in use, and availability of electricity—are used as controls in this study. Mothers living in urban places are less likely to have stunted children than rural mothers, owing to availability of prenatal care and information on child nutrition (Chambers & von Medeazza, 2014). The availability of electricity facilitates efficient use of resources necessary for childcare and improved child growth (Das, 2015). The major sources of water supply are pipe water, tube, well, and others. Of the four sources of water supply, pipe water is more accessible and stable than other sources of water supply. The availability of pipe water reduces the likelihood of stunting by improving sanitary conditions in the household (Maitra, Rammohan, Ray & Robitaille, 2013). The type of toilet facility
is also strongly associated with the level of sanitary conditions (Das, 2015).

Methods

Measurement

Stunting scores are computed using the WHO age- and gender-specific standards for height by age (de Onis & Blössner, 1997). The height by age status is measured in standard deviation units from the median of the reference population as recommended by the World Health Organization. A test of normality of stunting scores found scant support. As a remedy for non-normality, the dependent variable, stunting scores, was divided into four categories. Children with stunting scores less than -3 SD were labeled “severely stunted;” those with scores between -3 SD and -2 SD were labeled “moderately stunted;” those between -2 SD and -1 SD were labeled “mildly stunted;” and the rest were labeled “not stunted.” These four categories were further coded 1, 2, 3, and 4, respectively.

Mother’s education is measured as the number of years of schooling. The variable was dichotomized by coding less than 8 years of education as 0 and the rest as 1. Wealth status is a standardized measure of all household assets. The variable was divided into five different groups measured at the ordinal level. The five levels were poorest, poorer, middle, richer, and richest, coded 1, 2, 3, 4, and 5, respectively. More specifically, the poorest category was coded 1, the poorer category coded 2, and those in middle, richer, and richest categories coded 3, 4 and 5 respectively. Mother’s age at first birth measured in years was recoded into five categories. Less than 16 years was coded as 1, 17 to 19 years was coded as 2, 20 years to 22 was coded as 3, 23 years to 25 was coded as 4, and later than 25 years was coded as 5.

The rest of the variables were coded as follows: Two categories of place of residence, urban and rural, were coded 0 and 1. All sources of water other than pipe and tube were coded as 1 and the rest 0. Two types of toilet facilities, pit and flush were dummy coded. Two dummy variables were created; pit toilet was coded 1 and the rest coded 0; flush toilets were coded 1 and the rest coded 0. The reference category is all other types of toilets, other than pit and flush toilets. Electricity availability was coded as a dummy variable with “household has no availability of electricity” coded...
0 and the rest coded 1. Five religious groups; Hindu, Muslim, Christian, Sikh, and others, were measured nominally with those subscribing to Hinduism coded 1 and the rest 0.

Data

Data from the Third National Family Health Survey (NFHS-3) of India were used in this study (International Institute for Population Sciences, 2007). The survey was commissioned by the Ministry of Health and Family Welfare, an agency of the government of India. This survey was conducted in all states of India during 2005–2006 and is the most recent survey available that is representative of households in India. The survey was administered verbally via questionnaires to male and female respondents separately. However, since our study is focused on examining the role of mother’s education, among other characteristics, we selected only the female sample for this study. The survey included responses of 131,596 women, aged 15–49 years, producing a response rate of 95%. This study uses a subsample of households (N = 17,239) with a live child between the ages of approximately 2 and 5. The survey reports information about nutritional levels of children in the household.

Analysis

The multivariate regression method provides an appropriate strategy to examine the effects of selected determinants on stunting scores. Given that stunting scores are measured at the ordinal level, ordinal regression method is most suitable. However, one of the assumptions underlying ordinal logistic regressions is that location parameters (slope coefficients) of each of the variables is the same across all four categories of stunting. A test of this assumption of parallelism was not supported, as shown in Table 1.

In the absence of the support for the parallelism assumption, multinomial regression models have been used as an analysis strategy. However, a more recent approach, generalized ordinal logistic regression (GOLR), yields a far more parsimonious model than the multinomial model while adjusting for the violation of parallelism hypothesis (Fu, 1999).
Table 1. Test of Parallel Lines

<table>
<thead>
<tr>
<th>Model</th>
<th>-2 Log Likelihood</th>
<th>Chi square (df)</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Null:</td>
<td>9106.44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General/Full</td>
<td>8947.45</td>
<td>158.99 (38)</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Results**

The results from the GOLR approach are presented in Table 2 and in Figure 1. In assessing the effect of mother’s education, we examined the role it plays in determining the odds of being in a stunting level beyond a selected level of stunting. The level of stunting is measured at the ordinal level. Consequently, three comparisons—no stunting versus the rest of the stunting categories; no stunting and mild stunting versus the rest; and finally, no stunting, mild, and moderate versus severe stunting—were made in terms of the odds of a selected stunting category compared with the odds of being in categories at a higher level.

Women with more than 8 years of education had lower odds of their children being in any of the categories ranging from mild to severe. The odds for children of women with 8 or more years of education being in any of the stunting categories is about .77 times the odds for women with less than 8 years of education. In general, a higher level of mother’s education decreases the odds of their children’s being in any of the stunting categories, mild, moderate, or severe.

At higher levels of wealth status, the odds of being stunted are less than at lower wealth status levels. The odds of being stunted decreases by about 15% with every unit increase in wealth status. The odds of suffering from either moderate or severe stunting compared with mild or no stunting decreases by about 23% with unit increases in wealth status. A similar decrease characterizes the odds of being in the severe stunting category compared with lower levels of stunting in the presence of improvement in wealth status. Thus, wealth status is indeed negatively related to stunting status, as expected.

The odds for children of women at higher age at first birth being in any of the stunting categories is about .75 times the
Table 2. Generalized Ordinal Regression of Stunting Status on Selected Determinants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Y &gt; 1 Vs. Y &lt;=1</th>
<th></th>
<th>Y &gt; 2 Vs. Y &lt;=2</th>
<th></th>
<th>Y &gt; 3 Vs. Y &lt;=3</th>
<th></th>
<th>Values/Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Odds Ratio</td>
<td>Std.Error</td>
<td>Odds Ratio</td>
<td>Std.Error</td>
<td>Odds Ratio</td>
<td>Std.Error</td>
<td>Coded 1 or 0 for Others</td>
</tr>
<tr>
<td>Mother’s Education</td>
<td>0.778*</td>
<td>0.0513</td>
<td>0.649*</td>
<td>0.030</td>
<td>0.473*</td>
<td>0.041</td>
<td>1=6 or more years of education/39.50</td>
</tr>
<tr>
<td>Wealth status</td>
<td>0.846*</td>
<td>0.030</td>
<td>0.777*</td>
<td>0.018</td>
<td>0.763*</td>
<td>0.029</td>
<td>Range: 1 to 5(mean=3.28)</td>
</tr>
<tr>
<td>Mother’s age</td>
<td>0.748*</td>
<td>0.042</td>
<td>0.773*</td>
<td>0.031</td>
<td>0.910</td>
<td>0.061</td>
<td>1=20 years or older/40.18</td>
</tr>
<tr>
<td>Place of residency</td>
<td>1.068</td>
<td>0.068</td>
<td>0.855*</td>
<td>0.040</td>
<td>0.719*</td>
<td>0.056</td>
<td>1=Urban/57.74</td>
</tr>
<tr>
<td>Other Sources of water</td>
<td>0.663*</td>
<td>0.058</td>
<td>0.765*</td>
<td>0.053</td>
<td>0.850</td>
<td>0.099</td>
<td>1=Other sources of water/12.36</td>
</tr>
<tr>
<td>Pit toilet</td>
<td>1.005</td>
<td>0.107</td>
<td>0.738*</td>
<td>0.052</td>
<td>0.615*</td>
<td>0.075</td>
<td>1=Pit toilet in use/8.98</td>
</tr>
<tr>
<td>Flush toilet</td>
<td>0.856</td>
<td>0.073</td>
<td>0.841*</td>
<td>0.049</td>
<td>0.918</td>
<td>0.085</td>
<td>1=Flush toilet in use/48.76</td>
</tr>
<tr>
<td>Electricity</td>
<td>0.872</td>
<td>0.079</td>
<td>0.861*</td>
<td>0.047</td>
<td>0.777*</td>
<td>0.061</td>
<td>1=Electricity available/78.84</td>
</tr>
<tr>
<td>Hindu religion</td>
<td>1.183*</td>
<td>0.088</td>
<td>0.966</td>
<td>0.057</td>
<td>0.796*</td>
<td>0.077</td>
<td>1=Hindu/72.76</td>
</tr>
<tr>
<td>Muslim religion</td>
<td>1.319*</td>
<td>0.134</td>
<td>1.213*</td>
<td>0.089</td>
<td>0.892</td>
<td>0.103</td>
<td>1=Muslim/14.47</td>
</tr>
<tr>
<td>_cons</td>
<td>23.740*</td>
<td>4.583</td>
<td>7.303*</td>
<td>1.0175</td>
<td>2.017*</td>
<td>0.454</td>
<td></td>
</tr>
</tbody>
</table>

odds of stunting among children born to women at lower age at first birth. At the next higher level of stunting, children’s odds of suffering from moderate to severe levels of stunting compared with mild or no stunting is about 23% lower among children born to mothers at older ages than lower. Increases in levels of parenting and nurturing skills that accompany delays in the transition to motherhood have significant effects on reducing the odds of suffering from stunting. Unlike both wealth status and mother’s education, the influence of mother’s age at first birth is confined primarily to the early degrees of stunting.

The fourth determinant, a control variable, in the proposed model of stunting in India was “place of residence.” It was expected that children in urban areas would experience lower levels of stunting than rural children. Our results suggest urban children had lower odds of suffering from either moderate or severe stunting than children from rural areas.

Though a high proportion of the households, nearly 40%, have access to pipe water, the odds of being “not stunted” is significantly higher among households with water supply sources other than pipe or tube water. We found that accessibility to flush toilets plays a limited role in decreasing the risk of being in either mildly or severe stunting group. Most households, nearly 78%, had electricity available. Electricity availability reduces the odds of being moderately or severely “stunted.” Religious differences did significantly affect the odds of being “not stunted.” Both Hindu and Muslim children were more likely to be stunted compared with non-Hindu and non-Muslim children. Muslim children were more likely to be in the “moderately” stunting category compared to Hindu children and to share similar odds of being in the “severely” stunted category with non-Hindu and non-Muslim mothers.

Four determinants—availability of sources of water supply other than pipe and tube, increases in mother’s level of education, age at first birth, wealth status—and urban residence significantly reduced the odds of being stunted. The effect of urban residence was significant for the moderate and severe stunting categories. Net of other factors, being either a Hindu or Muslim compared to the rest increased the stunting odds. In comparing the moderately and severely stunted with the rest, a large proportion of our selected determinants emerged playing a significant role in reducing stunting levels. Increases in mother’s education, age at first birth,
and wealth status significantly reduced the odds of moderate levels of stunting. Along with the three mother’s characteristics, public infrastructural variables—availability of water supply sources other than pipe and tube, pit and flush toilet facilities, electricity, and urban residence—reduced the odds of suffering from a moderate level of stunting. Muslims had higher odds of moderate stunting than the rest. The same set of variables (except age of the mother at first birth, sources of water supply other than pipe and tube, and availability of flush toilets) continued to carry over their significant role in reducing the odds of severe stunting. Surprisingly, Hindu children were less likely to be severely stunted than the children in the reference population.

Among all the determinants considered, mother’s education plays a significant and persistent role in reducing the odds at any of the three states of stunting. Among the three characteristics of the mother considered for their influence on all three states of stunting (mild, moderate, and severe), mother’s education had, in general, a stronger effect than the rest. A similar role, though much less strong, is played by mother’s wealth status. These two are the only determinants in our selected set to significantly reduce the odds of stunting across all three stunting states. Availability of pit toilets, water supply sources other than pipe and tube, older age at first birth, and availability of electricity reduced the odds of later states of stunting, moderate and severe. Other than the two mother’s characteristics, educational level and wealth status, the only other variable that reduced the odds at moderate and severe levels of stunting was urban residence. Our results clearly demonstrate the worthwhile role played by mother’s education in not only preventing the likelihood of ever being stunted, but also its effectiveness in preventing severe stunting. Educating women and investing in public infrastructure appear to be effective in preventing the odds of stunting among Indian children.

Conclusion and Discussion

A cursory view of stunting globally suggests that the problem of stunting in India is massive, accounting for more than half of all stunted children in the world. Our study found that mothers’ characteristics, such as education, wealth status, and age at first birth, have significant effects on reducing the
level of stunting. Mother’s capacity to make intra-household allocations for safeguarding children’s adequate nutritional intake is crucial for the success of prevention programs against stunting. Policies that directly help mothers to improve their social status through gradual increases in their wealth and educational levels are more likely to reduce stunting than programs that neglect the family context. Mothers with a high level of education are more likely to be aware of sanitary practices at the household level and also to improve children’s nutrition within the limits of available monetary resources.

In general, selected variables in our model of stunting, including the ecological variables related to vulnerability, were far more significantly associated with the mild and moderate states of stunting than with the severe state. The inconsistent effects of variables other than mother’s characteristics across the four levels of stunting suggest that it is appropriate to focus on each of the three states as an outcome instead of linking the three states together as a continuum of change from severely stunted to stunted. Both moderate and severe stages of stunting are likely to be characterized by disabilities and shortcomings which may only weakly manifest during the first stage of mild stunting (Kamal, 2011). The dissimilar effects of selected determinants on various stages of stunting as presented in this study underscore the importance of recognizing the various stages of stunting for both future research as well as policy formulation. Investing in women’s education programs should find priority in stunting prevention programs in India. These initiatives should be accompanied by public health programs in sanitation, water supply, and toilet facilities. From a policy point of view, it is necessary initially to design a variety of interventions that target various levels of stunting, rather than relying only on a limited set of interventions that prevent the odds of being in the first stage of stunting.

The strength-based approaches in public health are particularly useful for the purpose of educating mothers. All too often, mothers are blamed for their stunted children, and most intervention programs put forth to solve the stunting problem view mothers as deficient in the knowledge and skills necessary to prevent stunting. A public health approach to stunting, in contrast to this blaming perspective, would advocate for preserving the health of the mother and the child
as an integrated system rather than independent identities (Seipel, 1999).

Given the important role the mother plays in reducing the incidence of stunting, social workers and public health workers should advocate for stunting-prevention policies that preserve and promote the health and well-being of mother and the child in unison. Seipel (1999) identifies specific strategies for the eradication of stunting among children and argues that provision of information is the first step in the making of policies for prevention and eradication of malnutrition. A second strategy involves the infusion of a human rights perspective in tackling issues of stunting. A human rights approach to improve women's status, along with provision of information on child health, is central to policies for stunting prevention (Wollo, 2005).

Social workers have a crucial role to play in advocating for development of policies and legislation for the eradication of childhood stunting. Social workers as advocates may also help network various non-governmental agencies involved in child development and child welfare in India. In their role as facilitators, social workers in non-governmental and governmental organizations are crucial to helping parents with the utilization of available social and medical services for the eradication of childhood stunting.

Current Indian governmental policies and programs for eradicating stunting among children fall broadly into two categories. A set of programs in the first category provides both direct as well as ancillary support services. The most prominent among direct interventions to improve child nutrition is the Midday Meal Scheme. A second category of programs is anchored in a set of assumptions that indirectly link stunting with a number of environmental determinants associated with sanitary conditions (Chambers & von Medeazza, 2014; Ghosh, Gupta, & Spears, 2014). Both approaches fail to pay adequate attention to interventions that improve human capital among mothers, improving their capacity to significantly reduce child stunting (Drèze & Khera, 2017; Khera, 2006; Lokshin, Das Gupta, Gragnolati, & Ivaschenko, 2005).

Though we have emphasized the salient contributions of mother's characteristics such as education on reducing levels of stunting among children, our study underscores the
importance of the indirect effects of environmental factors on stunting levels. Furthermore, overall our results support several selected aspects of the vulnerability theory of stunting. Public health workers as partners should be put on an equal footing with several nongovernmental, governmental, and local institutions while advocating and coordinating the community efforts aimed at prevention. The experiences acquired by public health workers in the forefront of stunting-prevention programs in India may be harnessed to improve the bio-social content of a public health–related curriculum (Shor, 2010).

One important limitation of this study is that we have no data on the role and influence of father/guardians’ characteristics on child stunting status. Even though the data used in this study are a decade old, the extent of child stunting in India appears to have not improved significantly during the last decade (Chanani et al., 2019; Coffey & Spears, 2017).

References


