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Original Research Article

Nutritional status in under five children and their associated risk factors in an urban slum of Mumbai

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ABSTRACT

Background: Young children living in urban slums are at high risk for acute malnutrition and stunting. Many factors contribute towards it including living conditions, gender, delivery method, or access to nutrition. Malnutrition at a young age can cause morbidity and mortality, and impact further development and educational outcomes of children, and cause lifelong impairment. The aim of this study was to assess the nutritional status of young children in an urban slum in Mumbai and the factors affecting the health of children.
Methods: A community based cross sectional study was conducted in the slum community of Dharavi, Mumbai. Data was collected using pre-designed and pre-tested proforma by interview method.
Results: The prevalence of wasting (W/H) was found in 48.9% of the population in this study, of which 25.0% had severe acute malnutrition (SAM) and 23.9% had moderate acute malnutrition (MAM). Stunting was found in 39.7% of the population, of which 29.5% were moderately stunted and 10.2% were severely stunted. Wasting was found to be highly correlated with the age of the child and the age of the mother, whereas Stunting was found to be highly correlated with the child, the age of the mother, and complementary feeding.
Conclusions: Poor nutritional status of children in the urban slums in Mumbai needs to be addressed by improving education and awareness amid parents and access to Anganwadi, Balwadi, and nutritional supplements.

Keywords: Nutritional status, Stunting, Under five children, Urban slum, Underweight

INTRODUCTION

The United Nations Sustainable Development Goal 3 is dedicated to health, with specific goals towards improving maternal and child health as well as a focus on slum populations.[1] USAID stated in a study of India's health status indicators that India ranks among the top 5 "at-risk" countries when calculating absolute numbers of maternal and child mortality. However, it also states that India has also made some progress to improve those statistics.[2] A global study conducted by UNICEF found that the highest prevalence of stunting and wasting is in South Asia, and that amid children under five in India, 54% are stunted, wasted, or overweight.[3,4]

In India, it is estimated that over 100 million people live in urban slums.[5] Furthermore, slum population is increasing every year due to rapid urbanization. Around 1 million people lives in Mumbai's slum area, which is around 41.3% of the whole slum population.[6]

Health risks of slum populations, especially women and children, is higher than the national average due to overcrowding, and lack of basic services including access to safe drinking water, clean environment, and garbage disposal.[7] While the health indicators are much better in urban India than rural India, the indicators in the urban poor are still very low, children being the most vulnerable.

Child marriage and early motherhood are also very common in the urban poor communities and these can be related to increased risk of neonatal mortality, low birthweight baby, child morbidity and mortality. Even, early motherhood also correlates to poor maternal health or maternal mortality which can lead to an increase in the likelihood of poor infant and child health outcomes.[8,9] Many few studies have been done on nutritional status of urban slum's children. So, this study was done to assess nutritional status of under five children and the factors affecting their health.

METHODS

A community based cross sectional study was conducted in the slum community of Dharavi, Mumbai from July 2019 to January 2020. Dharavi is a notified slum as per the 2011 census. A randomized selection of households was taken in different areas of the slum. Households were identified via "snowball" method to reach mothers with young children in the neighborhood. 88 houses were selected for this study.

Data collection

A pre-designed and pre-tested proforma was used to collect data, which consists of series of questions to assess mother's medical history, socio-economic background, habits, age at pregnancy, types of birth, and diet. Child's medical history for the first 2 years of age, child's current height and weight was also noted in the proforma. Data collection was done through personal interview with participants in Hindi & English language. All the personal information of study participants was kept confidential. Mother's ante-natal and postnatal checkup, diet, and morbidity conditions were assessed by history and medical records. Child's early development, breastfeeding, and morbidity pattern in first two years was captured via mother's recall. Details of early morbidity including child's birth weight was noted from the child's medical record and vaccine record card. Child's current height and weight was measured as per standard operating procedure. Height-for-age and BMI-for-age. Z-scores were derived using WHO chart as well as Indian reference populations.[10,11]

Inclusion criteria

Lived in the area for more than six months, had childbirth while living in the area, youngest child currently less than 5 years, only one mother and one child per household were interviewed and assessed.

Statistical analysis

Data was collected in the proforma and it was entered into Microsoft Excel Sheet. It was then tabulated and analyzed using SPSS (21 trial version). Test of significance like Pearson chi square test was used and the statistical significance level was fixed at $p<0.05$.

RESULTS

Table 1: Socio- demographic indicators of study population (n=88).

	Frequency	Percentage
Age distribution of child (months)		
6-12	28	31.8
13-24	7	8.0
25-36	17	19.3
37-48	16	18.2
49-60	20	22.7
Child gender		
Male	44	50
Female	44	50
Education of mother		
Illiterate	10	11.4
Primary school	7	8.0
Middle school	18	20.5
High school	33	37.5
Graduate	20	22.7
Mother's current occupation		
None	71	80.7
Paid casual job	6	6.8
Paid permanent job	4	4.5
Paid professional job	7	8.0
Family type		
Nuclear	39	44.3
Joint	49	55.7
Diet		
Mixed	86	97.7
Veg	2	2.3
House type		
Semi-permanent construction	58	65.9
Permanent construction	16	18.2
Highrise Chawl	14	15.9
Socio economic status (Modified BG Prasad Classification)		
I	4	4.5
II	19	21.6
III	31	35.2
IV	27	25.0
V	12	13.6
Number of children of mother		
≤ 2	65	73.9
3 to 4	15	17.0
5 or more	8	9.1
Toilet in house		
Yes	60	68.2
No	28	31.8

Table 2: Maternal health and morbidity indicators (n=88).

	Frequency	%
Current age of mother		
< 20 years	4	4.5
21 to 30 years	53	60.2
31 to 42 years	31	35.2
Childbirth location		
Home	1	1.1
Government Hospital	40	45.4
Private hospital or nursing home	47	53.3
Childbirth type		
Normal	45	51.1
Cesarian	43	48.9

	Absent		Present	
Other maternal factors	**F**	**%**	**F**	**%**
Period regularity	6	6.8	82	93.2
Current morbidity of mother	73	83	15	17
Mother's addictions	85	96.6	3	3.4
Supplements taken during pregnancy	9	10.2	79	89.8
Pregnancy complications	78	88.6	10	11.4

F: Frequency

Table 3: Child health and morbidity indicators (n=88).

Variable	Absent		Present	
	Frequency	**%**	**Frequency**	**%**
Birth full term	5	5.7	83	94.3
Birth normal delivery	43	48.9	45	51.1
Regular doctor visits	14	15.9	74	84.1
Early breastfeeding	41	46.6	47	53.4
Exclusive breastfeeding for 6 months	12	13.6	76	86.4
Complete breastfeeding till 2 years	38	43.2	9	10.2
Morbidity in first year	81	92.0	7	8.0
Multiple diarrhoea in first year	55	62.5	33	37.5
Multiple Viral fever in first year	51	58.0	37	42.0

Table 4: Anthropometric measurement of study population.

Parameters		No. (%)
Weight at birth	Normal	61 (69.3)
	Low birth weight	27 (30.7)
Current weight (underweight)	Normal	58 (65.9)
	Underweight	18 (20.5)
	Severely Underweight	12 (13.6)
Current height for age (stunting)	Normal	53 (60.2)
	Stunted	26 (29.6)
	Severely Stunted	9 (10.2)
Wasting (weight for height)	Normal	36 (40.9)
	Wasted	21 (23.9)
	Severely wasted	22 (25.0)
	Overweight	5 (5.7)
	Obese	4 (4.5)

A total of 88 children was included in the study. Table 1 shows the demographic profile of the population studied. Children were in the age group of birth till 5 years, with an even mix (50%) of male and female, with median age of 33.8 months. While few mothers were illiterate (11.4%), and some mothers were graduates (22.7%), the rest of them had varied levels of school education. Majority of the mothers were stay at home (71%) but some mothers (8%) held professional jobs as nurse, teacher, accountant, or bank executive. Majority of families lived in semi-permanent constructions (65.9%), had a pour style toilet in the house (68.2%), and were in SES III, IV, and V categories (73.8%) (Table 1).

Table 2 shows the mother's age, pregnancy, and health factors. The mothers studied were generally healthy and most had uneventful pregnancy. Majority of the mothers were in the current age range of 21 to 30 (60%), and had an even mix of normal and cesarian births (48% to 52%). Only 11% of mother's had pregnancy complications, whereas 17% had current morbidity conditions (Table 2).

Table 3 shows the child's delivery, breastfeeding, complementary nutrition, and growth factors. Most of the children were full term (94.3%). 53.6% children started early breastfeeding, 86% did exclusive breastfeeding for the first six months, while only10.2% continued breastfeeding till complete two years. Only 8% children experience morbidity in their first year. However, by recall method, 37.5% children had multiple diarrhea and 42% children had multiple viral fevers in the first year. 30.7% children were underweight at birth (Table 3).

Maximum (69.1%) child's birth weight was normal. As per current weight of the child, only 20.5% children were underweight and 13.6% children were severely underweight. Only 10.2% children were severely stunted and 25.0% were severely wasted (Tables 4).

The highest number of severely underweight children (16.1%) was observed among the mother whose age group was between 31-42 years, which was statistically significant (Table 5).

Table 5: Factors associated with weight of child (n=88).

Variables		Total	Weight			Chi square	P value
			Normal	Under weight	Severely under weight		
Age of child (in months)	6-12	28	16 (57.2)	6 (21.4)	6 (21.4)	16.932	0.152
	13-24	7	6 (85.7)	0 (0)	1 (14.3)		
	25-36	17	11 (64.7)	5 (29.4)	1 (5.9)		
	37-48	16	12 (75.0)	3 (18.8)	1 (6.2)		
	49-60	20	13 (65.0)	4 (20)	3 (15)		
Gender of child	Female	44	27 (61.4)	9 (20.4)	8 (18.2)	2.772	0.428
	Male	44	31 (70.5)	9 (20.4)	4 (9.1)		
Complementary feeding	No food yet	7	6 (85.7)	0 (0)	1 (14.3)	8.582	0.198
	Regular food	81	52 (64.2)	18 (22.2)	11 (13.6)		
Delivery	Caesarean	43	28 (65.1)	10 (23.3)	5 (11.6)	5.248	0.512
	Normal	45	30 (66.6)	8 (17.8)	7 (15.6)		
Age of mother (in years)	<20	4	3 (75.0)	1 (25.0)	0 (0)	21.903	0.001
	21-30	53	35 (66.0)	11 (20.8)	7 (13.2)		
	31-42	31	20 (64.5)	6 (19.4)	5 (16.1)		

Table 6: Factors associated with stunting of child (n=88).

Variable		Total	Height			Chi Square	P value
			Normal	Stunted	Severely Stunted		
Age of child (in months)	6-12	28	17 (60.7)	8 (28.6)	3 (10.7)	2.952	0.937
	13-24	7	4 (57.1)	2 (28.6)	1 (14.3)		
	25-36	17	9 (52.9)	6 (35.3)	2 (11.8)		
	37-48	16	11 (68.8)	5 (31.2)	0 (0)		
	49-60	20	12 (60.0)	5 (25.0)	3 (15.0)		
Gender of child	Female	44	29 (65.9)	12 (27.3)	3 (6.8)	1.626	0.444
	Male	44	24 (54.6)	14 (31.8)	6 (13.6)		
Complementary feeding	No food yet	7	1 (14.3)	2 (28.6)	4 (57.1)	12.308	0.015
	Regular Food	81	8 (9.9)	51 (63.0)	22 (27.1)		
Delivery	Caesarean	43	25 (58.2)	13 (30.2)	5 (11.6)	2.632	0.621
	Normal	45	28 (62.2)	13 (28.9)	4 (8.9)		
Age of mother (in years)	<20	4	2 (50.0)	1 (25.0)	1 (25.0)	3.749	0.441
	21-30	53	30 (56.6)	19 (35.9)	4 (7.5)		
	31-42	31	21 (67.7)	6 (19.4)	4 (12.9)		

Table 7: Factors associated with wasting of child (n=88).

Variable		Total	Wasting (weight for height)					Chi square	P value
			Normal	Over weight	Obese	Wasted (MAM)	Severely wasted (SAM)		
Age of child (in months)	6-12	28	10 (35.7)	1 (3.6)	1 (3.6)	7 (25)	9 (32.1)	22.692	0.122
	13-24	7	2 (28.6)	0 (0)	1 (14.2)	2 (28.6)	2 (28.6)		
	25-36	17	5 (29.4)	3 (17.6)	2 (11.8)	5 (29.4)	2 (11.8)		
	37-48	16	8 (50.0)	1 (6.2)	0 (0)	2 (12.5)	5 (31.3)		
	49-60	20	11 (55.0)	0 (0)	0 (0)	5 (25.0)	4 (20.0)		
Gender of child	Female	44	7 (15.9)	1 (2.3)	2 (4.5)	7 (15.9)	27 (61.4)	3.548	0.471
	Male	44	3 (6.8)	4 (9.1)	2 (4.6)	6 (13.6)	29 (65.9)		
Complementary	No food	7	1 (14.3)	1 (14.3)	0 (0)	2 (28.6)	3 (42.8)	3.414	0.906

Continued.

Variable		Total	Wasting (weight for height)					Chi square	P value
			Normal	Over weight	Obese	Wasted (MAM)	Severely wasted (SAM)		
feeding	yet								
	Regular food	81	9 (11.1)	5 (6.2)	3 (3.7)	11 (13.6)	53 (65.4)		
Delivery	Caesarean	43	5 (11.6)	2 (4.7)	2 (4.7)	9 (20.9)	25 (58.1)	3.517	0.898
	Normal	45	5 (11.1)	3 (6.7)	2 (4.4)	4 (8.9)	31 (68.9)		
Age of mother (in years)	<20	4	1 (25.0)	0 (0)	1 (25.0)	1 (25.0)	1 (25.0)	10.228	0.249
	21-30	53	8 (15.1)	4 (7.5)	2 (3.8)	6 (11.3)	33 (62.3)		
	31-42	31	1 (3.2)	1 (3.2)	1 (3.2)	6 (19.4)	22 (71.0)		

The stunting of children was observed more among 25-36 months of children (47.1%) (Table 6). Even the stunting in children had high correlation with complementary feeding, which was statistically significant (Table 6). The highest proportion of severely wasted (SAM) children was observed among children aged 6-12 months (32.1%) followed by 37-48 months (31.3%) (Table 7). Complementary feeding and age of mother are also associated with children's wasting (Table 7).

DISCUSSION

Prevalence of wasting, stunting, underweight

This study was carried out in low-income households in the urban slum of Dharavi in Mumbai. Our study showed that the prevalence of wasting (W/H) was found in 48.9% of the population in the study, of which 25.0% had severe acute malnutrition (SAM) and 23.9% had moderate acute malnutrition (MAM). Similarly, Vaishali Ghane conducted a study under 5 children at tertiary care hospital in suburban Mumbai indicated the prevalence of severe acute malnutrition (SAM) was 13.33% and moderate acute malnutrition (MAM) was 20.32%, which was comparable to this study finding.[12] In this study, stunting was found in 39.7% of the population of which 29.5% were moderately stunted and 10.2% were severely stunted, whereas 34% of the children were underweight compared with 30.7% children being underweight at birth.

Similarly, in a study done by Patil et al in rural Wardha District of Maharashtra (Central India) indicated the prevalence of stunting and wasting under 5 children was 49.8% and 21.7% respectively.[13] Even, in a study conducted by Mittal et al in Punjab and Agarwal et al in Mumbai slum showed that prevalence of stunting was 46.06% and 29.1% respectively, and prevalence of underweight was 38.8% and 41.7% respectively.[14,15]

Percentage of children with Wasting and Stunting was found to be higher in this study in the urban slum of Dharavi in Mumbai compared with average data of Maharashtra state and with studies conducted in other slums in Central India and Punjab.[13,14,16] Stunting, wasting, and underweight children were higher in our study even compared to the study done by Sahu et al in urban slum of Delhi.[17]

This indicates that children in the urban slum of Dharavi in Mumbai are at very high risk of malnutrition. The children in slum areas in Dharavi have poor economic status, poor sanitation and hygiene in living conditions, and poor nutritional status.

Factors of wasting, stunting, underweight

This study found a high correlation between the wasting and age of the child. The trend indicated a U-shaped pattern, with high percentage of children with wasting in the age range of 6 to 12 months, indicating low birth weight, and again in the age range between 37 to 60 months, indicating poor nutritional status. However, it was not statistically significant (p>0.05). The age of the mother had a high correlation with wasting of the child, and mothers with higher age had higher percentage of children as wasted and severely wasted. Even studies carried out by Ansuya et al in Karnataka showed that low birth weight is strongly associated with malnutrition.[18,19] Delayed start and quality of complementary feeding were found to be significant factors by other studies.[18,20,21]

This study found a similar pattern in weight of children, with underweight being highly correlated with the age of the child, age of the mother, and complementary feeding which was significant and comparable with other studies finding.[22,23] Stunting has been found to impact early childhood development and cause poor performance at school and low productivity when they reach their working age.[23,24] A study in Rwanda found that gradual increase in stunting with age of the child might be due to inappropriate food supplementation during weaning and quality of complementary feeding.[25] This study found that stunting had a high correlation with complementary feeding with high significance (p -0.015), indicating that poor nutrition impacted stunting. A study conducted by Kapur et al in an urban slum of Delhi suggested that low food intake and chronic calorie deficit was the primary cause of growth retardation and malnutrition in children.[26] A study in Burkina Faso reported that child

sex, age, size at birth, child morbidity, mother's education and BMI, and household wealth index were identified to be the most contributing factors to affect child malnutrition.[22]

Limitations

This study were small sample size. As it was a cross sectional study and the study setting was urban slum, so the study findings cannot generalize to general children population.

CONCLUSION

Malnutrition impacts long term health, academic, and success potential of children; hence, it must be addressed as a priority. Malnutrition is associated with modifiable and non-modifiable factors. Modifiable factors include training and education about nutrition, home hygiene and sanitation, age of weaning, access and quality of complementary feeding, and diteray practices. High prevalence of wasting, stunting and underweight in children under five in our study suggests that there is a general need for creating awareness about nutrition and growth factors amid parents in urban slums that may influence the healthy development of these children. Giving these children access to Anganwadi and Balwadi facilities and supplemental meals may improve their nutrition and growth.

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