

**Use of WHO Anthro Software for Assessing under Nutrition (Wasting, Stunting & Underweight) amongst Under-Five Children of District Ahmedabad, Gujarat**Swarna Rastogi<sup>1</sup>, Chaitanya Maheshwari<sup>1</sup>, Santosh Kr. Raghav<sup>2</sup>, M. K. Lala<sup>3</sup><sup>1</sup> Assistant Professor, <sup>2</sup> Lecturer cum Statistician, Department Community Medicine, MMC Muzaffarnagar, Uttar Pradesh, India<sup>3</sup> Professor, Department Community Medicine, B. J. Medical College, Ahmedabad, Gujarat, India**Correspondence :** Dr. Swarna Rastogi , E mail: dr.swarnarastogi@gmail.com**Abstract :**

**Introduction :** A child is future of nation. Malnutrition is a big public health problem in India as it can be attributed for more than half (54 percent) of all under five mortality in India. **Aim :** To assess prevalence of malnutrition among urban and rural population of Gujarat using newly developed WHO growth standards.

**Method:** Community based cross-sectional study was done, in which 504 under-five children were studied from Anganwadis in both urban and rural area of Ahmedabad. Z-score was used to determine underweight, stunting, and wasting based on WHO Growth Standard - 2007 using WHO Anthro 2011 software version 3.2.2. **Statistical Analysis:** Analysis was done by using Epi-info version 7. Chi-square test & Z-test were used to test the significance. **Results :** Overall in our study, in urban area, 36.9% of under-fives were underweight, 41.7% wasted and 31.4% stunted compared to that, under-fives of rural area 56.3% were underweight, 35.3% wasted and 54.3% stunted. Both male and female children were found undernourished in both urban and rural areas. Among socio demographic factors, maternal educational, working status of the mother, socioeconomic status and rural background of the family had greater impact on nutritional status of the child.

**Conclusion :** We found that almost one third of our under five children are underweight. For attainment of best possible nutrition and growth in children, targeted short-term strategies addressing underlying risk factors and more long-term poverty alleviation strategies may be needed.

**Keywords :** Stunting, Underweight, Under-Fives, Wasted, WHO Growth Standard

**Introduction :**

Malnutrition is one of the major public health problems in the present world. <sup>[1]</sup> In a study entitled "Save the Children" in 2012 malnutrition was found to be one of the major risk factors for childhood mortality and morbidity as well as for Non Communicable Diseases. <sup>[2-3]</sup> Stunting, wasting and underweight rates of under-five children have declined, especially during last decade, but still exceed levels observed in countries at similar income levels. According to recent data from (Rapid Survey On Children) RSOC (2014), 38.7% of Indian children under-fives are stunted, 19.8% were wasted and 42.5% were underweight. <sup>[4,5]</sup>

In India according to NHFS (National Family Health Survey) -4 data (2015-2016), <sup>[6]</sup> 35.7 per cent

children under age of five years are underweight (low weight for age); 38.4 per cent children under five are stunted (low height for age); 21 per cent children under five years of age are wasted (low weight for height); 7.5 per cent of children under five years of age are severely wasted. Another important consideration is the interstate variation in prevalence of under nutrition. As Per the National Family Health Survey-4 (NFHS-4), <sup>[6]</sup> states like Kerala (22.9%), Punjab (24.9%) and Goa (25%) have lower prevalence of underweight. On the other hand, there are states like Gujarat (39.3%), Bihar (55.9%), Jharkhand (56.5%) and Madhya Pradesh (60%) with higher Prevalence of underweight than national average. Gujarat is the 4<sup>th</sup> worst performing major state for under nutrition in India as per NFHS 4. Underweight prevalence in the state has reduced

only by 1.7% percent from 41% in NFHS 3 05-06 to 39.3% in NFHS 4 of 2015-16.

This research mainly tries to estimate the prevalence of underweight, stunting and wasting in Ahmedabad District of Gujarat using WHO Growth Standard - 2007 using WHO Anthro 2011 software version 3.2.2 and compare the socio-demographic profile of under-five children suffering from malnutrition.

#### Method:

The present study was conducted in rural and urban area of Ahmedabad District. The total population of Ahmedabad district is 5.82 million out of which 4.66 million (80%) live in urban area and 1.1 million (20%) live in rural area. Ethical committee approval was taken before conducting the study. A community based cross-sectional study was done in 2015-16. Considering the prevalence of under-nutrition as 46 % and allowable error as 10% of estimated prevalence, the calculated sample size is 469.

Upon considering the non-response error as 7.5%, 504 under-fives were taken for the study. Out

of the 504 under-five children studied, 252 were studied in urban and rural areas respectively of Ahmedabad district. Urban area, under Ahmedabad Municipal Corporation has been divided into 6 zones. Each zone had 8 to 10 UHCs (Urban Health Center). From each zone, one UHC had been selected randomly. So total 6 UHC has been selected. From each UHC, 3 Anganwadis were selected randomly to cover roughly 42 under-fives from each zone. Thus total 18 Anganwadis were selected for survey in urban area to cover 252 under-fives. Currency method was used for random selection.

In rural area, Ahmedabad district has 10 taluka excluding corporation area. 10 PHCs were selected randomly (one from each taluka), out of 10 PHC, one PHC (Sanathal), which is situated in Sanand Taluka, was selected using simple random sampling method. From 13 villages of Sanathal PHC, 6 villages were selected randomly. From each village, 3 Anganwadis were selected randomly so total 18 Anganwadis were selected for survey in rural area to cover randomly 252 under-fives (42 under-fives were selected randomly from each Anganwadi). A pre-designed and pre-tested performa was used to

#### Colour Coding used in Who Anthro 2011 Software

The following colour codes are applied to visually distinguish the different levels of severity

COLOUR	APPLIED TO	Z SCORES (Z)	PERCENTILE
<b>Green</b>	Numeric range Graph line	-1 SD < z < +SD Median	50 <sup>th</sup> percentile
<b>Gold</b>	Numeric range Graph line	-2 SD < z < + 2SD or +1 < z < +2SD -1 SD and +1SD	15 <sup>TH</sup> and 85 <sup>th</sup> percentile
<b>Red</b>	Numeric range Graph line	-3SD < z < -2SD or +2 < z < +3SD -2SD and +2SD	3 <sup>rd</sup> and 97 <sup>th</sup> percentile
<b>Black</b>	Numeric range Graph line	z < -3SD; z > +3SD -3SD and +3SD	NA #

# NA= Not Available

## Results:

Table 1 : Socio-demographic profile of studied under five children

Traits	Urban Under-fives (N=252)			Rural Under-fives (N=252)			p-value	
	Under nourished*	Normal*	Total*	Under nourished*	Normal*	Total*		
<b>AGE</b>								
<b>0-12 Months</b>	00 (0.00)	00 (0.00)	00 (0.00)	03 (1.20)	13 (5.16)	16 (6.34)	$\chi^2=59.8$ $P<0.001$ $df=12$	
<b>13-23 Months</b>	28 (11.1)	09 (3.57)	37 (14.7)	22 (8.73)	11 (4.36)	33 (13.1)		
<b>24-35 Months</b>	59 (23.4)	16 (6.35)	75 (29.7)	48 (19.1)	15 (5.9)	63 (25.0)		
<b>36-47 Months</b>	64 (25.4)	20 (7.94)	84 (33.4)	54 (21.4)	32 (12.7)	86 (34.1)		
<b>48-60 Months</b>	43 (17.10)	12 (4.76)	55 (21.86)	43 (17.1)	10 (3.9)	53 (21.0)		
<b>GENDER</b>								
<b>Male</b>	106 (42.1)	36 (14.3)	142 (56.4)	96 (38.1)	32 (12.7)	128 (50.8)	$\chi^2=2.64$ $df=3$ $P<0.05$	
<b>Female</b>	88 (34.9)	22 (8.73)	110 (43.2)	91 (36.1)	33 (13.1)	124 (49.2)		
<b>RELIGION</b>								
<b>Hindu</b>	170 (67.5)	51 (20.2)	221 (87.7)	145 (57.5)	55 (21.8)	200 (79.3)	$\chi^2=13.76$ $df=6$ $P<0.032$	
<b>Muslim</b>	24 (9.52)	6 (2.38)	30 (11.9)	38 (15.1)	07 (2.8)	45 (17.9)		
<b>Others**</b>	00 (0.00)	00 (0.00)	00 (0.00)	04 (1.58)	02 (0.79)	06 (2.37)		
<b>SOCIAL CLASS</b>								
<b>Class-I</b>	07(2.80)	33(13.1)	40(15.9)	$\chi^2=77.7$ $P<0.05$	02(0.80)	05(1.90)	07(2.70)	$\chi^2=53.5$ $P<0.05$
<b>Class-II</b>	12(4.70)	46(18.3)	58(23.0)		11(4.40)	32(12.7)	43(17.1)	
<b>Class-III</b>	54(21.4)	15(5.9)	69(27.3)		57(22.6)	21(8.30)	78(30.1)	
<b>Class-IV</b>	43(17.1)	22(8.7)	65(25.8)		66(26.2)	10(3.90)	76(30.1)	
<b>Class-V</b>	18(7.10)	2(0.8)	20(07.9)		34(13.5)	14(5.50)	48(19.0)	

\* Figures in parenthesis denote percentage.

collect baseline data. Anthropometric measurements were taken from randomly selected under-fives of Anganwadis and other required information was collected by performing house to house visit of the concerned child accompanying his/her mother. Analysis was done in Epi-info version 7. Z test and Chi-square tests was used to test the significance. Z

score was used to determine underweight, stunting, and wasting based on WHO Growth Standard-2007 using WHO Anthro 2011 software version 3.2.2<sup>[7]</sup>

As per age distribution, in urban area, maximum number of undernourished children were present in the age group of 36-47 months (25.4%) followed by 24-35 months (23.4%), 48 to 60 months (17.10%)

and 13-23 months (11.1%). In rural area, maximum number of undernourished are present in the age group of 36-47 months (21.4%) followed by 24-35 months (19.1%), 48 to 60 months (17.10%), 13-23 months (8.23%) and 0-12 months (1.2%). There is statistical significant difference in the mean age of studied under-fives of urban area ( $36 \pm 10.5$  months) & rural area ( $30 \pm 12$  months) ( $P < 0.05$ ). Percentage of undernourished males was higher in urban area (42.1%), while in rural area percentage of undernourished females (36.1%) was higher which is statistically significant ( $p < 0.05$ ). More undernourished children were present among Hindus in both urban (67.5%) and rural (57.5%) area followed by Muslim in urban (9.52%) and rural area (15.1%) i.e. more Muslim children were undernourished in rural area, which is statistically significant ( $p < 0.05$ ). As per B. J. Prasad's modified S.E. classification, more undernourished children were in class III (21.4%) in urban area followed by class IV (17.1%), class V (7.1%), class II (4.7%) and class I (2.8%). In rural area more undernourished were present in class IV (26.2%), followed by class III (22.6%), class V (13.5%), class II (4.4%) and class I (0.8%) which is statistically significant ( $p < 0.05$ ) (Table 1).

As per education of mothers of studied under-fives, more undernourished children were present in rural illiterate mothers 118 (46.8%) compared to 8 (3.1%) in urban illiterate. Among literate mothers, more undernourished under-fives were present among urban primary 96 (38.1%), secondary 78 (30.9%) and graduate & post graduates 12 (4.8%) respectively compared to rural primary 40 (15.8%), secondary 27 (10.7%) graduate & post graduates 3 (1.2%) respectively. Finding is statistically highly significant ( $p < 0.001$ ). (Table 2) As per occupation of mothers of studied under-fives, more undernourished under-fives were present in housewife's of urban area 99 (39.3%) compared to 77 (30.5%) in rural area. Same pattern of undernourishment was seen in mothers engaged in business both in urban 66 (26.2%) and rural 67 (26.65) area followed by service in urban

28 (11.25) & rural 16 (6.3%) area. More undernourished children were observed in laborer class of rural area 25 (9.9%) compared to that of urban area 01 (0.4%). Distribution is statistically highly significant ( $p < 0.0001$ ). (Table 2)

In urban area, as per weight/age parameter, 81 (32.14%) children were moderately underweight and 12 (04.76%) children were severely underweight. In rural area as per weight/age parameter was taken 70 (27.7%) children were moderately under-weight and 72 (28.6%) children were severely underweight. Severely underweight under-fives were more in rural area as compared to urban area which was statistically significant ( $p < 0.05$ ). (Table 3(a)) In urban area as per weight/height parameter was taken 51 (20.2%) children were moderately wasted and 54 (21.4%) children were severely wasted. In rural area as per weight/height parameter was taken 54 (21.4%) children were moderately wasted and 35 (13.9%) children were severely wasted. (Table 3(a))

In urban area, as per height/age parameter, 44 (17.5%) children were moderately stunted and 35 (13.9%) children were severely stunted. In rural area, as per height/age parameter, 43 (17.1%) children were moderately stunted and 94 (37.3%) children were severely stunted. Severely stunted were more in rural area as compared to urban area which was statically significant ( $p < 0.05$ ). (Table 3(a)).

Urban and rural area under-five population graphs has shown that in urban area z score was -3.36 according to weight/age and z score was -5.44 according to height/age compared to in rural area z score -4.18 according to weight/age and z score -4.31 according to height/age which is statistically significant ( $p < 0.05$ ). (Figures 1 and 2)

### Discussion:

Present study was a community based cross-sectional study covering 504 under-five children from the Anganwadis, which were equally distributed among the urban and rural area of Ahmedabad District of Gujarat.

**Table 2 : Distribution of studied under-fives as per education and occupation of mothers in urban and rural area of Ahmedabad district**

Urban u nder-fives			Rural under -fives				P VALUE
Traits	Under-Nourished*	Normal*	Total*	Under-Nourished*	Normal*	Total*	
<b>EDUCATION OF MOTHER</b>							
<b>Illiterate</b>	08 (3.10)	02 (0.80)	10(3.90)	118 (46.8)	38 (15.1)	156(61.9)	$\chi^2=193$ $P<0.01$ $df=9$
<b>Primary</b>	96 (38.1)	26 (10.3)	122 (48)	40 (15.80)	15(5.90)	55(21.80)	
<b>Secondary</b>	78 (30.9)	26 (10.4)	104 (41)	27 (10.70)	10(3.90)	37(14.90)	
<b>Graduate &amp; P.G</b>	12 (4.80)	04 (1.60)	16(6.40)	03 (01.20)	01(0.40)	04(01.40)	
<b>OCCPATION OF MOTHER</b>							
<b>Laborer</b>	01 (0.4)	00 (0.00)	01 (0.40)	25(9.90)	08 (3.20)	33 (13.1)	$\chi^2=44.8$ $P<0.001$ $df=9$
<b>Business</b>	66 (26.2)	31 (12.3)	97 (38.5)	67(26.6)	29 (11.5)	96(38.1)	
<b>Service</b>	28 (11.2)	08 (3.20)	36 (14.4)	16 (6.30)	08(3.20)	24(9.50)	
<b>Housewife</b>	99 (39.3)	18 (7.10)	118 (46)	77 (30.5)	22(8.70)	99(39.2)	

\*Figures in parenthesis denote percentages

**Table 3a : : Anthropometric indicators weight/age, weight/height & height/age [(w/a), (w/h) & (h/a)] prevalence among under-fives in urban and rural areas of Ahmedabad District.**

PARAMETER	URBAN[N=252]			RURAL[N=252]		
<b>Underweight (w/a )</b>						
<b>GRADING</b>	<b>Male*</b>	<b>Female*</b>	<b>Total*</b>	<b>Male*</b>	<b>Female*</b>	<b>Total*</b>
Moderate <2SD	47(18.6)	34 (13.4)	81(32.14)	34(13.5)	36 (14.3)	70 (27.70)
Severe <3SD	09(3.57)	03 (1.19)	12(04.76)	42(16.7)	30 (11.9)	72 (28.60)
Normal	86(34.1)	73 (28.9)	159(63.1)	52(20.6)	58 (23.0)	110(43.6)
<b>Wasted(w/h)</b>						
Moderate <2SD	27(10.70)	24 (9.52)	51(20.20)	35(13.9)	19 (7.54)	54 (21.40)
Severe <3SD	31(12.30)	23 (9.13)	54(21.40)	17(6.74)	18 (7.14)	35 (13.90)
Normal	84(33.40)	63 (25.0)	147(58.3)	76(30.1)	88 (34.9)	163(64.7)
<b>Stunted(h/a)</b>						
Moderate <2SD	23(09.13)	21(8.34)	44(17.50)	18(7.14)	25 (9.92)	43(17.10)
Severe <3SD	18(07.14)	17(6.75)	35(13.90)	48(19.0)	46 (18.3)	94 (37.30)
Normal	101(40.1)	72(28.6)	173(68.6)	62(24.6)	53 (21.0)	115 (45.6)
<b>Total</b>	<b>142</b>	<b>109</b>	<b>252</b>	<b>128</b>	<b>124</b>	<b>252</b>

\*Figures in parenthesis denote percentage

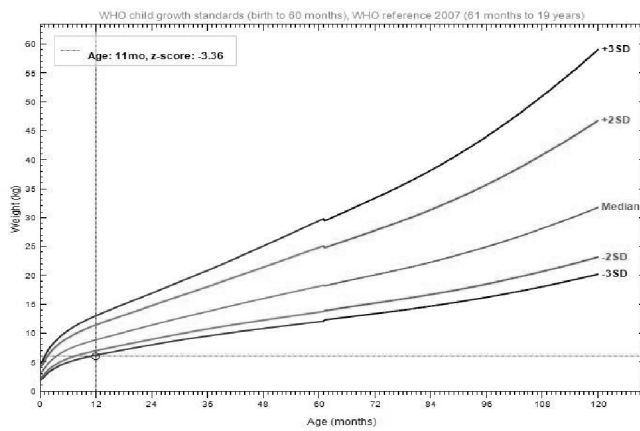


**Table 3(b) : Overall anthropometric indicators [(w/a), (w/h) & (h/a)] prevalence among under-fives in urban and rural areas of Ahmedabad.**

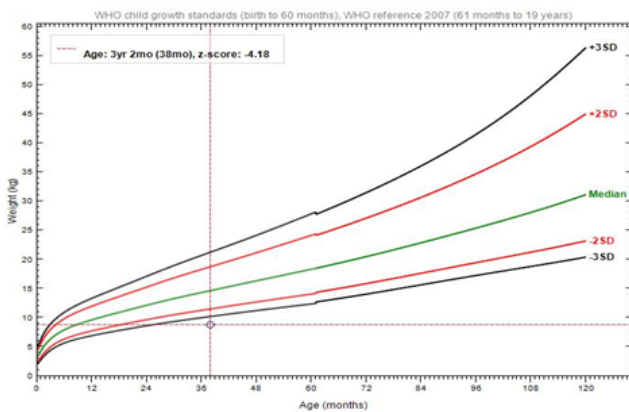
PARAMETER	URBAN* (N=252)		RURAL* (N=252)		TOTAL* (N=504)
	<3SD	<2SD	<3SD	<2SD	
<b>Underweight</b>	12(4.76%)	81(32.14%)	72(28.6%)	70(27.7%)	235(46.6%)
<b>Wasted</b>	54(21.4%)	51(20.2%)	35(13.9%)	54(21.4%)	194(38.5%)
<b>Stunted</b>	35(13.9%)	44(17.5%)	94(37.3%)	43(17.1%)	216(42.8%)

\* Figures in parenthesis denote percentage

**Figure 1: Z-score of subjects in urban areas**



**Figure 2 :Z-score of subjects in rural areas**



Out of 504 under-fives studied, in urban area maximum number of undernourished under-fives were present in the age group of 36-47 months (25.4%) followed by 24-35 months (23.4%).(Table1) which is similar to rural area, maximum numbers of undernourished children were present in the age group of 36-47 months

(21.4%) followed by 24-35 months (19.1%). In a study by Dinesh et al (2006),<sup>[8]</sup> the maximum prevalence of wasting and underweight in age group 37-48 months was similar to our study. The Male: Female ratio of the population under study was 1:0.86 i.e. the sex ratio of the population under study was 860 females per 1000 population. Similar results were found in Bhavnagar urban slums MICS (2006)<sup>[9]</sup> in which there were 52.6% males and 47.4% were females in under four year's population. Also sex ratio in Bhavnagar MICS survey,<sup>[9]</sup> was 899 females per 1000 males. According to NFHS-4 Report (2015-2016)<sup>[6]</sup>, there were 53.2% male and 46.8% females, which was similar to our study. Overall girls and boys were equally undernourished. In the present study, undernourished males were higher in urban area (42.1%), while in rural area percentage of undernourished females (36.1%) was higher. The difference may be due to the fact that in urban areas, more attention was also given on nutrition of female children. In this study, maximum number of under-fives belonged to Hindu religion both in urban (88%) and rural areas (79.7%) (Table1). Laxminath A et al (2001) 10 in his study also found that majority of under-five children were Hindus. Similar result was found in NFHS-4 Report (2015-2016) [6], for religion in which 81.6% were Hindus and 12.5% were Muslim. More undernourished children were Hindus in both urban (67.5%) and rural area (57.5%). Religion wise distribution of under nutrition may be due to the fact that in the present study majority of under-fives belonged to Hindu religion. In the present study, more undernourished children were

from class III (21.4%) in urban area followed by class IV(17.1%),class V(7.1%),class II(4.7%) and class I(2.8%) compared to rural area where more undernourished were present in class IV(26.2%),followed by class III(22.6%),class V(13.5%),class II(4.4%) and class I(0.8%). In studies carried out by Laxminath A et al(2001)<sup>[10]</sup>, Hassan et al (2001)<sup>[11]</sup>, Biswas et al (1999)<sup>[12]</sup> it was noted that a larger percentage of population belong to lower socio economic class(90.6%,82.6% and 77.5%) as compared to present study. This may be due to changing socioeconomic status in present study. Veerbhan Singh et al<sup>[13]</sup> depicts that maximum mothers belonged to class III 155(38.75%), followed by 81(20.25%) mothers from socio-economic class V. It may be due to the reason that most of the nutrition programmes were more concentrated towards the lower socioeconomic class.

In our study, overall in urban area out of 252 studied under-fives mother, majority were (89.7%) educated up to primary and secondary level. 3.9% of mothers were illiterate. In rural area, out of 252 studied under five mothers, 61.9% of mothers were illiterate.36.5% was educated up to primary and secondary level. (Table2). According to NFHS 4 (2015-2016)<sup>[6]</sup>, in India 38.5% were illiterate women and in Gujarat 35.2% were illiterate women, which were more in our study in rural area compared to urban. In study by Veerbhan Singh et al<sup>[13]</sup> 37% mother were illiterate, 23.75% mothers were educated up to primary, 18.5% up to middle, 11.25% educated up to secondary level and <10% were educated up to higher secondary and above. Uttekar BP et al<sup>[14]</sup> also observed in their study in Rajasthan that majority of Janani Suraksha Yojana beneficiaries were illiterate (68%) or had Studied only up to primary and middle level (22%), <10% had studied above secondary Level which is similar to our study.<sup>[15]</sup> In present study, more undernourished children were present in rural illiterate mothers (46.8%) compared to (3.1%) urban illiterate. It may be due to the fact that more mothers were illiterate in studied rural area than urban area. Mother's illiteracy has impact on nutrition of under-fives.

Distributions according to occupation of under-five mothers showed that majority of mothers were housewives both in urban (79.7%) and rural areas (60.7%). 27% of rural mothers were employed as labours as compared to urban mothers (9.5%) (Table 2).In study of Chaterejee Saurav et al. (2008) similar result for occupation of mother was observed in which 90.0% mother were housewife, 3.64% were labour in urban area of Kolkata<sup>[16, 17]</sup> In a study by Veerbhan Singh et al<sup>[13]</sup> among 400 infants 212 were exclusive breast feed (EBF) of which mothers of 75.47% infants were housewives and 24.53% were working, the relation is being statistically significant. In the present study, more undernourished children were present in housewives of urban area (39.3%) compared to (30.5%) rural area. There is a need to improve child rearing practices in housewives.

Among working mothers almost same pattern of undernourishment was seen in mothers engaged in business both in urban (26.2%) and rural (26.65%) followed by service in urban (11.25%) and rural area (6.3%). More undernourished children were observed in laborer of rural area (9.9%) compared to that of urban area (0.4%) (Table 2). It may be due to the fact that housewives and women laborers were more illiterate than employed woman which was affecting the nutrition of under-fives.

Out of the total 252 under-fives studied according to weight/age criteria, in urban area 32.14% were moderately underweight, 4.76% were severely underweight. In rural area, out of the total 252 under-fives studied according to weight/age criteria, were 27.7% moderately under-weight, 28.6% were severely underweight. Here severely underweight among studied under-fives according to weight/age criteria were more in rural area as compared to urban area which was statically significant (Table 3a). Out of the total 252 under-fives studied according to .weight/height criteria, in urban area 20.2% were moderately wasted, 21.4% were severely wasted. In rural area out of the total 252 under-fives studied according to weight/height criteria, 21.4% were moderately wasted, 13.9% were severely wasted. Here severely wasted among

studied under-fives according to weight/height criteria were more in urban area as compared to rural area which was statically significant (Table 3a). Out of the total 252 under-fives studied according to height/age criteria, in urban area 17.5% were moderately stunted, 13.9% were severely stunted. In rural area as per height/age parameter was taken out of the total 252 under-fives studied in rural area 17.1% were moderately stunted, 37.3% were severely stunted. Here severely stunted among studied under-fives according to height/age criteria were more in rural area as compared to urban area which was statically significant. According to NFHS-4 (2015-2016) in Gujarat<sup>[6]</sup>, prevalence of underweight, stunting and wasting were 39.3%, 38.5% and 26.4% respectively and in India according to NFHS-4 (2015-2016) prevalence of underweight, stunting and wasting were 35.7%, 38.4% and 21% respectively.

### Summary and Conclusion :

More undernourished children were present in Hindus in both urban and rural area 67.5% and 57.5% respectively. More undernourished children were in class III (21.4%) in urban and in class IV (26.2%) in rural area. Out of the 504 under-fives studied overall 46.6% were underweight, 38.5% were stunted and 42.8% were wasted. In urban area, 36.9% were underweight, 41.7% were stunted and 31.3% were wasted compared to rural area in which 56.3% were underweight, 35.3% were stunted and 54.4% were wasted according to New WHO growth standards.

Overall in urban area 89.7% of under-five mothers were educated up to primary and secondary level. Only 3.9% of under-five mothers were illiterate compared to rural area, in which 61.9% of mothers were illiterate which was significant. In urban area more undernourished children were present among fathers pursuing business 32% and service 32% compared to rural area in which more undernourished was seen among fathers working as laborer 34.5% and agricultural workers 17.1%. More undernourished children were present in housewife's of urban area (39.3%) compared to

(30.5%) rural area. This may be due to the reason that housewives were not motivated regarding good feeding practices of under-five children which requires their constant motivation by Anganwadi workers & other grass root workers.

### Recommendations :

#### Short Term Measures :

Considering the high prevalence of underweight, wasting and stunting among under-five children more emphasis should be given on exclusive breast feeding and timely introduction of adequate and safe complementary food in conjunction with continued breastfeeding. Use of the new WHO growth standards should be adopted and encouraged as they make breastfeeding the biological norm and establishes the breastfed infants as the normative growth model. More attention should be given to "infant and young child feeding" and nutritional counseling of mothers of under-five children.

#### Long Term Measures :

Improving female literacy, improving socioeconomic condition and improving urban and rural living condition is recommended.

### Declaration:

Funding: Nil

Conflict of Interest: Nil

### References :

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