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Determinants of Malnutrition (Stunting) Among Rural Farming Households: Evidences from Rural Areas of District Doda, Jammu & Kashmir

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Abstract

Background: The nutritional status of school-going children is an indicator of a country's health status. Malnutrition especially child under nutrition is a major health problem affecting the development of the children in many developing countries of the world. It continues to be the principal cause of ill-health and pre-mature mortality and morbidity among children.

Objectives: To assess the nutritional status and its determinants among 6-14 years old school going children of farming households in district Doda of Jammu and Kashmir, India.

Methods: The present study was conducted in district Doda of Jammu & Kashmir to assess the nutritional status of 182 school going children (6-14 years) among farming households. Nutritional status of the children was assessed in terms of anthropometric measurement. Height for age (HAZ) of the sample subjects were calculated and compared with WHO-2007 reference standard. Data were entered and analyzed using statistical software epi info 7 and Anthro Plus.

Results: Results indicate that out of the total children screened (N=182), 27.37 percent of male and 27.59 percent of female children were stunted. The main determinants of malnutrition were found to be child's age, religion, castes, parents‟ education mother‟s diet during pregnancy, economic status of the family, nature of house and availability of drinking water and toilet facilities at home.

Conclusion: There is a great need to focus the attention of the policy-makers for intervening in such areas, as nutritional status of children is a main indicator of development and a pre-condition for the society to progress.

Keywords: Undernutrition; Stunting; Determinants of malnutrition, farming households.

1.1 Introduction

Malnutrition especially under nutrition is a major health problem affecting the development of the children in many developing countries of the world. (Smith & Haddad, 1999, Nandy, Michelle, David, Subramaniam & Smith, 2005, Thakur & Gautam, 2014). It continues to be the principal cause of ill-health and pre-mature mortality and morbidity among children of the developing countries. It has been estimated that in 2014, 23.8 percent (159 million) of the children under-five worldwide suffering from the problem of stunting (HAZ) and 7.5 percent (50 million) from wasting (HWZ). Approximately 1 out of every 13 children in the world was wasted in 2014 (UNICEF, WHO & World Bank Group, 2015).

The children of today are the future of tomorrow; this powerful quotation assumes a very special importance in the context of a nation like India as children between the age group of 0-14 comprise one third of the total population in the country (Census, 2011). Despite the fact that India has made an impressive progressive in science, medicine, information technology and a tremendous economic performance, with the gross domestic product (GDP) rising 10.26 per cent in 2010-11 and 5.6 per cent in 2014-15 (Economic Survey, 2014 GoI), human development still reveal an unacceptable situation – contributing to India‟s poor rank of 130 among 188 countries on the Human Development Index (HDI) in 2015.

As per NFHS-4 (2015-16), there are variations between the states in each of the anthropometric measure of under nutrition among the children of under five years of age. For example, the prevalence of stunting varied between 19.7 percent in Kerala and 48.3 percent in Bihar, the prevalence of underweight varied between 25.7211.9 percent in Mizoram and 47.8 percent in Jharkhand and the wasting varied between 6.1 percent in Mizoram and 29.0 percent in Jharkhand. The survey further indicated the prevalence of underweight; stunting and wasting among < 5 years in 2015-16 in Jammu & Kashmir were 16.6 percent, 27.4 percent and 12.1 percent respectively. As per another study these rates were, 21.3 percent, 15.5 percent and 13.8 percent respectively

(Yasmeen & Nelofar, 2012). The lack of progress over the past decade and the current high levels of undernourishment have led to India being recognized as having, perhaps, the worst under nutrition problem in the world. This high level of under nutrition in children in the country poses major challenge for child health and development.

Nearly every nation has a serious health problem owing to malnutrition in one of its forms (Global Nutrition Report-2014). The assessment of growth in children is important for monitoring health status, identifying deviation from normality and determining the effectiveness of interventions (WHO-1995). The significance of timely detection of poor growth in early life resides in its association with adverse functional consequences, including poor cognition and educational performance, low adult wages, lost productivity and, when accompanied by excessive weight gain later in childhood increase the risk of nutrition-related chronic diseases (Victoria et al, 2008). Poor health and nutritional status among the school going children may contribute to high rate of school dropout, absenteeism, and poor academic performance (Rausch, 2013. Willaiam F. Tate, 2013). In addition, hungry school children tend to be nervous, irritable, disinterested and unable to fully concentrate in the classroom (Soemantri, Pollitt & Kim, 1985, Kudzai Chinyoka, 2014).

The improved nutrition status helps to break the intergenerational cycle of poverty, enhance labour force performance, income earning, and wage rate, generates broad-based economic growth, provides both a foundation for human development and the scaffolding needed to ensure to reach its full potential, and leads to a lot of positive consequences for individuals, families, communities , and countries. It means that improving the nutrition status of the children can have significant payoffs in terms of generating economic benefits and reducing costs. For example, a study conducted in Brazil in which a sample of more than 3000 individuals tracked over a period of thirty years found that infants who were breastfed longer than 12 months, achieved an additional year of education and higher incomes about three times higher than those with less than 1 month (UNICEF‟s Report 2009). As per the Global Nutrition Report 2014, the scaling up nutrition specific intervention to address undernutrition has a benefit-cost ratio of 60.

There is surprisingly little research on nutritional status of school going children among rural farming households, as most of the studies had stressed on the pre-school children located in urban centers. Perhaps this research vacuum or lack of quantity of literature reflects a need to investigate into the nutritional status of school going children as this age is the age of learning which enhance the efficiency in the later life (Kudzai Chinyoka, 2014, Veugelers & Fitzgerald, 2005. All this motivates to investigate the determinants of malnutrition (stunting) among rural farming households. Using primary data this study makes a modest attempt to answer two questions.

1) The first, what are the incidences of stunting in the area under study.

2) The second, what are the determinants of stunting among children of rural farming households.

Therefore, the purpose of this study was to know the determinants of nutritional status (stunting) among school-going children of farming households in rural areas of district Doda, Jammu and Kashmir.

1.2 Objectives of the Study

The present study was carried out in district Doda of Jammu and Kashmir with the following objectives:

1) To compare the mean height and weight of the school going children of farming households to that of the reference weight and height of children recommended by Indian Counsel of Medical Research (ICMR) as reference data.

2) To know the prevalence of stunting among 6-14 years old school going children of farming households in district Doda.

3) To investigate the determinants of child stunting in the area under study.

1.3 Material and Methods

The purpose of the present study was to assess the prevalence of stunting among school going children of farming households in district Doda of Jammu and Kashmir:

1.3.1 Area under Study: The study was carried out in district Doda of Jammu & Kashmir, India. District Doda lies in the outer Himalayan range in Jammu & Kashmir State. It is located about 175 kilometers from Jammu and about 200 kilometer from Srinagar. It comprised of 7 tehsils, 10 educational zones and 10 CD blocks.

1.3.2 Sample Size: 182 school-going children between the age group of 6-14 years constituted the study subjects for the present study.

1.3.3 Questionnaire: The information regarding anthropometric characteristics of the children and demographic features of the family and mothers were attained through a well designed questionnaire by visiting in schools and houses either from the mothers themselves or any other family member.

1.3.5 Anthropometric Measurement: The present study was based on Anthropometric Assessment (indirect approach[*]) to identify the stunted school aged children. Anthropometry now-a-days has become a practical tool for determining the nutritional status of children (Hakeem, 2004) and the well being of the children is indicated in a best way by the nutritional status globally (Onis M de et. al 2000). For measuring the height of the children a stature meter (height measuring) tape was used.

The z-scores system was used to classify stunting i.e. height for age (stunted) following the internationally accepted cut-off points with reference to WHO 2007 standard. A child who is below minus two standard deviation (-2SD) from the median of a reference population in terms of height-for-age was considered as stunted.

[*] Mainly, there are „two approaches" or levels at which a person"s energy balance can be estimated. One is "Direct Approach" to measure energy intake and/or expenditure directly. The second is „Indirect Approach" which includes the anthropometric and other symptoms which indirectly reflect an inadequate energy balance and the measurable indicators of negative consequences of an unduly low energy balance.

1.3.6 Statistical Analysis

Data was entered and analyzed using statistical software epi info 7(available at www.cdc.gov). Z-scores system was used to assess the nutritional status of the children by using software -WHO Anthro Plus (version v1.0.4) by comparing with WHO reference 2007[†]. Statistical techniques were used to know the significance of determinants and stunting among the school going children of farming households.

1.4 Results and Discussion

A total of 182 school-going children (Male - 93, Female - 89) of farming households were examined in district Doda of Jammu and Kashmir to know their nutritional status and determinants involved there off .

1.4.1 Mean Weight and Height

The mean weight and height of present studied boys and girls were compared with Indian Council of Medical Research (ICMR) reference data shown in Table 1.1. It is evident that the present studied boys and girls have lighter weight and shorter stature than reference population (ICMR).

Table 1.1 Mean Weights and Height of the Children

Age in Years	N = 182	Mean Weight in Kg						Meant Height in CM					
		Boys			Girls			Boys			Girls		
		ICMR	Our Study	Diff.	ICMR	Our Study	Diff.	ICMR	Our Study	Diff.	ICMR	Our Study	Diff.
6	22	20.7	16.0±2.6	4.7	19.5	17.3±2.9	2.2	116.1	107.3±6.2	8.8	114.6	110.2±8.1	4.4
7	27	22.9	20.8±3.2	2.1	21.8	19.6±1.9	2.2	121.7	117.2±7.9	4.5	120.0	115.0±7.5	5.0
8	25	25.3	21.6±2.0	3.7	24.8	20.7±3.4	4.1	127.0	120.9±4.7	6.1	126.4	112.8±.6	13.6
9	34	28.1	24.9±3.5	3.2	28.5	22.9±4.1	5.6	132.2	129.0±10.5	3.2	132.2	126.9±9.2	5.3
10	37	31.4	27.8±5.1	3.6	32.5	27.1±7.3	5.4	137.5	132.9±7.7	4.6	138.3	132.8±8.6	5.5
11	12	32.2	25.8±5.5	6.4	33.7	28.2±7.4	5.5	140.0	131.7±12.8	8.3	142.0	128.8±4.5	13.2
12	12	37.0	27.6±0.5	9.4	38.7	34.7±5.2	4.0	147.0	136.6±2.1	10.4	148.0	143.1±6.1	4.9
13	8	40.9	38.0±1.4	2.9	44.0	36.5±11.2	7.5	153.0	148.0±2.8	5.0	150.0	148.5±7.1	1.5
14	5	47.0	40.5±5.2	6.5	48.0	35.0±0.0	13	160.0	152.3±10.5	7.7	155.0	143.1±0.0	11.9

Source: Primary Survey Data, 2016, Values are given as mean ± SD

[†] The WHO Reference 2007 is a reconstruction of the 1977 National Center for Health Statistics (NCHS)/WHO reference. It uses the original NCHS data set supplemented with data from the WHO child growth standards sample for under-fives. To develop this reference the same statistical methodology was used as in the construction of the WHO standards for school aged children and adolescent to monitor the nutritional status of children aged 5-19 years.

It was observed in the present study that in the early ages the differences in the weight of children was less but after 10 year of age; it started widening. The highest difference in mean weight was found 9.4 kg for boys of 11 year of age and 7.5 kg for girls in 13 year of age.

Table 1.2. Determinants of Nutritional Status of the Children (Stunting HAZ)

Variable		N=182	Normal	Stunted (HAZ)	χ^2
Gender					
	Male	93	67 (72.63)	26 (27.37)	$\chi^2 = 0.001081$*
	Female	89	63 (72.41)	26 (27.59)	
Age of the Child (years)					
	6	22	16 (72.72)	6 (27.28)	$\chi^2 = 67.95174$ P < 0.01
	7	27	23 (85.19)	4 (14.81)	
	8	25	17 (68.00)	8 (32.00)	
	9	34	22 (64.71)	12 (35.29)	
	10	37	29(78.38)	8 (21.62)	
	11	12	3 (25.00)	9 (75.00)	
	12	12	9 (75.00)	3 (25.00)	
	13	08	7 (87.50)	1 (12.50)	
	14	05	4 (75.00)	1 (25.00)	
Religion of the child					
	Hindu	125	81 (64.80)	44 (35.20)	$\chi^2 = 9.100766$ P < 0.05
	Muslim	57	49 (85.96)	8 (14.04)	
Social Caste of the child					
	GEN	123	94 (76.42)	29 (23.58)	χ^2 =6.4845 P < 0.10
	SC	41	23 (56.10)	18 (43.90)	
	ST	15	12 (80.00)	3(20.00)	
	OBCs	3	2 (66.67)	1 (33.33)	
Birth Order of the child					
	1st	48	29 (60.42)	19 (39.58)	$\chi^2 = 5.771$*
	2nd	44	34 (77.27)	10 (22.73)	
	3rd	46	36 (78.26)	10 (21.74)	
	4th	18	15 (83.33)	3 (16.67)	
	≥ 5th	26	16 (61.54)	10 (38.46)	
Mother's Education					
	Illiterate	137	91 (66.42)	46 (33.58)	$\chi^2 = 6.8018$ P < 0.05
	Literate	45	39 (86.67)	6 (13.33)	
Father's Education					
	Illiterate	72	44 (61.11)	28 (38.89)	$\chi^2 = 6.21373$ P < 0.05
	Literate	110	86 (78.18)	24 (21.82)	
Mother's Diet during Pregnancy					
	Normal	56	50 (89.29)	6 (10.71)	$\chi^2 = 13.36585$ P < 0.01
	Inadequate	126	80 (63.49)	46 (36.51)	
Economic Status of the Family					
	Anthodia	14	7 (50.00)	7 (50.00)	$\chi^2 = 6.679814$ P < 0.05
	BPL	108	74 (68.52)	34 (31.48)	
	APL	60	49 (81.67)	11 (18.33)	
Land Owned by the Family					
	≤ 3 Kanal	19	11 (57.89)	8 (42.11)	$\chi^2 = 1.879906$*
	4 – 8 Kanal	72	54 (75.00)	18 (25.00)	
	9 – 12 Kanal	73	51 (69.86)	22 (30.14)	
	≥ 12 Kanal	18	14 (77.78)	4 (22.22)	
Type of Family					
	Nuclear Family	163	117 (71.78)	46 (28.22)	$\chi^2 = 0.000934$*
	Joint Family	19	13 (68.42)	6 (31.58)	
Nature of House					
	Pucca	20	16 (80.00)	4 (20.00)	$\chi^2 = 9.789011$ P < 0.01
	Semi-Kachcha	38	34 (89.47)	4 (10.53)	
	Kachcha	124	80 (64.52)	44 (35.48)	
Availability of Drinking Water facility at Home					
	Yes	165	121 (73.33)	44 (26.67)	$\chi^2 = 3.610271$ P < 0.10
	No	17	9 (52.94)	8 (47.06)	
Availability of Toilet facility at Home					
	Yes	68	43 (63.23)	25 (36.76)	$\chi^2 = 7.615954$ P < 0.01
	No	144	117 (81.25)	27 (18.75)	
Source: Primary survey data, 2016, Values in parentheses are in percentages, * Not significant					

Results further revealed that the mean height of boys and girls had increased with age. Lowest heights, 107.3 cm and 110.2 for boys and girls respectively were found for 6 year of age and highest height of 152.3 cm and 148.5 cm for boys and girls were found for 14 year and 13 year respectively.

1.4.2 Prevalence of Stunting (Height-for-age)

Child Stunting (height for age) is the phenomenon of children being too short for their age, which is a measure of profound physical and cognitive underdevelopment. It is a manifestation of child undernutrition, which affects an estimated 165 million children globally and it is believed to be responsible for almost half of all deaths of children under the age of five years (UNICEF and Institute of Development Studies, UK, 2014). Stunting among Indian children matters; shorter children are at disadvantaged. The differences in height are strongly associated with cognitive outcomes, productivity and health. Taller Indian children have better cognitive outcomes than shorter Indian children (Diane Coffey et. al 2013).

In India, almost half (48.00 percent) of children less than five years of age are stunted, a manifestation of „chronic undernutrition" (UNICEF, 2014). The rates of decline in stunting varied across states. On the reduction of stunting rates, UNICEF after citing the report on „Maharashtra Stunting " suggested that leadership on child undernutrition reduction is particularly important, given the lack of an institutional home and the multi-sector actions required. When leadership in government and civil society join forces within a reasonably supportive socioeconomic context, as Maharashtra shows, public action can reduce undernutrition fast.

The description of the socioeconomic characteristics of the children and the prevalence of stunting (height for age) is presented at Table 1.2. About 27.59 percent of the female and 27.37 percent of the male children were below the -2 z-scores for height for age (stunting). These results indicate that a large segment of children were suffering from the problem of stunting in the area under study. It was found that the prevalence of stunting in the present study increases with increase in age of the child and the results found significant ($\chi^2 = 25.4515$, df = 8, $p < 0.01$).

About 35.20 percent of the Hindu and 15.04 percent of the Muslim children were suffering from stunting having significant difference (χ^2=9.100766, df=1, p = < 0.05).

A higher prevalence of stunting (43.90 percent) was found among children of Schedule Castes (SCs) and Other Backward Classes (OBCs) (33.33 percent) as compared to General Category (GEN) (23.58 percent), which shows statistically significant difference (χ^2 =6.4845, df = 3, P< 0.10) . Results from Table 1.2 indicated that the prevalence of stunting among children in the present study decreases with the increase in birth orders. As, it was found that in 1st, 2nd, 3rd and 4th birth orders the prevalence of stunting reported were 39.58 percent, 22.73 percent, 21.74 percent and 16.67 percent respectively. The present study provides important insights into the relationship between order of births and stunting among school going children of farming households. The reasons may be that in farming households most of the mothers are engaged in farming activities and less time is available for child to care. But, after 2nd and 3rd birth the 1st one become quite mature to take care of the younger ones to the large extent. The second reason could be that the mothers usually are inexperienced to take care of the child adequately. But after raring 1st one, she

is having enough experience to care the new one in a better way compared to old one. However, no significant difference was found is this regard.

It was thought that risk of being illiterate is inversely related with the level of nutritional status of the children, specially, in rural areas where the education of the parent is a significant factor for the determination of income of the family. In the present study, it was estimated that the prevalence of stunting (33.58 percent) was high among the children of illiterate mothers and fathers (38.89 percent). A significant differences were found among the education of mothers ($\chi^2 = 6.8018$, df = 1, $P < 0.0$), fathers ($\chi^2 = 6.21373$, df = 1, $P < 0.0$) and stunting among children of farming households.

The present study found that children of mothers having inadequate diet during pregnancy were at higher risk of child stunting than the children of mothers having normal diet during pregnancy. It was found that the level of stunting was 36.51 percent among the children of mothers having poor diet compared to 10.71 percent had normal diet during pregnancy. A significant difference was found (($\chi^2 = 13.36585$, df = 1, $P < 0.01$). This was expected, because maternal nutritional status is a proximate determinant of the child‟s nutritional status.

Economic status of the household is one of the important determinants of nutrition status. The present study shows that, as compared with children of Above poverty Line (APL) households (18.33 percent) the risk of being stunted in Anthodia (50.00 percent) and Below Poverty line (BPL) (31.48 percent) was significantly higher ($\chi^2 = 6.679814$, df = 2, $p < 0.05$). This finding of the present study is consistent with Girma W, (2002). This indicates that the economic status of the household is positively associated with household food security, which is a pre-requisite for access to improved nutritional status for the children in the household.

It was found that the prevalence of stunting was not associated with the land owned by the household, as it was found in the present study that 42.11 percent of the children were stunted whose parents‟ owned land less than 3 kanal and on the other hand 30.14 percent of children of parents owning 9 – 12 kanal land were stunted. This finding is consistent with Victoria C.G et al. 1986).

Results further show that the prevalence of child stunting among nuclear families were 28.22 percent compare to 31.58 percent among joint families. The fact behind the result may be that the allocations of resource become less as the number of member increases in the family. However, no significant difference was found in this regard.

Nature of house is also one of the important determinants of child stunting reported in many studies. The present study found that Kachcha houses were associated with higher percentage of child stunting (35.48 percent) compared to Pucca (20.00 percent) and Semi-pucca (10.53 percent) houses. The results were significantly associated ($\chi^2 = 9.789011$, df = 2, $P < 0.01$).

The stunting among children of households with no drinking water and toilet facilities at home were significantly higher as compared with those who have. A significant differences were found in terms of drinking water ($\chi^2 = 3.610271$, df = 1, $p < 0.10$) and toilet facility ($\chi^2 = 7.615954$, df = 1, $p < 0.01$) at homes.

Summary and Conclusions

Undernutrition among children is increasingly recognized as a major prevalent and important public health problem in many developing countries including in India, which has a long-term consequences for the human and economic development (Bisai et al. 2008). Income is the most important and influential determinants of child undernutrition, as greater incomes at household level make it easy to invest more in food consumption, access to clean drinking water, good hygiene and adequate health and child care arrangements (Katoch, 2012).

It was found that besides poverty, there are other socio-economic determinants – (age of the child, religion, parents‟ education, mothers‟ diet during pregnancy, social and economic status of family, nature of house and availability of drinking water and toilet facility at home) that directly or indirectly affect the nutritional status (stunting) of the school-going children among farming households. The present study has shown a higher prevalence of stunting (28.57 percent) among the selected school going children as compared to other studies - NHFS-3, Subramanyam et al. (2011) and Yasmeen & Nelofar, (2012). This is possible due to that the sample drawn from a particular community of farming households having lower socio-economic status and this cannot be compared to the national findings in the same age group.

There is a great need to focus the attention of the leaders and policy-makers for intervening in such areas, as nutritional status of children is a main indicator of development and a pre-condition for the society to progress.

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