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A Cross-Sectional Comparative Study to Assess the Nutritional Status and Diseases Associated With Malnourishment in Children in Rural and Urban Settings

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ABSTRACT
Background:Malnutrition is a significant public health issue in developing nations and has an impact on a child's growth and development in their early years. The incidence and prevalence of malnutrition can differ between rural and urban populations for a variety of reasons.
Purpose:The current study intends to evaluate and compare dietary habits and anthropometric indices among school-aged (6–12 years old) children in an urban and rural area.
Results and discussions:The prevalence of severe wasting (WHZ<-3SD) and severe underweight (WAZ<-3SD) was greater in kids from rural areas, whereas severe stunting (HAZ<-3SD) was greater among urban kids. Nutritional analysis showed no differences between the consumption of vegetables, dairy, and meat products in urban and rural populations.
Keywords: Nutritional assessment, Anthropometric, Urban, Rural.

I. INTRODUCTION

Nutrition status determines the growth in children which in turn is influenced by their dietary intake. However, a child's growth is also greatly influenced by other factors such as food security, socio-economic status, environmental factors, and available resources[1]. child's health and nutritional status have a major role in the overall health and economic development of a country. The child's nutritional status is a sensitive indicator of community health and nutrition, where the greatest public health problems in developing countries are attributed to undernutrition[2].

NEED FOR STUDY

A condition known as malnutrition is brought on by dietary deficiencies or overconsumption, which in turn causes undernutrition or overnutrition. According to the report of UNICEF around 2300 children die daily and in developing countries, 1 in 7 children die at preschool age because of malnutrition[3]. The extensive diet and nutrition survey carried out by the National Nutrition Monitoring Bureau [NNMB] and the National Institute of Hyderabad [NIN] in 12 states of the country indicates that the diet is inadequate and deficient in nutrition among rural population[4]. India is home to one-third of the world's children who are wasted, with 43% underweight and 48% stunted due to chronic undernutrition. Only 25% of newborns are nursed exclusively during the first hour after delivery, and only 46% are. According to the research provided by the World Bank, considerable improvements must be made to India's Integrated Child Development Services (ICDS) to solve the present malnutrition epidemic[5].

Undernourished children are more susceptible to infections and according to statistical reports, these children are more prone to diseases such as diarrhea, measles, malaria, and LRTI. Undernourishment will reduce physical and cognitive development in children[6]. In LMIC (low - middle-income countries) obesity and overweight are more prevalent in urban areas whereas underweight is higher in rural areas[7].

A mother's education and socioeconomic status have a greater impact on the child's nutritional status. Sound child-feeding practices and the health-seeking behaviour of mothers are very crucial for child development which is Unfortunately lacking in illiterate or poorly educated mothers which affects the nutritional status of children. One of the reasons for children's nutrition and their indulgence in chocolates, processed food items, and bakery products like

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biscuits can be due to mothers' illiteracy. Employment of mothers may contribute to poor childcare and may result in poor dietary habits[1].

The most effective way to evaluate a population's nutritional status is by anthropometric measures, which make it possible to determine the type and severity of protein-energy deficiency in each group. Weight and height were converted to nutritional indices: Weight for age (W//A), Weight for Height (W//H), and Height for Age (H//A)[8].

On this account, there lies a necessity to compare and to know about the diseases associated with malnutrition in children in urban and rural areas.

OBJECTIVES

Primary objective:

- To determine and compare nutritional status in rural and urban settings.
- To know the diseases associated with malnourishment.

Secondary objective:

- To estimate the prevalence of malnutrition using anthropometric indicators.
- To provide awareness using PILS to parents and children.

METHODS AND MATERIALS

Inclusion criteria:

- school-aged (6-12 years)

Exclusion criteria:

- Infants and toddlers
- children from 13- to 18-year-old

METHOD OF STUDY

STUDY DESIGN AND SETTING:

- This community-based, cross–sectional comparative study was conducted in rural and urban areas in Bengaluru.
- The survey was conducted in certain localities in Bengaluru in the rural areas like Devanahalli, BandikodigehalliPalya, Mylanahalli, Hunachur and urban areas like Yelahanka, Bagalur.

STUDY POPULATION:

- The population targeted for this study consists of school-aged (6-12 years)

SAMPLE SIZE:

- A sample size of 500 was surveyed. An equal no. of 250 samples were collected from both rural and urban children population.

	MALE	**FEMALE**	**TOTAL**
RURAL	**125**	**125**	**500**
URBAN	**125**	**125**	

STUDY INSTRUMENT / RESEARCH TOOL:

- Information collected was based on dietary intake, socioeconomic status, environmental factors, parents' education, employment status, size of family, medical history, and medication history.
- Additional Information was collected by Using a questionnaire for both parents and children.
- By anthropometric assessment (i.e., measurement of weight, height, and age) – to assess the prevalence of wasting, stunting, and overweight.

STUDY PROCEDURE AND METHOD OF COLLECTION OF DATA

A cross-sectional comparative study to assess the nutritional status was done in both rural and urban settings. The data were primarily collected from schools. The survey covered urban schools of Yelahanka, Bagalur, and in rural schools of Devanahalli, BandikodigehalliPalya, Mylanahalli, and Hunachur. The children who met the inclusion criteria were enrolled in the study. Components of a complete nutritional assessment include a medical history, nutritional history including dietary intake, physical examination, and anthropometrics (weight, length, or stature, midarm circumference). Patients unable to stand or with

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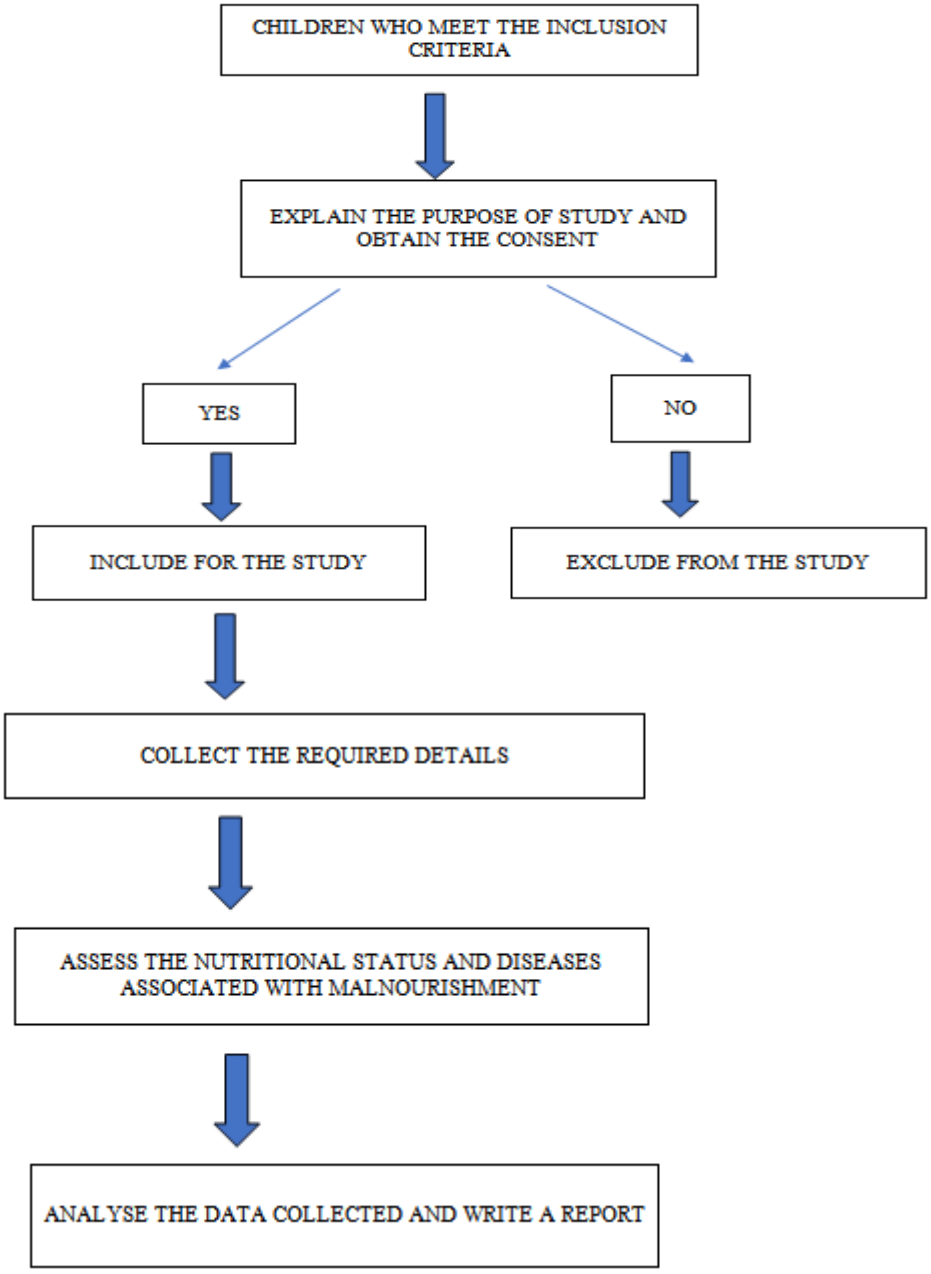
musculoskeletal abnormalities might undergo other tests for linear growth evaluation, such as upper arm and lower leg measurements. The use of age, gender, and growth charts was vital in assessing nutritional status and monitoring nutrition interventions.

An evaluation of current and past medical conditions, together with prescriptions, is part of a medical history. A nutritional history was acquired, covering the kid and family's unique eating habits, prior feeding histories, usage of calorie, vitamin, or mineral supplements, and an assessment of the food consumed on a "typical" day. Socio–demographic status, dietary pattern of the child, feeding histories, medical and medication history, and intake of vitamin-mineral supplements were collected through questionnaires given to the parents. The physical examination includes current weight, height, length, and mid - arm circumference. A careful examination of signs of general malnutrition, vitamin deficiency, anemia, and rickets were made.



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II. RESULTS

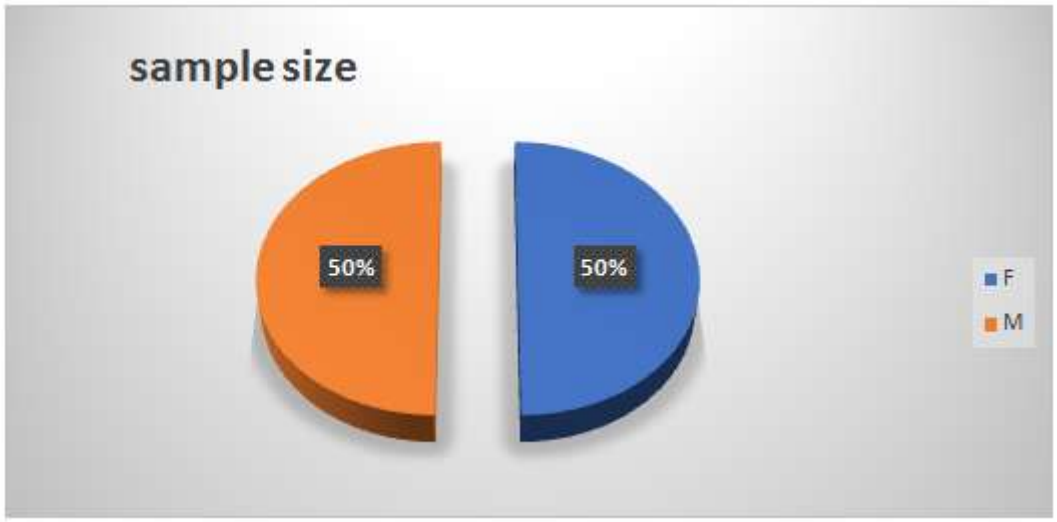

Figure 1: Graphical representation of sample size based on age in urban settings

Figure 01 shows the involvement of 250 children of various age group from age 6- to 12-year-old in urban areas. The 250 children are distributed as 125 (50%) male child and 125 (50%) female child.

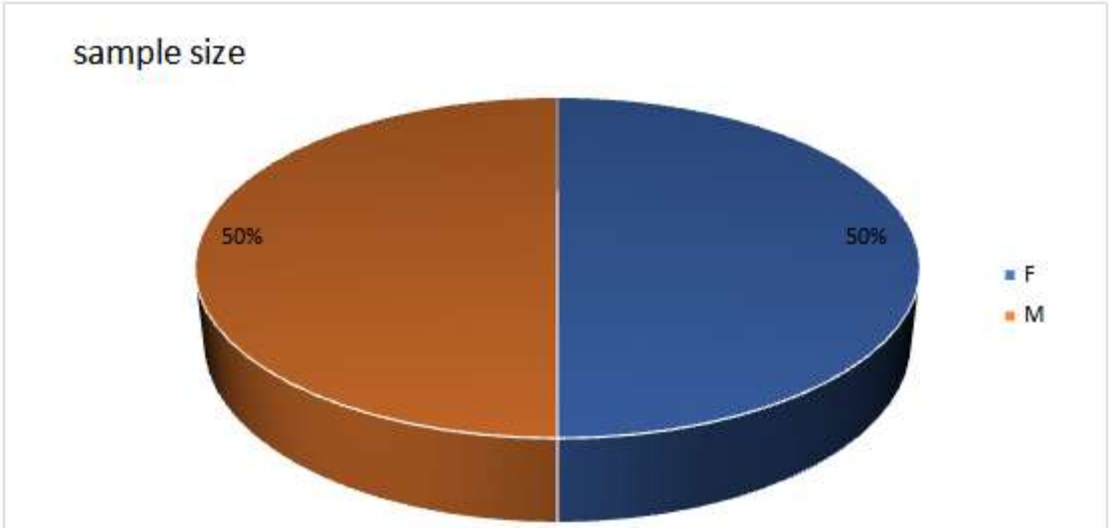

Figure 2: Graphical representation of sample size based on age in rural settings

Figure 02 shows the involvement of 250 children of various age group from age 6- to 12-year-old in rural areas. The 250 children are distributed as 125 (50%) male child and 125 (50%) female child.

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COMPARISON OF ANTHROPOMETRIC INDICES ACCORDING TO URBANIZATION

Height for age comparison between rural and urban settings

Table 3: Height for age Z score for urban population

HEIGHT FOR AGE Z SCORE		Percentage (%)
marginally stunted	59	23.6
moderately stunted	37	14.8
Normal	147	58.8
severely stunted	7	2.8
Grand Total	250	100

HAZ represents the number of standard deviations of the actual height of the child from the median height of the children of his/ her age as determined from the standard sample. Stunting is a kind of malnutrition, and the WHO considers a child too small for his or age when the height for age Z score (HAZ) value is less than -2SD (i.e., <-2SD) from the median height of the WHO reference population.

Table 4: Height for age Z score for rural population

Height for age Z score		Percentage (%)
marginally stunted	62	24.8
moderately stunted	38	15.2
normal	147	58.8
severely stunted	3	1.2
Grand Total	**250**	100

In this study, a total of 500 samples were collected with 250 samples each from urban and rural settings. The data were collected from various schools. Most of the children from the urban areas belonged to the upper socio-economic group while in the rural settings, most of the children belonged to the lower socio-economic group.

The extent of marginal stunting (-2 < HAZ <-1) is significantly greater in rural areas (24.8%) when compared to urban (23.6%). 15.2 % moderate stunting (-3 <HAZ <-2) children were observed in the rural population whereas it was 14.8% among the urban children. Severe stunting (HAZ <-3SD) was seen more in urban children (2.8%) whereas 1.2% severe stunting was observed in rural children. And among 500 children 58.8% each from rural and urban settings were found to be normal (-1 < HAZ <0).

Weight for height comparison between rural and urban settings

Table 5: Weight for height Z score for urban population

Weight for height Z score		Percentage (%)
At the risk of overweight	25	10
Marginally wasted	54	21.6
Moderately wasted	40	16
Normal	119	47.6
Severely wasted	12	4.8
Total	250	100

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Weight for height for age indicates a child's weight status independent of their height relative to a reference population. It is often indicating whether the children are overweight, obese, or underweight.

Table 6: Weight for height Z score for rural population

WEIGHT FOR HEIGHT Z SCORE		**Percentage (%)**
At the risk of overweight	14	5.6
marginally wasted	46	18.4
moderately wasted	42	16.8
Normal	120	48
severely wasted	28	11.2
Total	250	100

The extent of marginally wasted (-2 < WHZ <-1) is significantly greater in urban areas (21.6%) when compared to rural (18.4%). 16.8 % moderate wasting (-3 <WHZ <-2) children were observed in the rural population whereas it was 16% among the urban children. Severe wasting (WHZ <-3SD) was seen more in rural children (11.2%) whereas 4.8% severe wasting was observed in urban children. Among 500 children 48% from rural settings were found to have normal weight for height measurements and 47.6% children from urban settings were found to be normal (-1 < WHZ <0). 10% of the children from the urban population were at risk of being overweight whereas over 5.6% of children from the rural area were at risk of being overweight.

Weight for age comparison between rural and urban settings

Table 7: Weight for age Z score for urban population

weight for age Z score		**Percentage (%)**
At risk of overweight	20	8
Marginally underweight	72	28.8
Moderately underweight	40	16
Normal	97	38.8
Severely underweight	21	8.4
Total	250	100

Table 8: Weight for age Z score for rural population

Weight for age Z score		**Percentage**
At the risk of overweight	14	5.6
Marginally underweight	84	33.6
Moderately underweight	47	18.8
Normal	83	33.2
Severely underweight	22	8.8
Total	250	100

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The magnitude of marginally underweight (-2 < WAZ <-1) is significantly more in rural areas (33.8%) when compared to urban (28.8%). 18.8 % moderately underweight (-3 <WAZ <-2) children were observed in the rural population whereas it was 16% among the urban children. Severely underweight (WAZ <-3SD) was seen more in rural children (8.8%) whereas 8.4% severely underweight was observed in urban children. Among 500 children 33.2% from rural settings were found to have normal weight for age measurements and 38.8% children from urban settings were found to be normal (-1 < WAZ <0). 8% of the children from the urban population were at risk of being overweight whereas over 5.6% of children from the rural area were at risk of being overweight.

Dietary patterns among students

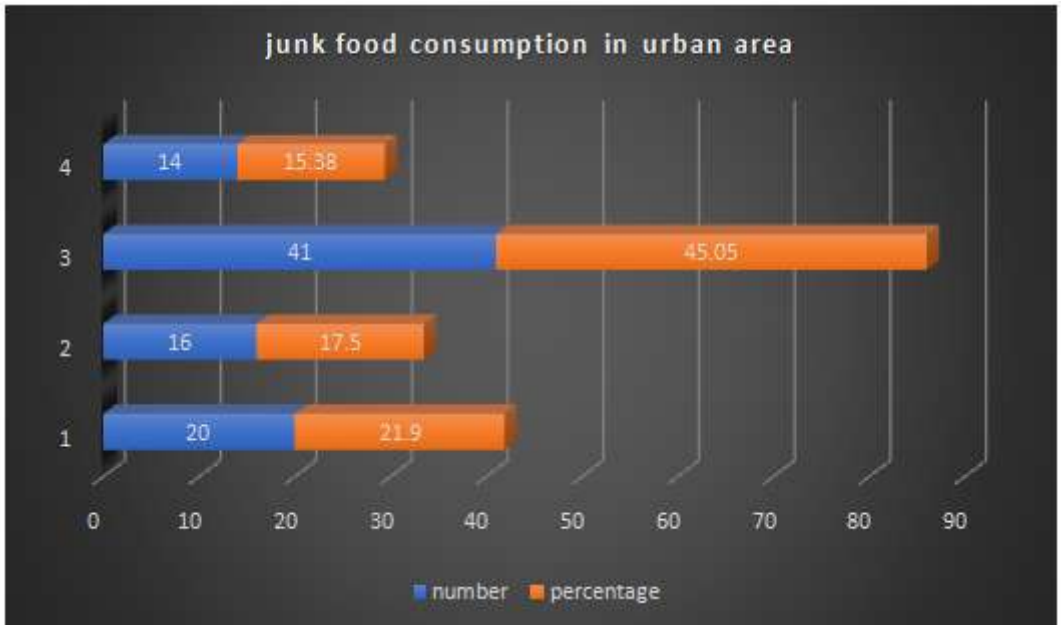
Dietary patterns in children were assessed with the help of questions that were duly filled by parents. The questions included were

- child's appetite
- number of meals taken by the child
- type of diet
- inclusion of raw vegetables/ green leafy vegetables and dairy products
- consumption of junk foods/ packed foods
- additional vitamin/ mineral supplementation
- duration of breastfeeding
- How often the child gets sick.

Most of the children consumed vegetarian and non – vegetarian diets, and dairy products. For students in the rural areas the data were collected from government schools, and it was observed that the provision of mid–day meals which included rice, vegetables, milk, eggs, and fruits was beneficial to the children.

Consumption of junk food/ packed/ preserved food

Out of 250 questionnaires provided to the parents in urban areas, 91 responses were obtained.



The chart explains junk food consumption in urban children. From these 91 responses, 14 children (15.38%) consume junk food once in a month. 41children (45.05%) consume junk food/ preserved food once in 2 weeks, 16 children (17.5%) consume junk food thrice in a week and 20 children (21.9%) are everyday consumer of junk food.

Out of 250 questionnaires provided to the parents in rural areas, 142 responses were obtained.

Chart Title: junk food consumption in rural area
Series 1: Number
Series 2: Percentage

The above chart explains junk food consumption in rural children. From these 142 responses, 62 children (43.66%) consume junk food once in a month. 38 children (26.76%) consume junk food/ preserved food once in 2 weeks, 13 children (19.15%) consume junk food thrice in a week and 29 children (20.4%) are everyday consumers of junk food.

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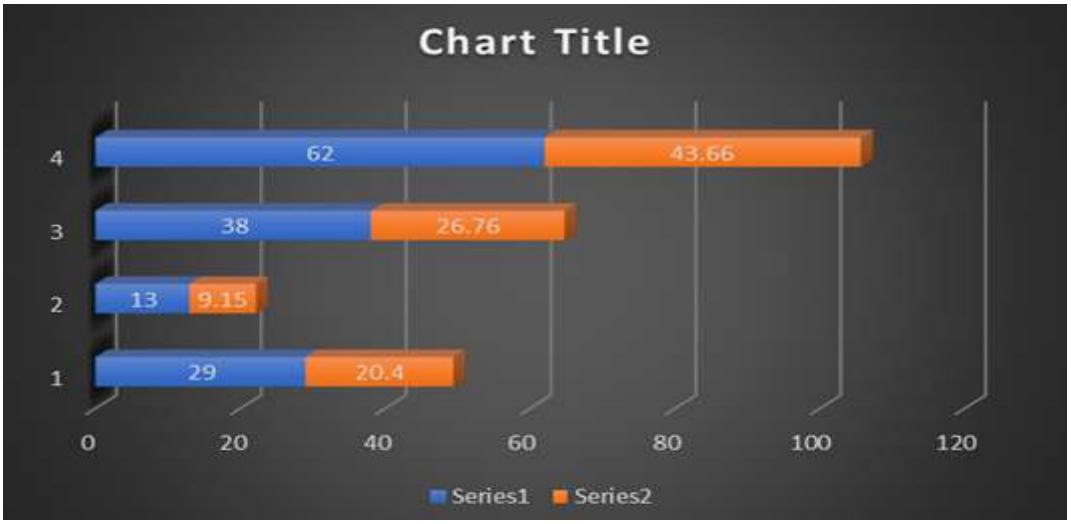

III. DISCUSSIONS

The cross – sectional comparative study on nutritional assessment in children of rural and urban areas of Bengaluru was comprised of 500 samples. A number of 250 samples were selected equally from rural and urban area. The study was conducted in school going children of age 6 – 12 years. Nutritional assessment was done using anthropometric measurements. Information on dietary pattern, medical and medication history was obtained through questionnaires. The parameters used for nutritional assessment was weight for age (WAZ), weight for height (WHZ), and height for age (HAZ). According to WHO guidelines, children were classified as stunted if their height for age (HAZ) was below -2 SD and severely stunted if their height for age (HAZ) was below -3 SD. The weight for height (WHZ) below 2 SD was deemed wasted, while the weight for height (WHZ) below 3 SD was deemed seriously wasted. In a similar way, children whose weight for age (WAZ) fell below -2SD were deemed underweight, while those whose WAZ fell below -3SD were deemed severely underweight[1.]

In the study conducted the prevalence of severe wasting (WHZ<-3SD) and severe underweight (WAZ<-3SD) was greater in kids from rural areas, whereas severe stunting (HAZ<-3SD) was greater among urban kids.

In a similarComparative Study of Nutritional Status of Preschool Children of Rural Area and Urban Slum conducted by Waghode R, Jasti P, Ghooi R et al.The cross-sectional survey was carried out in a few chosen urban slums and rural regions surrounding Pune City. Eighty preschool-aged children were chosen at random, forty from rural and forty from urban slums. The information was gathered using a home survey, in which mothers were interviewed in person after obtaining their informed consent. A self-designed, semi-structured questionnaire was used to gather sociodemographic data as well as other information. Using the Kappuswami scale, the socioeconomic index of the study population was determined[1].

Anthropometric assessment, a commonly recognized technique to ascertain nutritional status, was employed in the study. The anthropometric evaluation was done by a qualified researcher. Children were measured while wearing loose clothing and without shoes. Using a Model 201 (SECA) flexible, non-elastic measuring tape, the mid-upper arm circumference was measured to the closest 0.1cm. Three anthropometric indices, such as height for age, weight for age, and weight for height, were used to assess the nutritional health of the children. These anthropometric indicators, which were reported as Z scores, were compared to cutoff points determined by WHO growth guidelines. The prevalence of severe stunting (HAZ<-3SD), severe underweight (WAZ<-3SD), and moderate wasting (WHZ<-2SD) was greater in kids from urban slums, although the frequency of severe wasting (WHZ<-3SD) was comparable in both groups. The mid-upper-arm circumference (MUAC) showed that 2.5 percent of children in urban slums were severely malnourished (MUAC<115mm), a condition that was not observed in children in rural areas. Additionally, the proportion of children at risk of malnutrition

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was also shown to be much higher in urban populations. Dietary assessment results showed no difference in the consumption of cereals, legumes, and bread items between urban and rural populations; nevertheless, the urban population consumed processed foods, sweets (such as chocolates and candies), and tea in addition[1].
Whereas in the current study Nutritional analysis showed no differences between the consumption of vegetables, dairy, and meat products in urban and rural populations.

IV. LIMITATIONS

- Parents's illiteracy in rural areas was a major barrier to obtaining feedback on questionnaires, because of which the forms were filled out by respected class teachers.
- Also, a few questionnaires were filled out through interaction with children rather than parents.
- Further studies are required to identify the risk factors of stunting, wasting, underweight within the community level as well
- Estimation of wasting and stunting from mid-arm circumference was unable to be performed.
- Diseases associated with malnourishment was unable to evaluate.

V. CONCLUSIONS

The goal of the current study is to investigate the nutritional status of preschoolers in Bangalore who are between the ages of six and twelve. The presence of 500 school-going students, 250 each from urban and rural settings. Severe stunting was prevalent among urban children, while severe wasting among children with underweight was observed in rural populations. A few recommendations for improving the nutritional status of school-going children are as follows: Schools should educate students on nutrition. Schools must take the initiative to include health education in the curriculum. It is necessary to start awareness campaigns in the community and schools on proper diet to minimize the incidence of malnutrition with the aid of public health professionals. Further studies are required to identify the risk factors of stunting, wasting, and underweight within the community level as well.

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