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### GROWTH AND FACTORS ASSOCIATED WITH GROWTH FALTERING AMONG CHILDREN AGED UNDER 2 YEARS IN AN URBANIZED VILLAGE OF DELHI

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#### ABSTRACT

**Introduction:** Nutrition in under-five children is cause of concern hence a study was conducted to assess growth, growth faltering and determinants of growth faltering in children under 2 years of age in the current study.

**Material and methods:** A community based cross sectional study was conducted in Aliganj, an urbanized village of South Delhi during the period of December 2014 to May 2016. Children under two years were study participants. Mothers were interviewed using pre tested semi structured questionnaire, growth was assessed using WHO growth charts. Ethical clearance was taken from institute ethics committee. Data was entered into excel and analysed using SPSS. Chi-square was applied. Significance level was taken as  $p < 0.05$ .

**Results:** One fourth of children were underweight, one fifth were stunted and wasted. In this study, out of 210 children studied, 50 (23.8%) children were underweight, 46 (21.9%) were stunted and 37 (17.6%) children were wasted.

**Conclusion:** Improper complementary feeding practices, low socioeconomic status and higher birth order were associated with poor growth and higher literacy rate was associated with good nutrition.

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#### INTRODUCTION:

Stunting is the devastating result of poor nutrition in early childhood. Children suffering from stunting may never grow to their full height and their brains may never develop to their full cognitive potential. UNICEF / WHO / World Bank Group Joint Child Malnutrition Estimates reports that worldwide 154.8 million (22.9%) under 5 children suffered from stunting in 2016. These children begin their lives at a marked disadvantage: they face learning difficulties in school, learn less as adults, and face barriers to participation in their communities. Wasting in children is a result of chronic hunger and disease, leading to weakened immunity, susceptible to long term developmental delays, and face an increased risk of death: they require urgent

treatment and care to survive. In 2016, nearly 52 million (7.7%) under 5 children were wanted and 17 million were wasted<sup>1</sup>. Nearly half of all deaths in children under 5 are attributable to under nutrition. This translates into the unnecessary loss of about 3 million young lives a year.<sup>3</sup> Undernutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery.<sup>2</sup> Developing countries account for a majority of this burden, with 70% of all early childhood mortality and malnutrition concentrated in sub-Saharan Africa and South Asia. Despite setting a goal of reducing malnutrition among under five children by 50% between 1990-2000 at the World Summit for Children, few countries in these

2 regions have been successful in achieving this goal by the end of the decade.<sup>4</sup> As per National Family Health Survey (NFHS 4 fact sheet 2015-16) data, there were 38.4%, 21% and 35.7% children were stunted, wasted and underweight respectively.<sup>4</sup> Nutrition in under five children is cause of concern hence a study was conducted to assess growth, growth faltering and determinants of growth faltering in children under 2 years of age in the current study.

### Material and Methods:

A community based cross sectional study was conducted in Aliganj, an urbanized village of South Delhi during the period of December 2014 to May 2016. It is one of the field practice areas under the Department of Community Medicine, Vardhman Mahavir Medical College & Safdarjung Hospital (VMMC & SJH), New Delhi, India. The study population was all the children under 2 years of age residing in Aliganj area. Mothers who did not give consent, or houses found locked on 2 consecutive visits were excluded from the study. A pretested, semi-structured questionnaire was used and growth was assessed using WHO growth charts. The study was approved by the Institutional Ethical Committee of VMMC & SJH. Voluntary informed consent was taken from the mother/ caregiver of the children. Children who were found to be undernourished or suffering from any ailments were referred to Aliganj UHTC (Urban Health Training Centre) for appropriate management and routine follow up.

Statistical Analysis: The data was collected and entered in MS Excel and analyzed by using SPSS Version 21. Difference between the proportions was analyzed by Chi-square test/ Fisher exact test. Significance level was taken as p value <0.05.

### RESULTS

A total of 210 children less than 2 yrs of age were enrolled in the study. There were 85 girls (40.5%) and 125 boys (59.5%) among the study participants. Majority of the children (123; 58.6%) belonged to the age group of 7 to 18 months; parents of most of the children were literate, belonged to lower middle socio-economic status, and joint family. (Table 1)

**Table 1: Distribution of the study participants according to socio-demographic characteristics (N=210)**

Socio-demographic characteristics	Number (%)
Sex	
Male	125 (59.5)
Female	85 (40.5)
Age (in completed months)	
0-6	32 (15.7)
7-12	62 (29.6)
13-18	62 (29.0)
19-24	54 (25.7)
Father's Education status	
Illiterate	4 (1.9)
Literate	206 (98.1)
Mother's Education status	
Illiterate	29 (13.8)
Literate	181 (86.2)
Socioeconomic status *	
Upper class	2 (1.0)
Upper middle class	52 (24.8)
Lower middle class	90 (42.8)
Upper lower class	66 (31.4)
Family type	
Joint	170 (81)
Nuclear	40 (19)

\* SES by revised Kuppaswamy scale

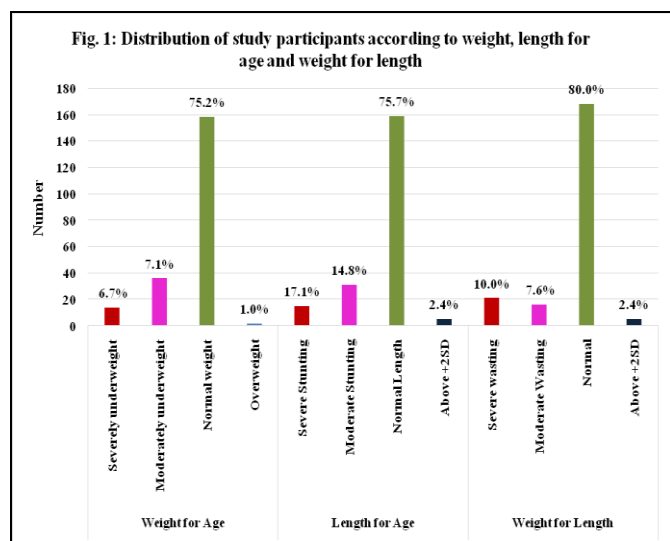
Most of the study participants were full-term (200; 95.2%). The average birth weight of the study subjects was  $2.55 \pm 0.35$  Kg, majority of them (103; 49.0%) were of birth order 2 while only 37 (17.6%) were of birth order of 3 or more. Out of 210 mothers, 196 were able to tell the birth weight of children by recall. Of which 153 (78.1%) had normal birth weight ( $\geq 2.5$  Kg) while 43 (21.9%) had low birth weight ( $<2.5$  Kg) (Table 2).

**Table 2: Distribution of study participants according to Birth History (N=210)**

Birth history	Number (%)
Gestational Age	
< 37 weeks	10 (4.8)
$\geq 37$ weeks	200 (95.2)
Birth order	
1	70 (33.3)
2	103 (49.0)
$\geq 3$	37 (17.6)
Birth Weight (Kg)*	
<2500g	43 (21.9)
$\geq 2500$ g	153 (78.1)

\*Birth weight was known for 196 children

Out of 210 children studied, 50 (23.8%) children were underweight, 46 (21.9%) were stunted and 37 (17.6%) children were wasted (Figure 1).



Higher proportion of underweight children (12; 37.5%.  $p = 0.056$ ) and wasted children (10; 31.2%,  $p = 0.044$ ) were seen in 0-6 month age group, while those of age group of 19-24 months had significantly higher proportion of stunting (19; 35.2%  $p < 0.001$ ) indicating chronic effect of under nutrition on length for age. Boys had significantly higher prevalence of stunting as compared to girls (34; 27.2% Vs 12; 14.1%,  $p = 0.024$ ). Boys also had higher prevalence of underweight (29; 58% Vs 21; 42.0,  $p$  value= 0.801) and wasting (23; 18.4% Vs 14; 16.5%,  $p = 0.719$ ), though not found to be statistically significant. Increasing education of mothers was associated with decreasing prevalence of underweight, stunting and wasting, though it was not statistically significant ( $p = 0.129, 0.434, 0.685$  respectively). Education of the father was not found to be associated with underweight, stunting and wasting. Higher prevalence of stunted children was found in upper socioeconomic status (1; 50.0%,  $p$  value =0.034) but the number was too less in this category (Table 3).

Wasting was found significantly associated with children born with gestational age less than 37 weeks (preterm) as compared to those born at more than 37 weeks (5; 50.0%, Vs 32; 16.0%,  $p = 0.016$ ). Higher prevalence of underweight was seen among preterm as compared to those born at more than 37 weeks though not significant (4; 40.0% Vs 46; 23.0,  $p$  value= 0.254).

**Table 3: Association of socio-demographic factors of study participants with underweight, stunting and wasting (N=210)**

Socio-demographic factors	Underweight		Stunting		Wasting	
	n (%)	p value	n (%)	p value	n (%)	p value
<b>Age</b>						
0-6 (n=32)	12 (37.5)	0.056 <sup>^</sup>	1 (3.1)	<0.001 <sup>^</sup>	10 (31.2)	0.044 <sup>^</sup>
7-12 (n=62)	9 (14.5)		7 (11.3)		12 (19.4)	
13-18 (n=62)	18 (29.0)		19 (30.6)		11 (17.7)	
19-24 (n=54)	11 (20.4)		19 (35.2)		4 (7.4)	
<b>Sex</b>						
Male (n=125)	29 (58.0)	0.801 <sup>^</sup>	34 (27.2)	0.024 <sup>^</sup>	23 (18.4)	0.719 <sup>^</sup>
Female (n=85)	21 (42.0)		12 (14.1)		14 (16.5)	
<b>Education of mother</b>						
Illiterate (n=29)	7 (24.1)	0.129 <sup>^</sup>	6 (20.7)	0.434 <sup>^</sup>	3 (10.3)	0.685 <sup>*</sup>
Primary (n=54)	20 (37.0)		16 (27.8)		11 (20.4)	
Middle (n=32)	7 (21.9)		9 (28.1)		8 (25.0)	
High school (n=32)	7 (21.9)		5 (15.6)		6 (18.8)	
Intermediate (n=47)	7 (14.9)		8 (17.0)		7 (14.9)	
Graduate & post graduate (n=16)	2 (12.5)		2 (13.3)		2 (12.5)	
<b>Education of father</b>						
Illiterate (n=4)	2 (50.0)	0.390 <sup>^</sup>	0 (0.0)	0.284 <sup>^</sup>	1 (25.0)	0.707 <sup>^</sup>
Primary school (n=31)	10 (32.3)		9 (29.0)		3 (9.7)	
Middle school (n=41)	10 (24.4)		9 (22.0)		7 (17.1)	
High school (n=39)	10 (25.6)		12 (30.8)		9 (23.1)	
Intermediate (11th & 12th) (n=59)	9 (15.3)		8 (13.6)		12 (20.3)	
Graduate & post graduate (n=36)	9 (25.0)		8 (22.2)		5 (13.9)	
<b>Socioeconomic status</b>						
Upper (n=2)	1 (50.0)	0.213 <sup>*</sup>	1 (50.0)	0.034 <sup>*</sup>	0 (0.0)	0.896 <sup>*</sup>
Upper middle (n=52)	11 (21.2)		14 (26.9)		8 (15.4)	
Lower middle (n=90)	17 (18.9)		12 (13.3)		16 (17.8)	
Lower (n=66)	21 (31.8)		19 (27.3)		13 (19.7)	

\*Fisher exact test, <sup>^</sup>Chi square test

A significant association of underweight and LBW was observed (16; 37.2%,  $p = 0.036$ ). Birth order of 3 or more was found to be significantly associated with being underweight (14; 37.8%,  $p = 0.040$ ) and marginally significant with stunting (11; 29.7%,  $p = 0.069$ ) as compared with birth order one and two (Table 4).

**Table 4: Association of Birth history of study participants with underweight, stunting and wasting (N=210)**

Birth History	Underweight		Stunting		Wasting	
	n (%)	p value	n (%)	p value	n (%)	p value
<b>Gestational Age</b>						
< 37 weeks (n=10)	4 (40.0)	0.254*	2 (20.0)	1.000*	5 (50.0)	0.016*
≥ 37 weeks (n=200)	46(23.0)		44 (22.0)		32 (16.0)	
<b>Birthweight (kg)</b>						
< 2.5 (n=43)	16 (37.2)	0.036^	12 (27.9)	0.241^	11 (25.6)	0.167^
≥ 2.5 (n=153)	33 (21.6)		30 (19.6)		25 (16.3)	
<b>Birth order</b>						
1 (n=70)	18 (25.7)	0.040^	9 (12.9)	0.069^	17 (24.3)	0.079^
2 (n=103)	18 (17.5)		26 (25.2)		12 (11.7)	
≥3 (n=37)	14 (37.8)		11 (29.7)		8 (21.6)	

\*Fisher exact test, ^Chi square test

## DISCUSSION

In this study, out of 210 children studied, 50 (23.8%) children were underweight, 46 (21.9%) were stunted and 37 (17.6%) children were wasted. As per NFHS 4 (2015-16), there were 38.4%, 21% and 35.7% children who were stunted, wasted and underweight respectively.<sup>4</sup> There was a higher proportion of underweight children (37.5%) and significantly higher proportion of wasting was seen among children of 0-6 month age group (31.2%). A significantly higher proportion of stunted children (35.2%) were seen in 19-24 months age group. Islam et al (2011) in his study conducted in tribal population in Assam, found highest prevalence of underweight and stunting among 48-60 months age group while wasting was more commonly seen in 24-36 months and the variations of these factors with age was found to be statistically significant<sup>5</sup>. Singh et al (2013) found that malnutrition was

significantly associated with age 0-12 months and 25-36 months among under five children in Bareilly district.<sup>6</sup> The higher prevalence of underweight, wasting and stunting among younger age group in our study may be due to improper complementary practices and also we included children under 2 years of age while other mentioned studies had study population of under five children. In our study boys had significantly higher prevalence of stunting (27.2%) as compared to girls (14.1%). As per Islam et al (2011-12) the prevalence of underweight, stunting and wasting was more common among the boys than the girls which was found to be statistically significant which is comparable to our study.<sup>5</sup> Similar results were found by Kumar et al (2015) in their study done among children living in Chandigarh that boys were more underweight as compared to girls.<sup>7</sup> Our study reported higher the level of parents education, lower was the prevalence of underweight, stunting and wasting, though it was not statistically significant. In study conducted by Islam et al, found that literacy of both the parents was associated significantly with the prevalence of under nutrition among the under 5 children. This may be due to the fact that in the rural areas of Assam, father is the sole decision maker for the family and also educated parents adopt better childcare practices.<sup>5</sup> In study conducted by Dhok et al (2013)<sup>8</sup>, Bhavsar et al (2012),<sup>9</sup> Sonkaria et al<sup>10</sup>. Singh et al (2013),<sup>6</sup> Mittal et al,<sup>11</sup> Das et al<sup>12</sup> literacy of mother was significantly associated with the prevalence of under nutrition among the under 5 children. In the present study significant association was found between stunting and low socioeconomic status and other studies also reported similar findings. Dhok et al<sup>8</sup> found that lower socioeconomic status was significantly associated with higher prevalence of stunting. Ruwali et al also found that children of household having poor socioeconomic status were almost three times more at risk of being stunted, about eight times more at risk of underweight than the children of household having rich socioeconomic status.<sup>13</sup> Das et al found the probability of being stunted and wasted was substantially lower for children of richest wealth quintile than the children of poorer households.<sup>12</sup> In our study birth order of 3 or more was found to be significantly associated with being underweight

(37.8%) and marginally significant with stunting (29.7%). Das et al found that children with birth order of 5 or more were 1.5 times more likely to be stunted and 1.4 times underweight as compared to the children having 1 or 2 birth order.<sup>12</sup> Kumar et al reported that birth order of more than 3 was significantly related with being underweight.<sup>7</sup> Nayak et al (2011) also observed that the prevalence of wasting was maximum among children with birth order of 4 and above.<sup>14</sup> In our study being underweight (37.2%) was significantly associated with low birth weight. Nayak et al found low birth weight to be significantly associated with stunting and underweight.<sup>14</sup>

### Conclusions:

Improper complementary feeding practices, low socioeconomic status and higher birth order were associated with poor growth and higher literacy rate was associated with good nutrition.

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