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Stunting, Underweight and Wasting Among Integrated Child Development Services (ICDS) Scheme Children Aged 6 Months – 5 Years of Urban Surat, Western Gujarat, India

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ABSTRACT

Introduction: Nearly half of all deaths in children under 5 are attributable to under nutrition; under nutrition increases morbidity and delays recovery.

Objective: To investigate age and gender variations in height and weight, levels of stunting, underweight and wasting among children under 5 years in Surat city.

Methodology: Levels of stunting, underweight and wasting among 970 children of urban Surat from 20 Anganwadi centers were assessed. Z-scores were used to assess the prevalence of malnutrition following the WHO Guidelines.

Results: Results revealed that as age increased, the mean weight and height also increased. However, even the prevalence of malnutrition increased. Older children met lower percentages of the standards than younger children. The overall (age and sex combined) rates of stunting, underweight and wasting were 39.27%, 38.14% and 20.41%, respectively. The rates of underweight and wasting were significantly higher among boys (underweight = 38.73 %, wasting = 22.31 %) compared with girls (underweight = 37.57%, wasting = 18.78 %).

Conclusion: The nutritional status of the subjects of the present study is not satisfactory, there is a scope for improvement in the form of enhanced supplementary nutrition. Therefore, it is imperative that the ICDS authorities consider its enhancement.

Key words: Malnutrition, Stunting, Wasting, Underweight, ICDS, Children under 5 years, Urban Surat

INTRODUCTION

Under nutrition is responsible for nearly half deaths among children under 5 years of age.[1] Under nutrition predisposes children at high risk of mortality due to increases frequency of morbidity. The interaction between under nutrition and illness leads to a vicious cycle of repetitive illness and delays recovery. The UNICEF conceptual framework defines nutrition and captures the multifactorial causality of under nutrition. The impact of stunting and other forms of Under nutrition on social and economic development and human capital formation has been supported and expanded by more recent researches.[2] Stunting is associated with poor school achievement and poor school performance.[3]

The most commonly used indicators are child stunting (low height-for-age), underweight (low weight-for-age) and wasting (low weight-for-height).[4,5] While stunting reflects a failure to reach linear growth potential due to suboptimal health and/or nutritional conditions, underweight reveals low body mass relative to chronological age, which is influenced by both, a child's height and weight.

Underweight thus cannot distinguish between a child who is small in weight relative to his/her height and a child who is low in height relative to his/her age, but who may be normal in weight-for-height. Whereas wasting is due to recent food deprivation or morbidity and thus is an indicator of acute Under nutrition.[4]

Child Malnutrition can manifest itself in several ways. Malnutrition in all its forms remains unacceptably high across all regions of the world. Despite reductions in stunting, 150.8 million children (22.2%) under five years of age are stunted, 50.5 million children under five are wasted and 20 million newborn babies are estimated to be of low birth weight.[6] In 2017, 150.8 million children were stunted. Based on the NFHS 4 data available, tracking the progress the average annual rate of reduction (AARR) is 2.3% which is below required AARR of 3.9% which is required to achieve the WHA targets of 2025. If these trends continue, there will be about 30 million stunted children in addition to the 100 million targets of 2025. In 2017, 50.5 million children were wasted. Hindsight of the global progress made from 2012 to 2017, the reduction in wasting is 0.4% in 5 years indicating negligible improvement towards the 5% target of 2025. A substantial increase in efforts will be required to break the global status of inertia in wasting and lower the rate in direction of 5% target by 2025.[7]

The Integrated Child Development Services (ICDS) scheme is the largest national programme for the promotion of mother and child health and their development in the world.[8] The beneficiaries include children below 6 years, pregnant and lactating mothers, and other women in the age group of 15–44 years. The scheme services are rendered essentially through the 'Anganwadi' worker at a village center called 'Anganwadi'. One of the three objectives of ICDS is improving the nutrition and health status of children under 6 years of age. Due to dearth of data related to the nutritional status of children in urban Surat, there is an urgent need to evaluate it to determine the impact of ICDS and intervene in delivery where required. Improvement in nutritional status of children implies positive impact of supplementary nutrition administration through ICDS.

Despite the economic, industrial and infrastructural development in Gujarat; the prevalence of Under nutrition continues to be high. Most of the studies carried out in India focus in rural and tribal areas, but few studies in urban slum areas. In view of this, the present investigation was undertaken to determine age and sex variations in height and weight, as well as to evaluate the levels of stunting, underweight and wasting, among 0- to 5-year-old ICDS children of Surat city, India.

MATERIALS AND METHODS

The present study was undertaken at 20 ICDS centers in urban Surat, West Gujarat, India. . All children (0–5 years old) registered at the ICDS center were enrolled in the present study. Formal ethical approval was obtained from The Maharaja Sayajirao University and ICDS authorities prior to the commencement of the study. Complete enumeration of population was done from the 20 randomly selected ICDS centers from 3 purposively selected ghataks. A total of 970 children (male = 498; female = 476) aged 0–5 years were measured for weight and height.

Anthropometric measurements and evaluation of nutritional status: Height and weight measurements were taken on each subject following the standard techniques.[9] Technical errors of measurements (TEM) were found to be within reference values.[10] Thus, TEM was not incorporated in statistical analysis.

Three commonly used Under nutrition indicators – stunting, underweight and wasting – were used to evaluate the nutritional status of the subjects. The United States National Center for Health Statistics (NCHS) age- and sex-specific -2 *z*-scores were followed to define stunting, underweight and wasting. The following scheme was utilized: Stunting: <-2 HAZ (*z*-score for height-for-age); Underweight: <-2 WAZ (*z*-score for weight-for-age); Wasting: <-2 WHZ (*z*-score for weight-for-height) where HAZ, WAZ and WHZ refer to height-for-age, weight-for-age and weight-for-height age- and sex specific *z*-scores, respectively, of NCHS. We followed the World Health Organization[4] classification for assessing severity of Malnutrition by percentage prevalence ranges of these three indicators among children. The classification is shown in Table 1.

Table 1: Classification for assessing severity of malnutrition by prevalence ranges among children under 5 years of age

Indicator	Severity of malnutrition by prevalence ranges			
	Low	Medium	High	Very high
Stunting	<20%	20-29%	30-39%	≥ 40%
Underweight	<10%	10-19%	20-29%	≥ 30%
Wasting	< 5%	5-9%	10-14%	≥ 15%

Source: WHO 1995 – The cut-off values for Public Health Significance

Statistical analysis:

The distributions of height and weight were not significantly skewed, therefore not necessitating their normalization. The data was entered in M.S. Excel and analyzed in WHO Anthro software.[11]

RESULTS

The means of height and weight by age and sex are presented in Table 2. As age increased, the mean weight and height also increased. However, even the prevalence of malnutrition increased. Older children met lower percentages of the standards than younger children.

Table 3 presents the mean *z*-scores for height-for-age, weight-for-age and weight-for-height. Results revealed that the mean HAZ, WAZ and WHZ were lower than (negative value) those of NCHS for both sexes at all ages. More than one fourth of the children were underweight (<-2 Z score.) and 10.6% were severely underweight (<-3 Z score).

Table 2: Mean Weight and Height of children

Age (months)	Sex	N= 970	Mean Weight (Kgs)	Mean Height (Cms)
0 – 6	Boys	7	6.65	63.74
	Girls	11	5.99	60.81
	Total	18	6.25	61.95
6 – 11	Boys	47	8.19	69.5
	Girls	55	7.37	67.92
	Total	102	7.75	68.65
12- 23	Boys	112	9.04	76.25
	Girls	115	8.67	75.35
	Total	227	8.85	75.79
24 – 35	Boys	132	11.02	86.21
	Girls	131	10.53	84.82
	Total	263	10.78	85.51
36 – 47	Boys	106	12.13	92.43
	Girls	116	11.83	91.2
	Total	222	11.97	91.79
48 – 60	Boys	71	13.74	98.53
	Girls	66	13.23	97.66
	Total	137	13.49	98.11

Table 3: Mean HAZ, WAZ and WHZ among the subjects

Age	Sex	HAZ	WAZ	WHZ
0-6 months	Boys	-0.95	-1.32	-0.67
	Girls	-1	-1.22	-0.61
	Total	-0.98	-1.26	-0.63
6-11 months	Boys	-1.03	-0.91	-0.44
	Girls	-0.54	-0.93	-0.77
	Total	-0.76	-0.92	-0.62
12 - 23 months	Boys	-1.79	-1.68	-1.12
	Girls	-1.48	-1.4	-0.89
	Total	-1.63	-1.54	-1
24-35 months	Boys	-1.67	-1.65	-1.1
	Girls	-1.66	-1.64	-0.98
	Total	-1.66	-1.65	-1.04
36-47 months	Boys	-1.87	-1.96	-1.36
	Girls	-1.84	-1.85	-1.1
	Total	-1.85	-1.9	-1.22
48-60 months	Boys	-1.76	-1.82	-1.19
	Girls	-1.75	-1.89	-1.24
	Total	-1.75	-1.85	-1.21

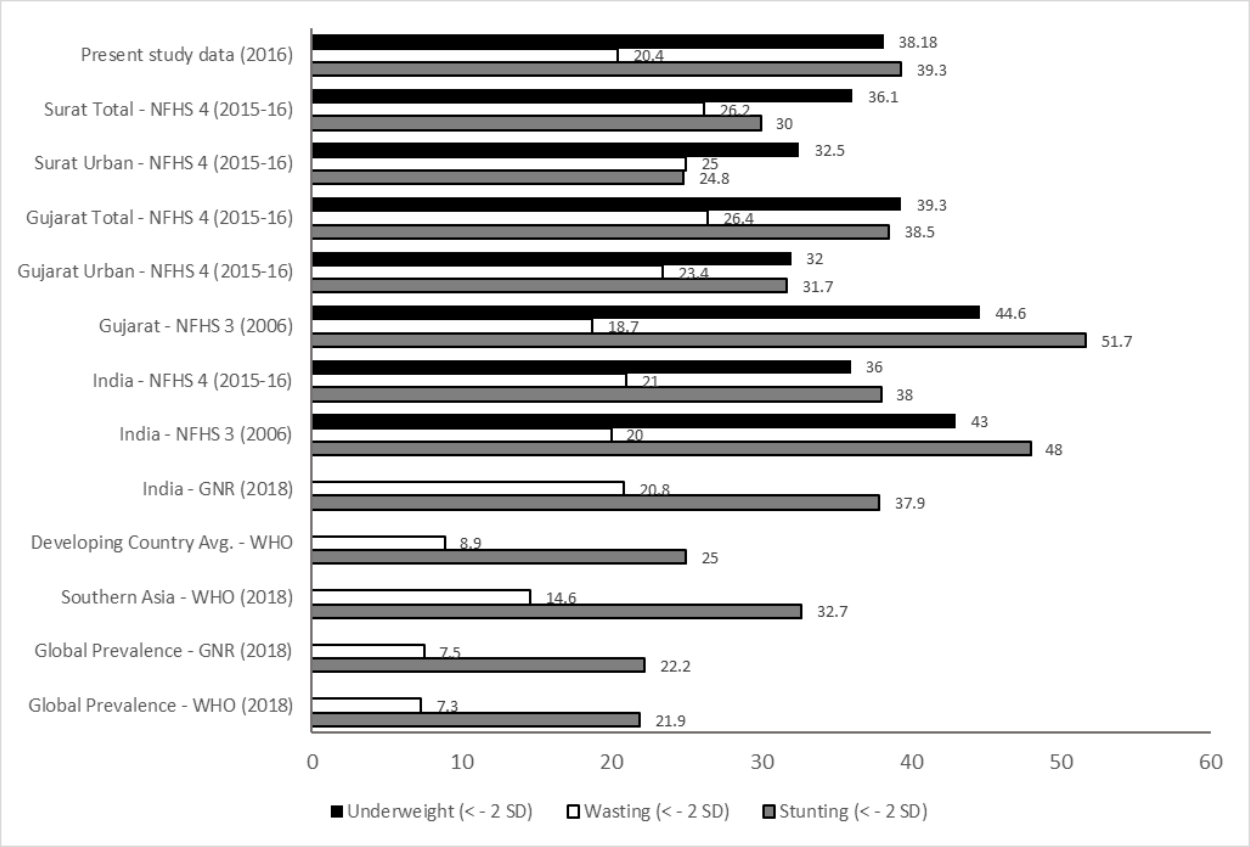
With increase in age, the prevalence of underweight increased significantly ($p<0.05$). No significant gender differences were obtained, the proportion of girls were found to be higher in severely underweight category (11.6%) as compared to boys (9.6%). Prevalence of stunting age, age wise and gender wise. As the results reveal, almost 39% children are stunted (< - 2 Z score) and one fourth of the study population is severely stunted. The prevalence and severity of stunting increased significantly as age increased. No significant gender differences were obtained. However more boys suffered from stunting whereas, higher proportion of girls fell in severe stunting category. Nearly one fifth of the children in the study sample were wasted (WHZ <-2 Z score). It was seen that there was significant difference in prevalence of wasting age wise but the prevalence of severe wasting didn't significantly differ either age wise nor gender wise.

The overall (age and sex combined) rates of stunting, underweight and wasting were 39.27%, 38.14% and 20.41%, respectively. The rates of underweight and wasting were significantly higher among boys (underweight = 38.73 %, wasting = 22.31 %) compared with girls (underweight = 37.57%, wasting = 18.78 %). In general, the frequency of stunted increased with increasing age in both sexes.

Table 4: Prevalence (%) of stunting, wasting and underweight among the children

Age	Sex	N=970	Stunting % (n) (HAZ<-2 SD)	Wasting % (n) (WHZ<-2SD)	Underweight % (n) (WAZ<-2SD)
0-6	Boys	7	28.57 (2)	28.57 (2)	28.57 (2)
mnths	Girls	11	18.18 (2)	18.18 (2)	36.36 (4)
	Total	18	22.2 (4)	16.66 (3)	33.33 (6)
6-11	Boys	47	31.91 (15)	12.76 (6)	14.89 (7)
mnths	Girls	55	12.72 (7)	14.54 (8)	12.72 (7)
	Total	102	21.56 (22)	13.72 (14)	13.72 (14)
12-23	Boys	112	43.75 (49)	17.85 (20)	41.96 (47)
mnths	Girls	115	40 (46)	17.39 (20)	31.30 (36)
	Total	227	41.85 (95)	17.62 (40)	36.56 (83)
24-35	Boys	132	43.18 (57)	25.75 (34)	34.84 (46)
mnths	Girls	131	38.16 (50)	18.32 (24)	41.22 (54)
	Total	263	40.68 (107)	22.05 (58)	38.02 (100)
36-47	Boys	106	49.05 (52)	26.41 (28)	50 (53)
mnths	Girls	116	42.24 (49)	18.10 (21)	44.82 (52)
	Total	222	45.49 (101)	22.07 (49)	47.29 (105)
48-59	Boys	71	39.43 (28)	22.53 (16)	40.84 (29)
mnths	Girls	66	36.36 (24)	27.27 (18)	50 (33)
	Total	137	37.95 (52)	24.81 (34)	45.25 (62)
6 – 35	Boys	298	41.27(123)	20.80 (62)	34.22 (102)
mnths	Girls	312	33.65 (105)	17.30 (54)	32.37 (101)
	Total	610	37.37 (228)	18.85 (116)	33.27 (203)
36–59	Boys	177	45.19 (80)	24.85 (44)	46.32 (82)
mnths	Girls	183	40.10 (73)	21.42 (39)	46.70 (85)
	Total	360	42.61 (153)	23.11(83)	46.51 (167)
6mnth	Boys	475	42.7 (203)	22.31 (106)	38.73 (184)
–5 yrs	Girls	495	35.95 (178)	18.78 (93)	37.57 (186)
	Total	970	39.27 (381)	20.41 (199)	38.14 (370)

Figure 1: Comparison of present study data with global, national and regional prevalence



Source: WHO, UNICEF and World Bank Joint Malnutrition Estimates (2019); Global Nutrition Report (2018)
NFHS 3 and NFHS 4 (2006, 2015)

Based on the WHO classification of severity malnutrition, the overall (age and sex combined) prevalence of underweight and wasting was very high (30% and > 15), while those of stunting (30–39%) was high.

DISCUSSION

Nutrition is central to the achievement of Global Nutrition Targets 2025 and Global Sustainable Development Goals.[6, 7, 12] It is critical to prevent Under nutrition, as early as possible, across the life cycle, to avert irreversible cumulative growth and development deficits that compromise maternal and child health and survival; and undermine the achievement of optimal learning outcomes in elementary education, impairing adult productivity and undermining gender equality. High levels of child Under nutrition in India have persisted, despite strong Constitutional, legislative policy, plan and programme commitments.

The UNICEF, WHO, World Bank global and regional child malnutrition estimates reveal that we are still far from a world without malnutrition.[1] The joint estimates, published in March 2019, cover indicators of stunting and wasting among children under 5, and reveal insufficient progress to reach the World Health Assembly targets set for 2025 and the Sustainable Development Goals set for 2030.

Wasting and stunting are associated with increased mortality, especially when both are present in the same child.[13] Added to this, it is becoming increasingly clear that children who are wasted are more likely to become stunted and children who are stunted are more likely to become wasted.[14] Children who are moderately or severely wasted have a higher risk of mortality.[15,16] Wasting still affects 50.5 million children under five, with more than half of the world's wasted children, 26.9 million, live in South Asia.[7]

Regionally, South Asia is home to 38.9% of the world's stunted children, having the highest burden of the regions. Stunting is the devastating result of poor nutrition in-utero and early childhood. Children suffering from stunting may never attain their full possible height and their brains may never develop to their full cognitive potential. The national prevalence of under-five stunting is 37.9%, which is greater than the developing country's average of 25%. In India, 38 percent of children under age five years are stunted. This is a sign of chronic Under nutrition.[17] The prevalence of stunting has

decreased since 2005-06, which declined from 48% in 2005- 06 to 38% in 2015-16. The state prevalence has reduced by 13.2% in a decade from 51.7% in 2006 to 38.5% in 2016. The AARR (Average Annual Reduction Rate) for stunting is 1.32% which is far below the expected to reach WHA 2025 Global Target. The findings of the present study indicate stunting prevalence in urban Surat is 39.3% which is very high as compared to the local prevalence (30%) as stated in NFHS – 4.

In 2018, over 49 million children under 5 were wasted and nearly million were severely wasted globally. India is among the three countries with the most children who are wasted. India's under-five wasting prevalence of 20.8% is also greater than the developing country average of 8.9%. Twenty-one percent of children under age five years are wasted, which is a sign of acute Under nutrition, while 36 percent of children under age five years are underweight.[17] Over the time period of a decade, the prevalence of wasting has increased by 7.7% from 18.7% (2006) to 26.4% (2016).[17] The Gujarat state prevalence (26.2%) is higher to the country's prevalence of 21% whereas present study findings indicate comparable prevalence rate in the city of Surat (20.4%). Looking at the latest prevalence rates of wasting and AARR (-0.64%), we are far from reaching the Global WHA target 2025 of reducing maintaining wasting at 5%.

Baseline survey for the present study indicated high (39.1%) prevalence of underweight. These figures were almost comparable to the state figures of 2014-15 which categorized 39.3% as underweight.[17] The results of the present study clearly indicated that, based on the WHO classification of severity malnutrition, the overall (age and sex combined) rates of stunting, underweight and wasting were 39.27%, 38.14% and 20.41%, respectively. The rates of underweight and wasting were significantly higher among boys (underweight = 38.73 %, wasting = 22.31 %) compared with girls (underweight = 37.57%, wasting = 18.78 %).

CONCLUSION

However, in the context of the present study, it should be noted that ICDS offers only supplementary nutrition to young children and controlling of other related factors of Under nutrition is not within its ambit. As the nutritional status of the subjects of the present study is not satisfactory, it seems that there is scope for much improvement in the form of enhanced supplementary nutrition than what is currently being offered by the ICDS scheme in Surat city, Therefore, it is imperative that the ICDS authorities urgently consider the enhancement of the supplementary nutrition being currently given.

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