

Gender inequality and bio-social factors in nutritional status among under five children attending anganwadis in an urban slum of a town in Western Maharashtra, India

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Nutrition for under-5 children is of great importance as the foundation for life-time health, strength, and intellectual vitality is laid during this period. Globally, more than one-third of the child deaths are attributable to under-nutrition. The discriminatory attitudes against female children vary from being implicit to those that are quite explicit. So, the present cross-sectional study aims to assess the nutritional status (gender differences) of 146 under-5 children attending Anganwadis and also to study the bio-socio-demographic factors associated with malnutrition attending three Anganwadis of Adopted Urban slum area, involving anthropometric examination using standardized techniques and interview using pre-designed semi-structured questionnaire for the mothers in September-October 2011. Nutritional status grading was done based on weight for age as per Indian Academy of Pediatrics (IAP) Classification and using height for age as per Vishveshwara Rao's Classification. 51.4% were males, majority in age group of 2-3 years. 63% children were malnourished, majority in Grade I malnutrition. Out of the total females, 72% were stunted and 43% were severely malnourished having mid arm circumference <12.5 cm. Birth order ($P < 0.05$), education status of the mother ($P < 0.001$), socio-economic status ($P < 0.05$) and type of family ($P < 0.05$) were found to be significantly associated with malnutrition.

Key words: Nutritional status, under-5 children, urban slum, Western Maharashtra

The prevalence of underweight children in India is among the highest in the World, and is nearly double as that of Sub-Saharan Africa.^[1] Malnutrition is a silent emergency.^[2] The nutritional status of a community particularly of vulnerable groups comprising of children, expectant mother and lactating mothers has been recognized as an important indicator, of national development in turn depends on social development indices.^[3] The "Nutrition" emerges as an essential prerequisite for national development.^[4]

Globally, more than one-third of the child deaths are attributable to under-nutrition.^[5] There is strong evidence that poor growth or smaller size is associated with impaired development and school performance and intellectual achievement.^[3] Girls of today are the women of tomorrow. From conception to death, the girl child is exposed to all sorts of discrimination, abuse, and exploitation and often has less access to nutrition.^[6] According to National Family Health Survey (NFHS-3), in rural areas of Maharashtra, 43.5% of under-5 children are under-weight, 40.3% are stunted and 15.6% are wasted.^[7]

In this study, a combination of anthropometry, breast feeding history and socio-economic status were used

to determine the nutritional status of under-5 children, since they have been known to give fairly accurate results in a study conducted in abroad.^[8] It provides baseline information on the health and nutritional status of the target group, by determining the impact of certain variables on the growth, nutritional status and the future outlook of under-5 children in the study location.

A cross-sectional study from September to October 2011 was carried out, in the field practice area encompassing three Anganwadis (No. 62, 63, 64) under Urban Health Center of Community Medicine Department of Government Medical College, Miraj, a town in Sangli district of Western Maharashtra. Out of the total 366 children, registered in Anganwadis, 28 children belonging in the age group of 5-6 years and 46 children who had joined the Anganwadis during the study period were excluded. By the use of systematic random sampling technique, the study sample comprised of total 146 under five children at the time of their visits. A pre-designed semi-structured questionnaire was used to collect the required information by trained doctors from mothers. Socio-economic status was then calculated as per modified Kuppusswamy Classification.^[9] Informed consent of the mother of the study subjects was obtained prior to their examination.

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Anthropometric measurements taken were weight (kg), height (cm) and mid arm circumference (cm) as per standard techniques. Mean weight and mean height of each study subject was then calculated and compared with the WHO reference median values.^[10] The exact age of every participant was cross checked from the birth certificate or available records. Nutritional status grading on the basis of weight for age and height for age as per IAP and Vishveshwara Rao's Classifications respectively was done.^[11] Quantitative variables are expressed as mean ± SD and qualitative variables as number (percent). The data obtained regarding various bio-socio-demographic factors related with malnutrition was analyzed by Chi-square test (with Yates continuity correction as appropriate) using SPSS Software Version 16.

Out of total 146 under five children, 75 (51.4%) were males and 71 (48.6%) were females. 42.7% of the males were in age group of 2+ to 3 years while in females, age group 2+ to 3 years and 3+ to 4 years comprised 22.5% each [Table 1].

The mean weights of male children ranged from 6.4 ± 2.8 kg to 13.17 ± 0.35 kg and of females ranged from 6.76 ± 2.65 kg and 11.7 ± 2.6 kg, between 0 years and 5 years. On comparison

with WHO Reference standards, mean weights of the study subjects were below the standard value ranging between 80-92% and 67-93% of WHO median value for males and females respectively [Table 2a]. The mean heights of male children were between 63.85 ± 2.7 cm and 95.57 ± 3.6 cm while in females between 60.15 ± 4.5 cm and 90.46 ± 8.9 cm. On comparison with WHO Reference standards, for males and females it was found to be between 88-95% and 82-92% respectively [Table 2b].

54 (37%) of the total subjects were having normal weight for age [Table 3a].^[11] Of the total 92 (63%) malnourished children, 61 (66.3%), 20 (21.7%) and 11 (12%) constituted Grade I, II and III malnutrition [Table 3a]. In Grade I malnutrition, males (34/61) were more as compared to females (27/61). On the contrary, more girls were Grade II and III malnourished [Table 3a]. 23 (30.7%) males and 20 (28%) females had normal height for age^[11] with lowest number in 4+ to 5 years and 3+ to 4 years respectively [Table 3b]. 52 (69.3%) of the total males were stunted, of which 60% had mild retardation and 9.3% had poor height for age. Similarly, 51 (72%) of the total females were stunted, of which 43.7% mild retardation and 28.3% had had poor nutritional status [Table 3b].

It was observed that 21 (31%) males and 25 (43%) females were mild to severely malnourished [Table 4].^[12]

It was found that females had a higher proportion of malnutrition in both the religions. Among Hindus, 58.3% of the total females compared to 56.3% of the total males, and among the Muslims, 74.3% of the total females compared to 66.6% of the total males were malnourished. It was statistically not significant [Table 5].

Table 1: Age and gender-wise distribution of the study subjects

Age group (years)	Males (n=75)	Females (n=71)	Total (n=146)
< or=1	7 (9.3)	13 (18.3)	20 (13.6)
1+ to 2	8 (10.7)	13 (18.3)	21 (14.4)
2+ to 3	32 (42.7)	16 (22.5)	48 (32.9)
3+ to 4	21 (28.0)	16 (22.5)	37 (25.3)
4+ to 5	7 (9.3)	13 (18.3)	20 (13.8)
Total	75 (51.4)	71 (48.6)	146 (100.0)

Table 2a: Age-wise distribution of children as per mean weight (kg)

Age group (years)	Males (n=75)				Females (n=71)			
	No	Weight mean±SD	WHO median	% of WHO standard	No	Weight mean±SD	WHO median	% of WHO standard
< or=1	7	6.4±2.8	7.93	80.3	13	6.76±2.65	7.29	92.8
1+ to 2	8	9.6±1.7	11.04	86.8	13	8.82±1.1	10.33	85.3
2+ to 3	32	1.1±2.03	13.38	82.3	13	10.94±1.63	12.8	85.5
3+ to 4	21	12.46±2.5	15.42	80.8	16	11.83±1.53	15.06	78.6
4+ to 5	7	13.17±0.3	14.42	91.3	13	11.7±2.6	17.24	67.8

WHO= World health organisation

Table 2b: Age-wise distribution of children as per mean height (cm)

Age group (years)	Males (n=75)				Females (n=71)			
	No	Height mean±SD	WHO median	% of WHO standard	No	Height mean±SD	WHO median	% of WHO standard
< or=1	7	63.85±2.7	67.62	94.4	13	60.15±4.5	65.73	91.5
1+ to 2	8	74.75±7.8	82.75	90.3	13	69.75±11.9	81.21	86.0
2+ to 3	32	81.84±7.9	92.29	88.6	16	83.56±8.4	91.06	91.7
3+ to 4	21	86.66±11.9	100.15	88.5	16	82±18.0	99.36	82.5
4+ to 5	7	86.66±11.9	106.94	89.4	13	90.46±8.9	106.44	85.0

WHO= World health organisation

Table 3a: Gradation of nutritional status of the subjects based on weight for age^[11]

Age group (years)	Nutritional grades (Indian academy of pediatrics classification) ^[11]										
	Normal (n=54)		Grade I (n=61)		Grade II (n=20)		Grade III (n=11)		Total (n=146)		
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females	Total
< or=1	2 (6.7)	5 (20.8)	3 (8.8)	8 (29.6)	0 (0.0)	0 (0.0)	2 (100.0)	0 (0.0)	7 (9.3)	13 (18.3)	20 (13.7)
1+ to 2	5 (16.7)	5 (20.8)	3 (8.8)	2 (7.4)	0 (0.0)	6 (54.5)	0 (0.0)	0 (0.0)	8 (10.7)	13 (18.3)	21 (14.4)
2+ to 3	15 (50.0)	9 (37.5)	14 (41.1)	3 (11.1)	3 (33.3)	2 (18.1)	0 (0.0)	2 (22.2)	32 (42.7)	16 (22.5)	48 (32.8)
3+ to 4	8 (26.7)	3 (12.5)	8 (23.5)	10 (37.0)	5 (55.5)	2 (18.1)	0 (0.0)	1 (11.1)	21 (28.0)	16 (22.5)	37 (25.3)
4+ to 5	0 (0.0)	2 (8.3)	6 (17.6)	4 (14.8)	1 (11.1)	1 (9.0)	0 (0.0)	6 (77.7)	7 (9.3)	13 (18.3)	20 (18.5)
Total	30 (55.6)	24 (44.4)	34 (55.7)	27 (44.3)	9 (45.0)	11 (55.0)	2 (18.2)	9 (81.8)	75 (51.4)	71 (48.6)	146 (100.0)

No case of grade IV malnutrition was found; Malnutrition proportion-Males: Females-1: 1.1 (60%: 66.2%)

Table 3b: Gradation of nutritional status of the subjects based on height for age^[11]

Age group (years) (n=146)	Nutritional grades (Vishveshwara Rao's classification) ^[11]					
	Males (n=75)			Females (n=71)		
	Normal	Mild	Poor	Normal	Mild	Poor
< or=1	4 (17.4)	3 (6.7)	0 (0.0)	4 (20.0)	8 (25.8)	1 (5.0)
1+ to 2	4 (17.4)	4 (8.9)	0 (0.0)	3 (15.0)	5 (16.1)	5 (25.0)
2+ to 3	10 (43.5)	19 (42.2)	3 (42.9)	8 (40.0)	7 (22.6)	1 (5.0)
3+ to 4	4 (17.4)	13 (28.9)	4 (57.1)	29 (10.0)	8 (25.8)	6 (30.0)
4+ to 5	1 (4.3)	6 (13.3)	0 (0.0)	3 (15.0)	3 (0.9)	7 (35.0)
Total	23 (30.7)	45 (60.0)	7 (9.3)	20 (28.0)	31 (43.7)	20 (28.3)

Table 4: Age-wise distribution of children based to mid arm circumference (cm)^[12]

Age group (years) (n=126)	Mid arm circumference (cm)					
	Males (n=68)*			Females (n=58)		
	Normal	Mild	Severe	Normal	Mild	Severe
1+ to 2	5 (10.6)	1 (7.7)	2 (25.0)	3 (9.0)	3 (21.4)	7 (63.6)
2+ to 3	22 (46.8)	6 (46.1)	4 (50.0)	14 (42.4)	1 (7.1)	1 (90.9)
3+ to 4	16 (34.0)	5 (38.5)	0 (0.0)	9 (27.3)	4 (28.6)	3 (27.3)
4+ to 5	0 (0.0)	4 (8.5)	1 (7.7)	2 (25.0)	7 (21.2)	6 (42.9)
Total	47 (69.0)	13 (19.1)	8 (11.9)	33 (57.0)	14 (24.1)	11 (18.9)

*Age group 0 months to 1 year not considered as MAC is valuable index between 1 year and 5 years

A higher proportion of females (80.3%) of birth order 3rd and subsequent were malnourished compared to the males of the same birth order. It might be viewed that the first child, whether a son or a daughter, is always cared for and discrimination starts when there is already a son in the family or when the expectation of having a son is not met. Similarly, female children of less educated and illiterate mothers were malnourished in higher proportion (77.1%) as compared to their male counterparts [Table 5].^[9] 58% and 71.9% of the total females belonging to joint/extended family of lower socio-economic status (as per modified Kuppaswamy Scale)^[9] respectively were malnourished compared to 80% and 65% of the total males, probable reason being lack of adequate money for nutrition of the family as a whole. However, this was found to be statistically significant [Table 5].

A higher proportion (62.5%) of the males were malnourished in whom the weaning was started before 6 months of age compared to female counterparts (57.1%). This can be justified by the fact that certain other intrinsic as well as

extrinsic environmental factors also interact in overall growth of the child. However, this was not found to be statistically significant [Table 5].

Thus, birth order ($P < 0.05$), education status of the mother ($P < 0.001$), socio-economic status ($P < 0.05$) and type of family ($P < 0.05$) were found to be significantly associated with malnutrition. However, the Chi-square test results were found to be statistically non-significant while comparing males and females, showing less significant gender differences.

Nutritional status is a major determinant of health and well-being of children. Under-nutrition is a serious public-health problem, especially in developing countries.^[11] The magnitude of problem amongst girl child is high throughout the country and also in the state of Maharashtra, India. The present study revealed that the prevalence of malnutrition is still high in urban slum area of Miraj town of Western Maharashtra and specially, under-5 children are the most vulnerable group with marginal

Table 5: Association of bio-socio-demographic factors and gender differences with malnutrition taking weight for age as the parameter

Variables	Males (n=75)			Females (n=71)		
	NC* (n=30)	UWC** (n=45)	Total (n=75)	NC (n=24)	UWC (n=47)	Total (n=71)
a. Religion						
Hindu	21 (43.7)	27 (56.3)	48 (64.0)	15 (41.7)	21 (58.3)	36 (50.7)
Muslim	9 (33.4)	18 (66.6)	27 (36.0)	9 (25.7)	26 (74.3)	35 (49.3)
	$\chi^2=0.78$, df=1, $P>0.1$, not significant			$\chi^2=2.01$, df=1, $P>0.1$, not significant		
b. Birth order						
First/second	24 (48.0)	26 (52.0)	50 (66.6)	19 (42.2)	26 (57.8)	45 (63.4)
Third/more	6 (24.0)	9 (76.0)	25 (33.4)	5 (19.2)	21 (80.8)	26 (36.6)
	$\chi^2=4.00$, df=1, $P<0.05$			$\chi^2=3.89$, df=1, $P<0.05$		
c. Education of the mother ^[9]						
Illiterate and below secondary	11 (22.0)	39 (78.0)	50 (66.6)	11 (22.9)	37 (77.1)	48 (67.6)
Above secondary	19 (76.0)	6 (24.0)	25 (33.4)	13 (56.5)	10 (43.5)	23 (32.4)
	$\chi^2=20.25$, df=1, $P<0.001$			$\chi^2=7.89$, df=1, $P<0.005$		
d. Socio-economic status ^[9]						
Upper	8 (66.6)	4 (33.4)	12 (16.0)	8 (57.1)	6 (42.9)	14 (19.7)
Middle	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Lower	22 (35.0)	41 (65.0)	63 (84.0)	16 (28.1)	41 (71.9)	57 (80.3)
(Upper middle and lower middle are clubbed into middle and upper lower is clubbed with lower socio-economic status, for the ease of analysis)						
e. Type of family						
Nuclear	25 (50.0)	25 (50.0)	50 (66.6)	11 (27.5)	29 (72.5)	40 (56.3)
Joint	3 (15.0)	17 (85.0)	20 (26.7)	13 (46.4)	15 (53.6)	28 (39.4)
Extended	2 (40.0)	3 (60.0)	5 (6.7)	0 (0.0)	3 (100.0)	
	$\chi^2=6.25$, df=1, $P<0.05^*$			$\chi^2=4.49$, df=1, $P<0.05^*$ (*Yates applied)		
f. Age at weaning						
<6 months	6 (37.5)	10 (62.5)	16 (21.3)	6 (42.9)	8 (57.1)	14 (19.7)
≥6 months	24 (40.7)	35 (59.3)	59 (78.7)	18 (31.6)	39 (68.4)	57 (80.3)
	$\chi^2=0.05$, df=1, $P>0.5$, not significant			$\chi^2=0.63$, df=1, $P>0.1$, not significant		

*NC=Normal children; **UWC=Underweight children

gender differences. A large proportion of children were found to be suffering from different grades of malnutrition reflecting both acute and chronic under-nutrition.

Maiti *et al.* found that in adolescent girls mean weight and average height were much lower than well-to-do Indian children and median value of National Center for Health Statistics (NCHS) data.^[12] It was also found that 23.6-50.8% girls had mild retardation and 0.8-3.2% had poor nutritional status with respect to height for age index.^[13] NFHS-2 also reported a higher percentage of undernourished females (48.9%) as compared to males (45.3%) among under three children.^[14]

Dey *et al.* (2008)^[6] found that, among Hindu community, 52.4% of the females compared to 39.1% of the males and among the Muslims, 58% of the females compared to 50.6% of the males had malnutrition. Similar to our findings, other studies from various parts of India^[15] also reported higher proportion of malnutrition of females than males, which can be explained by prevailing cultural beliefs and practices of the community. In a village in Bangladesh, Chen *et al.* (1987)^[16] showed 14% of the females to be severely

malnourished and stunted compared to 5% of males. Hence, gender inequality is evident in almost every part of this country and abroad. The various bio-social factors related to malnutrition were also found consistent with the other studies.^[6] These bio-social-demographic factors act in combination and augment effect of each other, more-over these factors are interrelated. This means that, intervention directed towards one/other factor/s may bring about desirable changes in other factors directly or indirectly.

The study highlights the awareness for the need of family planning, more attention to girl's nutrition, and educating mothers to achieve improvement in nutritional status of the girl child inspite of limited resources. Improvements in the functioning and utilization of Integrated Child Development Services ICDS Scheme need to be made in order to address the problem of malnutrition. Nutritional rehabilitation centers should be started in community and person from the community is identified and linked with health centers to treat under-nourished children. The families from communities should be encouraged for home based activities for alternative source of income, which will help in improving their purchasing power. Community

support is also necessary to negate such gender inequalities pertaining to nutrition.

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