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NUTRITIONAL STATUS OF PRESCHOOL CHILDREN IN URBAN SLUM OF KARACHI, PAKISTAN

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Abstract

Background:

Malnutrition which contributes to a very high number of child deaths is never a direct cause of death. Households barely fulfilling its daily need are unable to afford quality nutrition and nutritional compromise has become the priority to compensate for other burdens of life. Younger age group is most susceptible because of the dependency on their elder. The aim of the study was to assess the prevalence of malnutrition among children under 5 year of age.

Methods:

A cross-sectional survey of 132 households was conducted in urban slums of Karachi Pakistan. In order to reduce the likelihood of missing any affected children, a pre-designed questionnaire and a variety of anthropometric methods for identifying malnutrition were used.

Results:

The results of the study showed malnutrition in 38% children according to MUAC and 22% children were found to have a BMI below 5th percentile. Z-scores were calculated using WHO anthro software and height for age (stunting) and weight for height (wasting) among children were found to be 49% and 23.5% respectively

Conclusion:

Malnutrition is a public health issue in slums. The majority of preschool under 5 age children in our study were malnourished. It is recommended to implement skills-based nutrition education, food fortification, effective infection control, public healthcare worker training, and integrated program delivery.

INTRODUCTION

Malnutrition describes as insufficiency or imbalance of energy, protein and other nutrients, which can have negative consequences on tissue, body shape, size and composition and function and clinical outcome. Impaired immune function, delayed wound healing and illness recovery are the primary contributors to the morbidity effects of malnutrition (1).

Malnutrition is a major public health problem in Pakistan. Malnutrition refers to an imbalance between one or more of the nutrients considered essential for normal function due to relative or absolute deficiency or excess (2). Several social and

environmental factors contribute to primary malnutrition, while certain pathological conditions also contribute to the secondary malnutrition. Globally, the burden of malnutrition on children is high, as it contributes to morbidity and mortality (3-4).

In Pakistan approximately one-third of young children are counted as underweight, according to the 2018 National Nutrition Survey (NNS) (5).According to information gathered from the households and the extremely low income families, the primary cause of growth retardation was a lack of food. Malnutrition of different age groups may have different outcomes but the determinants are almost the same (6). Similar such studies have been done in different regions and in different age groups, yielding different results (6-9). An early nutritional survey in an expanding community will yield the indicators among suburban population.

According to National Nutritional Survey estimates, there are more than 150 million malnourished children under the age of 5 years around the world. Furthermore, malnutrition is widely recognized as the contributing factor to half of the 12 million deaths among children under the age of 5, or almost 54% of the young child mortality rate in the developing countries (9).

The children's nutritional status is a prime indicator of the general well-being of a society and reveals food security along with the existing health-care and ecological conditions. Unfortunately, in Pakistan, approximately 40% to 50% of children under the age of five years are stunted (10).

In the case of malnutrition, individuals are unable to perform natural bodily functions, such as growth, ability to resist and recover from infections, the capability to learn and exercise, and the inability to bear and rear children, particularly in the case of women. Children and infants who do not receive optimal breastfeeding and responsive complementary feeding, as well as illnesses such as diarrhea, malaria, pneumonia, and HIV/AIDS, often exacerbated by parasites, are among the leading causes of malnutrition (11).

Early identification of malnutrition in children and its correction is helpful not only in healthy growth but also helps in prevention of any morbidity and mortality. Based on multiple anthropometries, the purpose of this study was to assess the nutritional status of preschool children in urban slums of Karachi and to determine the prevalence of malnutrition among these children.

Methodology:

A total of 129 under 5 year aged children were enrolled on the basis of cluster sampling. The duration of this study was 3 months from January 2022 to April 2022. It was mainly a community based survey which was conducted in Karachi the largest city by population of Pakistan. For this study we selected the Gulberg Town with its UC 9 as a study site. The children with known chronic diseases, congenital disease or malformations and those suffering from acute infections were excluded from the study.

The sample size, estimated on the basis of expected 44% prevalence of stunting (NNS2018) (12) and, 95% CI and margin of error 9% is 117 using formula $P(1-P)/e2$. The sample size was increased by 10% to avoid non response, missing values and to reduce the effects of outlier. Hence a total of 132 under 5 children were included in the study.

Data Collection Instrument

Pre structured questionnaire was built in which the questions regarding the socio-demographic factors, anthropometric measurements. Survey questionnaire was built using the key indicator survey forms. Child anthropometric measurements (i.e. weight, height, BMI, mid upper arm circumference) were also recorded. The height and weight were measured by a stadiometer (floor type model with sensitivity of 0.1 cm and 0.1 kg. Typically, it is constructed from a ruler and a sliding horizontal piece which is adjusted to rest on the top of the head. For the purpose of measuring the mid arm circumference, measuring tape was used twice consecutively. The sensitivity of which is 0.1 cm.

Data Analysis

Data was collected using a pre-designed structured questionnaire, and SPSS version 22 was used for analysis. The principal investigator weighed the accuracy of data collection questionnaire against the database at least twice prior to analysis. Before the

actual analysis, every error that was found was fixed. Descriptive statistics were performed. Categorical data (i.e. gender) was presented as frequency & percentage. Quantitative variables (i.e. age, weight, height, BMI etc.) were presented as mean ± SD. Anthropometric indices were further analyzed and Z-scores for height, weight and MUAC were calculated using WHO anthro (13) along with the height for age and weight for age. Nutritional status of the children was then compared with WHO references.

Results

Characteristics of the Study Participants

The demographic characteristics of the children under 5 years of age who participated in this study are depicted below in Table 1. The mean (SD) age of children was 2.84 ±1.24. Among 132 children, majority (58.3%) were males.

Demographic Characteristics	n (%) or Mean ± SD
Age of child (Years)	2.84 ± 1.24
Gender	n(%)
Male	77 (58.3)
Female	55 (41.7)

Table 1: Demographics of children participated in this study

Child Nutritional Assessment:

4.1.2.1 Child Feeding Practices

The child feeding practices were assessed and demonstrated (Table 2). Majority (61.1%) were breast fed, followed by honey (20.6%). Ninety percent of mother breast fed their child. Around 38(56.7%) of child were currently on breast feeding. Feeding bottle use was pre-dominant with 79.5% of children using feeding bottle. The last intake of food taken was also inquired, with forty five percent took juice/soda or rice water, and one third (33.35%) took formula or dairy milk. Majority (43.9%) started complementary feeding between 6-7 months, followed by around twenty seven percent starting between 3-6 months. Majority (71.7%) had thrice daily eating frequency.

Child Feeding Practices	n (%)
Child first feed	
Breast Milk	80 (61.1)
Water	2 (1.5)
Ghutti	12 (9.2)
Honey	27 (20.6)
Others	10 (7.6)
Breast fed by mother	
Yes	117 (90)
Currently on breast feeding	
Yes	38 (56.7)
No	29 (43.3)
Feeding bottle used by child	
Yes	62 (79.5)
No	16 (20.5)
Food taken from bottle last night	
Plain Water	2 (3.3)

Formula or Dairy Milk	20 (33.3)
Juices, Soda or Rice water	27 (45)
Any semi solid or mushy food	11 (18.3)
Complementary feed started	
3-6 months	34 (27.6)
6-7 months	54 (43.9)
7-8 months	17 (13.8)
8-12 months	9 (7.3)
No Recall	9 (7.3)
Frequency of child eating	
Once Daily	3 (2.4)
Twice Daily	18 (14.2)
Thrice Daily	91 (71.7)
More than 3 Times Daily	15 (11.8)

Table 2: Feeding practices of children less than 5 years

Anthropometric Measurements of Child

The average anthropometric measurements of children are shown in Table 3. The mean (SD) of the age (years), weight (kg), height (cm), MUAC (cm), body mass index (kg.m^2) was measured as 2.835 (±1.24), 11.1439 (±2.83), 86.63(±12.45), 14.26 (±1.28) and 14.92 (±2.92).

	Mean ± SD
Age of child (years)	2.84 ± 1.24
Weight (kg)	11.14 ± 2.83
Height (cm)	86.63 ± 12.45
Mid upper arm circumference (cm)	14.27 ± 1.28
Body Mass Index (kg/m^2)	14.92 ± 2.92

Table 3: Anthropometric Measurements of Child

Assessment of Malnutrition using mid upper arm circumference (MUAC) cut-off

The Protein Energy Malnutrition based on mid arm circumference values are described below in Figure 1. Malnutrition was observed in 38% of children, with severe malnutrition among 10 percent and mild to moderate malnutrition among twenty eight percent 28%

Assessment of Malnutrition using percentile scores on Body Mass Index

The percentile scores of body mass index were used to classify the malnutrition shown below in Figure 1. Among the children assessed, 8% were overweight and 7% were obese. Majority, 63% were found to be healthy with BMI in the range of 5th to 85th percentile. Importantly, 22% were found to be underweight.

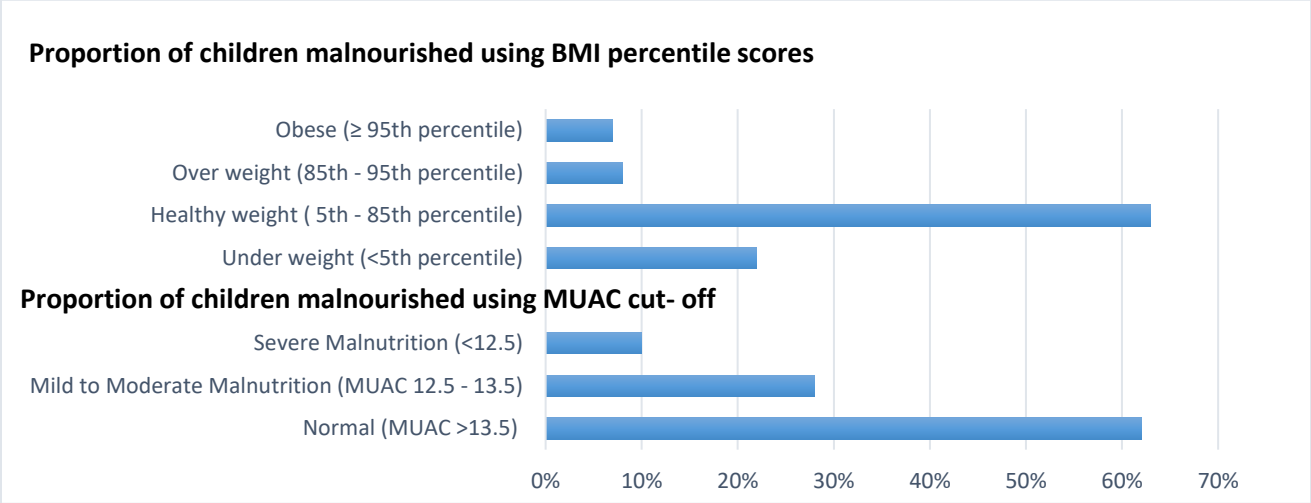


Figure 1: Proportion of children malnourished using BMI percentile scores and MUAC cut- off.

Assessment of Malnutrition using Z-scores:

Height for Age:

48.5% which is less than half of the children were in between +2 to -2 SD, 49.2 % of the children were malnourished (undernourished) while 2.3% of the children were over nourished according to their age.

Weight for Age

62% of the children were found to have a Z score within ±2 SD while 38% of the children were below -2 SD and were underweight according to their age.

Weight for Height:

72% of the children lies in between the ±2 SD where as 5% are above +2 SD and are overweight whereas 23% are below -2 SD and are considered malnourished.

Stunting and Wasting Among Children:

Z scores for weight for height, height for age, weight for age, MUAC, BMI for age were calculated using WHO anthro (13). A standard cut off of < -2 SD is used in this study, away from the 95% population. Children falling below the cut off or below 5thpercentile were considered stunted and wasted.

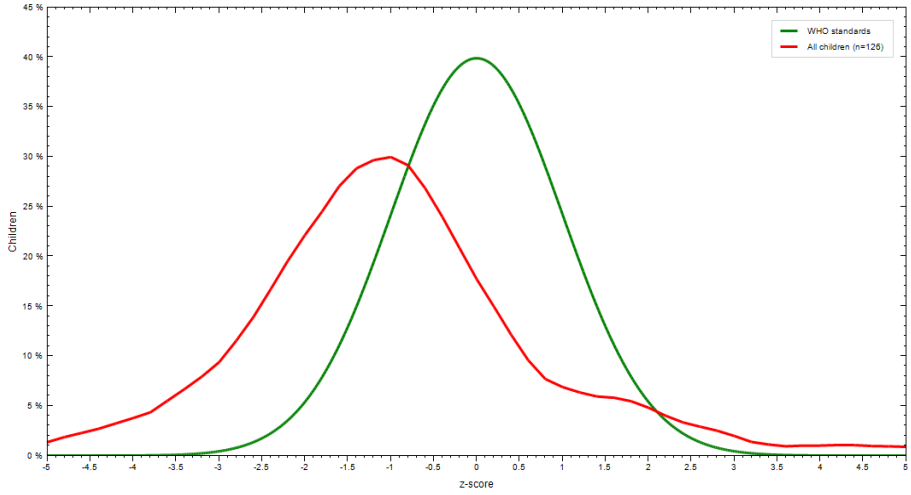
Stunting:

Height for age is the WHO standard method to calculate stunting. According to Height for age Z scores, 49% of the children are below -2 SD and are stunted. Only 2.3% children were above the 95thpercentile (Figure 2).

Wasting:

To calculate wasting using the weight for height Z scores, 23.5% of the children were found to be below -2SD and wasted (Figure 3).

Figure 2: Comparison of height for age (stunting) with reference population



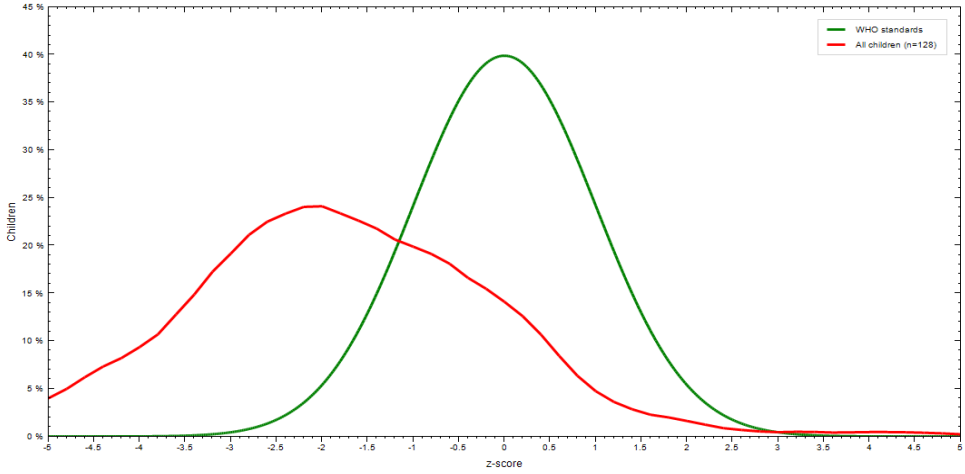


Figure 3: Comparison of weight for height (wasting) with reference population

Agreement between anthropometries:

In this study, various methods were used to assess the nutritional condition. A kappa statistical analysis was used for computing an agreement between different measurement techniques. An agreement was established between categories of BMI, MUAC and Height for age, Weight for age and Weight for height to obtain chance-corrected association coefficients (Table 4).

TEST A	TEST B	Kappa coefficient
MUAC	BMI	0.036
MUAC	Weight for Age	0.131
MUAC	Weight for Height	0.079
MUAC	Height for age	0.346
BMI	Weight for Age	0.246
BMI	Weight for Height	0.828
BMI	Height for age	-0.311

Table 4: Kappa analysis Between MUAC and Anthropometries & between BMI and Anthropometries

An excellent strength of agreement 0.81-1.0 was observed in:

- BMI and weight for height

Fair to good strength of agreement with a kappa coefficient 0.21-0.40 was observed among:

- MUAC and Height for age
- BMI and Weight for age

A poor strength of agreement with a kappa coefficient of <0.20 was observed among:

- MUAC and BMI
- MUAC and weight for age
- MUAC and weight for height
- BMI and height for age

Discussion:

To identify the factors affecting nutritional status, a prevalence study of current nutritional status was required. Child anthropometry was used to classify children in different nutritional groups. MUAC was used to assess the protein energy malnutrition (PEM) and BMI was calculated to observe gross malnutrition. Both indicators were recorded and a comparison between the two values was done. Using the basic anthropometries height for age and weight for age was calculated to identify the prevalence of stunting and wasting among children.

According to NNS 2018 (14), 11.6% of children in Pakistan were severely underweight, and 19.9% were moderately underweight. There was no significant difference found between rural and urban areas (9). Prevalence data of this study showed that 38% of the children were malnourished according to MUAC with severe malnutrition in 10% while the other 28% were mild to moderately malnourished. Among the children assessed using the BMI, 81% children were healthy in between $5^{th}$and 85^{th} percentiles and only 6.8% were underweight below the 5^{th} percentile.

A study conducted in 2003 by Department of health and nutrition Malaysia which observed a widespread improvement in trends of stunting is observed with an estimated prevalence of 43.7% which is a substantial decrease of 0.86% per year from 60.8% in 1980 (15). Another study conducted in urban squatter settlement in Pakistan showed a prevalence of underweight below 2 SD to be 29.5% (16).

In this study, the Z scores were used to assess the prevalence of stunting and wasting and overall stunting was found to be 49% and wasting at around 29%. Despite an improvement in nutritional trends in economically stable Asian countries, Pakistan have no observable improvement in this area. As a result of much higher prevalence of malnutrition reported from MUAC, the dependent variables were therefore compared with MUAC categories.

The test results in this study showed that Weight for Height and BMI showed an excellent degree of agreement in each category. Furthermore a fair to good strength of agreement between MUAC and height for age and BMI and weight for age was also observed. A poor agreement was observed in the remaining comparisons. The analysis of agreement among measures of thinness and obesity assessment of Iranian School Children also agreed to an excellent agreement between weight for height and BMI. The level of agreement between MUAC and BMI in pubertal girls was moderate to low (17). However, in this study a poor agreement was observed among MUAC and BMI and hence does not prove to be alternate to each other.

MUAC in place of Height for age and BMI can be used instead of weight for age and weight for height Z scores (18). But there is no agreement that measure of thinness which is MUAC can replace BMI. Weight for height and height for age are also measures to identify stunting and wasting. Hence no single method is accurate enough to figure out malnutrition. A combination of anthropometries is always required in figuring different patterns of malnutrition which is statistically proven in this study.

The limitations of this study include the small sample size and cross sectional study design which provides just the snap shot of current prevalence and does not provide information about the trends and temporal relationships. Hence, it is recommended that longitudinal studies with larger sample size should be conducted

Conclusion

The prevalence of malnutrition is quite high amongst preschoolers in urban slums of Karachi, Pakistan.

This neglect, not intentional but due to the inaccessibility of adequate resources causes a vicious cycle in the health of children. In order to improve child nutrition awareness regarding healthy diet and practice regarding food preferences and food preparation should be done at household levels involving the females of household.

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