

Original Research Article

Socio-demographic correlates of stunting among children in Port Blair, India

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ABSTRACT

Background: Stunting or low height-for-age is failure to reach linear growth potential, and is a key indicator of chronic under nutrition. The objectives of the study were to assess the status of stunting among children attending outpatient department and to evaluate the demographic profile of such children.

Methods: A hospital based cross sectional study conducted over a period 6 months from August 2015 to January 2016 among children within age group of 2 to 12 years attending outpatient department of GB Pant Hospital, Port Blair. Height-for-age z-scores (HFAz) was generated using the WHO Anthro software (version 3.2.2).

Results: Overall 444 students were included in the study which included 213 male children (48%) and 231 female children (52.0%). Out of this 21.70% children were stunted and 6.3% children were severely stunted. Among the socio demographic factors stunting and severe stunting is seen among lower/upper lower class (82.14%) followed by middle/lower middle class.

Conclusions: Collective effort by government, non-government organizations is required to plan long term and short term strategies addressing the risk factors.

Keywords: Stunting, Severe stunting, Port Blair, Chronic malnutrition, Undernutrition

INTRODUCTION

Nutrition plays a crucial role in physical, mental and emotional development of child especially in the formative years of life.¹ Stunting or low height-for-age is failure to reach linear growth potential, and is a key indicator of chronic under nutrition.² Globally, about 155 million children are affected by stunting.³ Among them more than half of these children live in Asia.⁴ Therefore suitable action and investments are required to decrease the problem.⁵ As per NFHS-4 data 38.4% of under 5 children in India are stunted.⁶ Consequences of stunting are diminished cognitive, physical development, poor educational outcomes which may have indirect

consequence on individual, household, community and society.^{7,8}

The important factors which can result in stunted growth and development in child are- poor maternal health and nutrition before, during and after pregnancy, inadequate and incorrect feeding practices in infant and young children, infections like diarrhea and helminthiasis in early childhood.⁹

No study has collectively and systematically analyzed the consistent factors associated with stunting in Port Blair. Therefore the present study was undertaken to ascertain the level of stunting and to determine its associates.

The objectives were as follows:

- To assess the status of stunting among children attending outpatient department.
- To evaluate the demographic profile of such children.

METHODS

A hospital based cross sectional study was carried out in the outpatient department of GB Pant Hospital, Port Blair. All the children in age group between 2 to 12 years attending the pediatric OPD were included in the study. It was a hospital based study conducted over a period 6 months from August 2015 to January 2016. Ethical approval was obtained from the Institutional Ethics Committee. Informed written consent was obtained from the parents of each child after explaining the study objective.

A complete general physical examination followed by anthropometric assessment was done using standard methods as described in training manual of WHO Growth Standards. A stadiometer (measuring rod) capable of measuring to an accuracy of 0.1 cm was used to assess height of the subjects. The subject was made to stand without footwear with the feet parallel and with heels, buttocks, shoulders, and occiput touching the measuring rod, hands hanging by the sides. The head was held comfortably upright with the top of the head making firm contact with the horizontal head piece.

A predesigned and pretested validated questionnaire was used to elicit relevant information regarding socio-demographic and individual characteristics like age, gender, education of mother and father, father occupation, number of siblings. Socio-economic status (SES) was determined using modified Kuppuswamy's scale.

Height-for-age z-scores (HFAz) were generated using the WHO Anthro software (version 3.2.2). Stunting was defined as (HFAz < -2SD) and severe stunting (HFAz < -3SD). The children were classified accordingly on three categories: normal, severe stunting, stunting.

The data was cleaned & entered in MS-Excel spread sheet and analyzed using IBM SPSS 20.0 software (Chicago). Chi-square test was used for assessing the significance of stunting/severe stunting and various independent variables of interest.

Inclusion criteria

Children under 2 to 12 years attending paediatric OPD.

Exclusion criteria

The children who suffered from chronic illnesses and those below 2 years and above 12 years were excluded.

RESULTS

Overall 444 students' within the age group between 2 to 12 years were included in the study. It included 213 male children (47.97%) and 231 female children (52.03%) (Table 1).

In the present study 94 children were stunted which consisted of 42 boys (44.68%) and 52 girls (55.32%). Severely stunted found in 15 boys (53.57%) and 13 girls (46.43%). There was no statistical association with gender. (Chi sq=0.789, p=0.674) (Table 1).

Severely stunted was more common among 36-47 months age group and 48 to 59 months (21.43%) followed by 24 to 35 months and 60 to 71 months (17.86%). Stunting was common among 24 to 35 months (20.21%) followed by 36 to 47 months and 48 to 59 months (14.89%). Statistical association was seen between stunting/severely stunting and age (Chi sq=33.873, p=0.013) (Table 2).

On analysis of effect of maternal educational status, it was observed that severe stunting and stunting was more common among illiterate mothers 28.57% and 12.77% respectively. There was a declining trend in stunting and severe stunting with increase in mother's education. Strong statistical association was seen between mother's education and stunted/severely stunted children (Chi sq=26.15, p=0.001) (Table 3).

Father's education (chi sq=8.524, p=0.384) and father's occupation (11.714, p=0.469) had no effect on stunting based on socio economic status majority of children with severe stunting belonged to lower/upper lower class (82.14%) followed by middle /Lower middle class (17.86%). The children with stunting belonged to lower/upper lower group (58.51%) followed by middle/lower middle class (24.47%). No statistical association was seen when compared with socio economic status (Chi sq=14.091, p=0.079) (Table 4).

Table 1: Association of gender with severe stunting/stunting.

Gender	Normal		Severe stunting		Stunting		Total		Chi-square	P value
	N	%	N	%	N	%	N	%		
Male	156	48.45	15	53.57	42	44.68	213	47.97	0.789	0.674
Female	166	51.55	13	46.43	52	55.32	231	52.03		
Total	322	100.00	28	100.00	94	100.00	444	100.00		

Table 2: Age-wise distribution of children.

Age (months)	Normal		Severe stunting		Stunting		Total		Chi-square	P value
	N	%	N	%	N	%	N	%		
24-35	33	10.25	5	17.86	19	20.21	57	12.84	33.873	0.013
36-47	32	9.94	6	21.43	14	14.89	52	11.71		
48-59	39	12.11	6	21.43	14	14.89	59	13.29		
60-71	35	10.87	5	17.86	9	9.57	49	11.04		
72-83	37	11.49	2	7.14	7	7.45	46	10.36		
84-95	40	12.42	1	3.57	5	5.32	46	10.36		
96-107	39	12.11	2	7.14	3	3.19	44	9.91		
108-119	28	8.70	0	0.00	10	10.64	38	8.56		
120-131	12	3.73	0	0.00	1	1.06	13	2.93		
132-144	27	8.39	1	3.57	12	12.77	40	9.01		

Table 3: Association of maternal education with stunting/severe stunting.

Mother's education	Normal		Severe stunting		Stunting		Total		Chi-square	P value
	N	%	N	%	N	%	N	%		
Graduate/post graduate	40	12.42	1	3.57	5	5.32	46	10.36	26.15	0.001
Intermediate	109	33.85	6	21.43	22	23.40	137	30.86		
Middle school	87	27.02	4	14.29	31	32.98	122	27.48		
Primary school	61	18.94	9	32.14	24	25.53	94	21.17		
Illiterate	25	7.76	8	28.57	12	12.77	45	10.14		

Table 4: Association of SE Status with stunting/severe stunting.

SE Status	Normal		Severe stunting		Stunting		Total		Chi-square	P value
	N	%	N	%	N	%	N	%		
Upper	2	0.62	0	0.00	0	0.00	2	0.45	14.091	0.079
Upper middle	68	21.12	0	0.00	15	15.96	83	18.69		
Middle/lower middle	86	26.71	5	17.86	23	24.47	114	25.68		
Lower/upper lower	165	51.24	23	82.14	55	58.51	243	54.73		
Lower	1	0.31	0	0.00	1	1.06	2	0.45		

Stunting and severe stunting was present with increase in number of siblings and this was statistically significant. (Chi sq=18.926, p=0.041).

DISCUSSION

In the present study 94 children were stunted which consisted of 42 boys (44.68%) and 52 girls (55.32%). Severely stunted found in 15 boys (53.57%) and 13 girls (46.43%).

National Family Health Survey-3 data reported 48% of under 5 children were stunted and 24% were severely stunted.¹⁰ This number has reduced in NFHS-4 data which has reported stunting to 38.4% (31% in urban area and 41.2% in rural area).⁶ According to NFHS-4 data 23.3% of under 5 children in Andaman and Nicobar Islands were stunted (17.1% in urban area and 27.7% in rural area).¹¹

Similar study done among 3–9 years of age group residing in slum areas of Bhubaneswar found 143 children (57.4%) were either stunted or severely stunted.⁴

A study was done by Manimunda et al on the tsunami affected population of these islands staying in relief camps, which showed a high prevalence of stunting (37%).¹² It has been observed that the number of stunted children has decreased in most part of the world except sub-Saharan Africa, where the number has increased by about one third between 1990 and 2013.¹³ Prevalence of stunting among under-five children attending outpatient department at a primary care rural hospital in Bareilly (UP) found 43.22% children were stunted.¹⁴

Another study done among 0-59 months of children in the neighboring country, Bangladesh has observed prevalence of stunted children to be 41%.¹⁵

Similar study conducted on children aged two to five years, in a primary healthcare center in Baghdad observed high prevalence of stunting (30.9%).¹⁶

Stunting is lower in our study compared with other parts of India and the world which indicates comparatively nutrition of children is better in these islands.

In our study girls were found to be more stunted than boys (55.32%) but more boys were severely stunted (53.57%). This may be due to the fact that food consumption being lower among both girls and boys.

One of the important factors resulting in childhood stunting is maternal under nutrition during antenatal and lactation period⁸. Study done among 3 to 9 years children in Bhubaneswar observed that more boys (63.3%) were stunted than their counterparts (54.7%).⁴ Various studies which have recognized the fact that boys are more likely to be stunted than girls.¹⁷ In disparity, few studies found no such association between gender and under nutrition.¹⁸

Present study revealed that severely stunted children were more common among 36-47 months age group and 48 to 59 months (21.43%) followed by and 60 to 71 months (17.86%). Stunting was common among 24 to 35 months (20.21%) followed by followed by 36 to 47 months and 48 to 59 months (14.89%). There was statistical association between stunting/ severe stunting and age (chi sq=33.873, p=0.013).

Study done among under five children attending pediatric clinic in a tertiary care hospital in the Capital of Nepal observed 2.1% severely stunted, 8% stunted which is quite lower than our study.¹⁹

Another study found prevalence of stunting was more common among children of lower age group.⁴

Study done among under-five children living in an informal urban settlement in Nairobi, Kenya, observed similar findings like our study, were children aged 36-47 months had the highest prevalence (58.0%) of stunting.²⁰ Another study done among Pakistani primary school children observed stunting increased with age among both boys and girls, and the trend was significant (both p<0.001). More girls were stunted in 9-10 years age group while stunting was higher among boys in all other age groups.²¹

As stunting is a consequence of chronic malnutrition, maternal nutrition before and during pregnancy becomes important if stunting in the first year of life is to be prevented in children. In the present study stunting and severe stunting is seen to start at 2 to 3 years of life, the reason could be due to inadequate nutrition both in quantity and quality of food.

In our study it was observed that stunting and severe stunting was more common among illiterate mothers

12.77% and 28.57% respectively. There was a declining trend in stunting and severe stunting with increase in mother's education. Strong statistical association was seen between stunted children and mother's education (Chi sq= 26.15, p=0.001).

A multilevel analysis study done by Akombi et al on Nigerian children observed that mothers with no education had children who more likely to be stunted/severely stunted when compared with mothers who attained either primary education or secondary education.²²

In a similar study done in slum area of Bhubaneswar among children 3-9 years of age observed that higher maternal education is related to improved child nutrition (p=0.056).⁴

Earlier studies have also acknowledged the positive impact of mother's education.²³⁻²⁵

Similar study done among children attending the reproductive and child health clinic at Bagamoyo District Hospital, Tanzania have shown relationship between education and stunting.²⁶

On the contrary few other studies found that the effect of mother's education on child stunting is only minimal.²⁷

In the present study stunting in children are lower with educated mothers the reason can be because of more awareness about balanced diet and proper nutrition, maintenance of hygiene, and knowledge about various health issues in educated mothers as compared to uneducated mothers. Present study and various other studies have reflected the significance of education of mothers plays a major role in development of healthy children.

On analysis we found that father's education (Chi sq=8.524, p=0.384) and father's occupation (11.714, p=0.469) had no effect on stunting.

Study done by Yadav et al among under five children in Haryana also observed that educational status of father had less marked effect but father's occupation (p=0.135) had modest effect on child's nutritional status.²⁷ Study done by Rijal et al found that education of both mother and father had significant effect on the nutritional status of their children.²⁸ The findings of our study reveal that fathers have less involvement on the health of their children in this island which needs attention. Health care providers while providing health education should also involve the fathers along with the mothers.

In the present study majority of children with severe stunting belonged to lower/upper lower class (82.14%) followed by middle/lower middle class (17.86%). The children with stunting belonged to lower/upper lower group (58.51%) followed by middle/lower middle class

(24.47%). No statistical association was seen when compared with socio economic status (Chi sq=14.091, p=0.079)

Study done among under five children in a primary care rural hospital in Bareilly observed prevalence of under-nutrition was higher among children belonging to low income group compared to high income group.¹⁴ Various other studies have also shown association between socio economic status and child stunting.²⁹ In our study stunting and severe stunting is more common among lower/upper lower class (82.14%) followed by middle/lower middle class. It directs us to the fact that there are higher chances of malnutrition including stunting among children coming to pediatric OPD because malnourished child have higher chances of morbidity and thus seek hospital care more often than normal children. Stunting is more common among people belonging to low socio economic status because of poor capability and non-affordability of this group of people to provide nutrient rich and healthy diet. Socio-demographic profile of children visiting government hospital is different than those who are not visiting.

In the present study stunting and severe stunting was present when there was increase in number of siblings and this was found to be statistically significant (Chi sq= 18.926, p=0.041). Similar results were observed in study done in Nairobi, 43% of stunting was seen with 3 siblings, 41% with 2 siblings and 35% with one sibling.²⁹ Few other studies have found association between under nutrition and high birth.³⁰⁻³² It has been observed in our study that there is decrease in stunting/severe stunting when there is one or none sibling compared to two or three siblings at home, the reason could be that more care and attention and adequate nutrition can be provided when the number of children is less in a family. When there are more children the same quantity of food gets divided as there are more mouths to feed.

Limitations of study

A follow-up study design is much better to assess the nutritional status of the children.

The study population may have represented a biased sample since it was a hospital based study. Other associated factors like breastfeeding, complementary feeding practices, birth weight, birth order, maternal age and stature, environmental factors have not been analyzed.

CONCLUSION

In our study we observed that stunting was seen among 2 to 5 year old children and severe stunting among 7 to 9 year old therefore it is required that health care providers should provide health education about nutrition and how to improve the quality of food to the mothers from weaning period itself. Mother should be taught about

hygiene and sanitation to defend the children from diarrhoeal diseases and intestinal worm infestation which causes severe nutrient diminution resulting in stunting. Efforts should be made by government and non-government organizations to improve female literacy. Proper emphasis on family planning must be done during antenatal visit itself so that the some method is adopted by any one partner as increase in family size also has an effect on nutritional status of the child.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kumar A, Kamath VG, Kamath A, Rao CR, Pattanshetty S, Sagir A. Nutritional status assessment of under-five beneficiaries of Integrated Child Development Services program in rural Karnataka. *AMJ*. 2010;3(8):495–8.
2. Fenske N, Burns J, Hothorn T, Rehfuess EA. Understanding Child Stunting in India: A Comprehensive Analysis of Socio-Economic, Nutritional and Environmental Determinants Using Additive Quantile Regression. *PLoS One*. 2013;8(11): e78692
3. Available at: <http://www.who.int/mediacentre/factsheets/malnutrition/en/>, Fact sheet. Accessed on 23 May 2017.
4. Panigrahi A, Das SC. Undernutrition and Its Correlates among Children of 3–9 Years of Age Residing in Slum Areas of Bhubaneswar, India. *The Scientific World J*. 2014;2014:719673.
5. WHA Global Nutrition Targets 2025: Stunting Policy Brief.
6. NFHS-4, 2015-16, India Fact Sheet.
7. The state of the world's children 2013. Children with disabilities. New York: United Nations Children's Fund; 2013. Available at: <http://www.unicef.org.uk/Documents/Publication-pdfs/sowc-2013-children-with-disabilities.pdf>. Accessed on 21 October 2014.
8. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. The Maternal and Child Nutrition Study Group. Maternal and child undernutrition and overweight in low-income and middle-income countries. *Lancet*. 2013;371:243–60.
9. Özaltin E, Hill K, Subramanian SV. Association of maternal stature with offspring mortality, underweight, and stunting in low- to middle-income countries. *JAMA*. 2010;303(15):1507–16.
10. NFHS-3. Available at: http://www.rchiips.org/nfhs/NFHS-3%20Data/VOL1/India_volume_I_corrected_17oct08.pdf Accessed on 21 October 2017.
11. NFHS-4, 2015-16; Union Territory Fact Sheet, Andaman & Nicobar Islands.

12. Manimunda SP, Sugunan AP. Nutritional status of preschool children in Andaman and Nicobar Islands and food insecurity, food groups, and nutrient consumption among population. *Indian J Community Med*. 2017;42:88-93.
13. United Nations. The Millennium Development Goals Report. United Nations; New York, NY, USA: 2015.
14. Singh JP, Gupta SB, Shrotriya VP, Singh PN. Study of Nutritional Status Among Under Five Children Attending Out Patient Department at A Primary Care Rural Hospital, Bareilly(UP). *Sch J App Med Sci*. 2013;1(6):769-73.
15. Das S, Gulshan J. Different forms of malnutrition among under five children in Bangladesh: a cross sectional study on prevalence and determinants. *BMC Nutr*. 2017;3:1-12.
16. Arif HS. Malnutrition trends in preschool children from a primary healthcare center in Baghdad: A comparative two-year study (2006 and 2012). *Qatar Med J*. 2017;2017(2):5.
17. Banstola S, Acharya B. Nutritional Status of Primary School Children in Pumdi Bhumdi Village of Kaski District, Nepal. *Int J Health Sci Res*. 2015;5(5):339-46.
18. Luthra M, Parvan UC. Epidemiological correlates of undernutrition in 0–5 year old children In rural field practice areas of SGRRI Mand HS, Dehradun. *Indian J Prevent Social Med*. 2010;41(1-2):8-10.
19. Chhetri UD, Sayami S, Mainali P. Nutritional Assessment of Under Five Children Attending Pediatric Clinic in a Tertiary Care Hospital in the Capital of Nepal. *J Lumbini Med Coll*. 2017;5(2):49-53.
20. Olack B, Burke H, Cosmas L, Bamrah S, Dooling K, Feikin DR, et al. Nutritional Status of Under-five Children Living in an Informal Urban Settlement in Nairobi, Kenya. *J Health Popul Nutr*. 2011;29(4):357–63.
21. Mushtaq MU, Gull S, Khurshid U, Shahid U, Shad MA, Siddiqui AM. Prevalence and socio-demographic correlates of stunting and thinness among Pakistani primary school children. *BMC Public Health*. 2011;11:790.
22. Akombi BJ, Agho KE, Hall JJ, Merom D, Astell-Burt T, Andre MN. Stunting and severe stunting among children under-5 years in Nigeria: A multilevel analysis. *BMC Pediatr*. 2017;17:15.
23. Makoka D. The impact of maternal education on child nutrition: evidence from Malawi, Tanzania, and Zimbabwe. Demographic and Health Surveys Working Papers no. 84, 2013.
24. Maiga EWH. The Impact of Mother's Education on Child Health and Nutrition in developing countries: Evidence from a Natural Experiment in Burkina Faso. African Center for Economic Transformation. Available at: http://www.uneca.org/sites/default/files/page_attachments/maiga_the_impact_of_mothers_education_on_child_health_and_nutrition_in_developing_countries_0.pdf. Accessed on 3 June 2018.
25. Oyekale AS, Oyekale TO. Do mothers' educational levels matter in child malnutrition and health outcomes in Gambia and Niger. UNICEF. Available at: <http://www.saga.cornell.edu/saga/educconf/oyekale.pdf>. Accessed on 3 June 2018.
26. Juma OA, Enumah ZO, Wheatley H, Rafiq MY, Shekalaghe S, Ali A, et al. Prevalence and assessment of malnutrition among children attending the Reproductive and Child Health clinic at Bagamoyo District Hospital, Tanzania. *BMC Public Health*. 2016;16:1094.
27. Yadav SS, Yadav ST, Mishra P, Mittal A, Kumar R, Singh J. An Epidemiological Study of Malnutrition Among Under Five Children of Rural and Urban Haryana. *J Clin Diagn Res*. 2016;10(2):7–10.
28. Rijal P, Sharma A, Shrestha S, Upadhyay S. Nutritional assessment of children at Nepal Medical College Teaching Hospital. *Health Renaissance*. 2011;9(3):184–8.
29. Abuya BA, Ciera J, Kimani-Murage E. Effect of mother's education on child's nutritional status in the slums of Nairobi. *BMC Pediatr*. 2012;12:80.
30. Barman D, Sarkar S. Social exclusion and child nutritional status among the scheduled population in India. *Developing Country Studies*. 2013;3(3).
31. Das S, Sahoo H. An investigation into factors affecting child undernutrition in madhya Pradesh. *Anthropologist*. 2011;13(3):227–33.
32. Srivastava A, Mahmood SE, Srivastava PM, Shrotriya VP, Kumar B. Nutritional status of school-age children—a scenario of urban slums in India. *Arch Public Health*. 2012;70(1):8.

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