



Assessment of Malnutrition in Children

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ABSTRACT

The Background of this study is Malnutrition is a main reason for the changes of the child mortality and morbidity. Several socioeconomic factors may influence the malnutrition in children. In children nutritional deficiency may cause diarrhea, recurrent illness and other chronic diseases. Therefore, it is necessary to assess malnutrition in children. The objective of this study is to assess the malnutrition in children by using anthropometric measurement. An observational prospective study was conducted to assess malnutrition of children. Data was obtained by using data collection forms which included information about anthropometric measures such as height, weight, BMI and MUAC of children of age 6 months to 7 years. A total of 160 children were included in the study, of which 55% were male and 45% were female. 35.6% of them were 3 to 5 years old and 41.9% of them were 6months to 2 years and 22.5% children were 6 to 7years. 47.5% of parent's annual income was less than 1lakh and 31.8% had 1 lakh to 2.5lakh and 20.6% had above 2.5lakh. 39.3% of the children were severely underweight, 10.6% were moderately underweight and 2.5% children were mild underweight, while 88.7% of children had normal MUAC and 11.25% of them had low MUAC. From the above data 52.5% were malnourished and 47.5% were well nourished. This study concluded children's underweight measures acute and chronic malnutrition and wasting represents a failure to receive adequate nutrition. Likewise, children's gender, age, size at birth, height, weight and low MUAC also predicts wasting among children.

Keywords: Malnutrition, MUAC, BMI, wasting, Anthropometric.

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INTRODUCTION

WHO defines malnutrition as “the cellular imbalance between nutrient and energy and the body's demand for them to ensure growth, maintenance and specific functions”. The term malnutrition covers two broad groups of conditions. One is ‘undernutrition’ which includes stunting (low weight for age), wasting (low weight for height), underweight (low weight for age) and micronutrient deficiencies or insufficiencies (a lack of vitamins and minerals). The other is overweight, obesity and diet related diseases.¹

Nutritional fame of kids is a hallmark of dietary profile of the whole community. Adequate nutrients at some point of infancy and early adolescence are essential to the improvement of every child's complete human potential. It is widely recognized that early life is a crucial window for

the promoting of most appropriate growth, fitness and behavioral development. This is the height age for boom faltering, deficiencies of positive micronutrients and not unusual place youth illnesses.²

Malnutrition is appeared because the maximum critical danger element for infection and dying globally and it's far related to 52.5 % of all deaths in younger children. Macronutrient deficiency is typical in children, despite the fact that each macronutrient and micronutrient deficiencies also can arise concomitantly. The dietary deficiency influences our kids given that their embryonic lives. Low birth weight, feeding issues, diarrhea, recurrent sickness, measles, pertussis, and chronic disease all increase the risk of malnutrition in children. The dietary deficiency makes youngsters susceptible to settlement diarrheal diseases, acute respiration infections and different infections that in addition compound the situation. As a result of the repeated bouts of diarrhea and infections, the child becomes susceptible to infections as well as weight loss, leading to severe malnutrition until the cycle is broken.²

In growing countries, malnutrition with the distinctive spectrum of sicknesses that it comprises, is especially standard and contributes extensively to the untimely



demise of children. Malnutrition is thought to play a key position in as much as a 3rd of the eight million annual deaths taking place in youngsters below the age of five years.³

Malnutrition varies from united states of America to united states of America relying on economic, ecological, social, and different factors. At gift the maximum severe dietary troubles are specifically because of low consumption of ingredients in general. Any alternate in profits or profits shape impact the dietary repute on the family and man or woman levels. The impact of earnings is measured through food expenditure, which reflects a family's earnings and resources. One of the most severe barriers to improvement in rural agricultural societies, it has been hypothesized, is the amount of land available to families. It is also believed that the greater the amount of land available to small-scale farming households, the better the dietary reputation of the family's younger children. Associated with the dietary renown of younger children, and hence might be utilized as a family trademark for fitness and nutritional famous. Land, among other things, is a useful way of defining a large portion of the agricultural population in terms of food, nutrition, and poverty.⁴

Malnutrition in youngsters isn't suffering from meals consumption alone, withinside the equal way it's also motivated diverse social elements together with fitness services, fine of antenatal and postnatal take care of the kid and pregnant mom in addition to correct hygiene practices. In India Girls had been at greater threat of malnutrition than boys due to their decrease social repute however now a days the state of affairs is converting because of literacy and Women empowerment.⁵

According to UNICEF the principle reasons of early life malnutrition may be labelled into 3 fundamental underlying elements which are; family meals insecurity, insufficient care and dangerous family environment, and shortage of fitness care services. Income, poverty, employment, housing, assets, remittances, pensions, and transfers, on the other hand, are all influenced by socio-economic and political factors.⁶

Three fundamental varieties of undernutrition are explicit; stunting, losing and underweight. Stunting is a continual shape of malnutrition which displays extended length of inadequate nutrient consumption and assimilation. It's also a defining feature of common societal socio-financial circumstances. Wasting, on the other hand, is a severe form of malnutrition marked by a loss of body tissue and fat mass as a result of insufficient food intake over a short period of time. It's frequently utilized as a reliable indicator of the general health of the population. Finally, underweight, a third sub-category of malnutrition, is a composite degree that includes both loss and stunting.⁷

The results of malnutrition are many and had been considerably documented. It includes an increased risk of infection, death, and delayed cognitive development, all of which contribute to low individual incomes, terrible

financial growth, and poverty transmission across generations. Malnourished children have a lower capacity to fight infection and are more prone to succumb to commonplace illnesses such as malaria, respiratory infections, and diarrheal illnesses. When compared to healthy newborns, children born with low start weight and intrauterine growth retardation have a higher risk of morbidity and death, as well as various types of malnutrition. They also have a tendency to increase noncommunicable diseases such as diabetes and high blood pressure in people's lives.²

Nutrition tracking is vital to evaluate dietary reputation of the community, in phrases in their nature, importance and distribution many of the populace businesses in addition to geographical areas. These facts may be used to adapt policies, to formulate diverse packages and enforce the identical for the prevention and powerful manipulate of dietary deficiency disorders.

According to the World Health Organization, malnutrition impacts greater than 1 / 4 of youngsters worldwide. It is maximum generally assessed thru the dimension of weight and height. A child may be excessively short for his or her age (stunted), underweight for their height (wasted), or underweight for their age (underweight) (underweight). A stunted or wasted toddler might also be stunted or wasted.⁸

Anthropometry is the measurement of a person's body measurements and gross composition. Anthropometric measures vary with age and dietary habits, and they're especially useful as indicators of frame composition when protein and strength imbalances are present. The majority of anthropometric measurements are based on a two-compartment model of frame composition: fats and fat-free mass. Skeletal muscle, non-skeletal muscle, delicate lean tissues, and the skeleton are all examples of fat-free mass. It is made up of a mixture of water, minerals, and protein. Because the majority of protein is stored inside the muscle, methodologies for evaluating muscular tissues can be utilized as indicators of the body's protein reserves.⁹

The mid-higher arm circumference (MUAC) is a common measurement of fat-free mass. The MUAC is a measurement of the circumference of the upper arm at the place where the olecranon and acromion processes meet in the middle. Adjustments in MUAC can mimic an alternative in muscle mass, an alternate in subcutaneous fats, or both, because the arm transports each subcutaneous fat and muscle. Adjustments in MUAC are considerably more likely to match changes in muscle mass in resource-poor situations, where persons have a propensity to have lesser amounts of subcutaneous fats. In similar circumstances, MUAC measures may be useful as a marker of protein-power deficiency or hunger, particularly in situations when a large weight or peak is not possible.⁹

The fundamental causes of malnutrition must be addressed in interventions to prevent malnutrition. As a



result, we look at social variables, health outcomes, and the adoption of malnutrition prevention interventions by mothers of malnourished and well-nourished children under the age of five.

METHODOLOGY

Study site

Adichunchanagiri Hospital and Research Centre (AH and RC) B.G. Nagara in Pediatrics department.

Study period

The study was carried out over a 3-month period (1st June to 31st August 2021).

Study approval

The study was approved by the institutional ethical committee of AH and RC (Adichunchanagiri Hospital and Research Centre) B.G Nagara before the initiation of the study.

Study procedure

The approval of the ethics committee of the institution was obtained prior to the commencement of the study procedure.

The present study is observational prospective study was conducted among 160 individuals in tertiary care hospital to assess malnutrition of children. Data was obtained by using data collection forms which included information about anthropometric measures such as height, weight, BMI and MUAC of children of age 6 months to 7 years. Considering the inclusion criteria, the patient was enrolled into the study after obtaining their written consent. The data will be collected from inpatient and outpatient through data collection forms. From this data we could conclude whether the pregnant children were well nourished or malnourished. Suggestions regarding nutrition was given to the children who was malnourished.

Study Criteria

Inclusion Criteria

Children of age 6 months – 7 years.

Exclusion Criteria

Those who are not ready to give consent or not willing to participate in the study.

Statistical Analysis

Data were entered into Microsoft Excel spread sheets and cross checked for its accuracy. The statistical analysis was performed using IBM SPSS statistics software for windows. Frequency distribution and graphical representation were employed as descriptive statistical method. The chi-square and logistic regression test were used to assess the association among the study variables and p-value of <0.05 was considered as statistically significant.

RESULTS

Table 1: Demographic Details.

Variables	Frequency	Percentage
Gender		
Male	88	55.0
Female	72	45.0
Age		
6 months to 2 years	67	41.9
3 years to 5 years	57	35.6
6 years to 7 years	36	22.5
BMI		
Normal	76	52.5
Underweight	84	47.5
Underweight classification		
Mild underweight	4	2.5
Moderate underweight	17	10.6
Severe underweight	63	39.4
MUAC		
Normal	142	88.8
Low MUAC	18	11.3

A total of 160 children were included in the study, 55.0% of participants were male and 45.0% were female. Out of 160 participants, majority of them belongs to age group of 6 months to 2 years (41.9%), 35.6% of them were 3years to 5 years and 22.5% of them were 6 years to 7 years. Based on BMI, 47.5% (76) were normal and 52.5% (84) were underweight.

Table 2: Socio-economic status of their parents

Variables	Frequency	Percentage
Education level		
Illiterate	6	3.8
Secondary	34	21.3
Higher secondary	53	33.1
Degree	67	41.9
Occupation		
House wives	44	27.5
Self employed	86	53.8
Government sector	13	8.1
Private sector	17	10.6
Annual income		
Less than 1 lakh	76	47.5
1 lakh to 2.5 lakh	51	31.9
Above 2.5 lakh	33	20.6
Type of family		
Joint	86	53.8
Nuclear	74	46.3



This study gives information about the importance of malnutrition in children and it is observed that the nutritional deficiency may affect the children height, weight, MUAC and BMI and the Underweight measures the acute and chronic malnutrition. Based on BMI, 47.5% (76) were normal and 52.5% (84) were underweight. In the study population, 39.4% of the children were severely underweight, 10.6% were moderately underweight and 2.5% children were mild underweight, while 88.8% of children had normal MUAC and 11.3% of them had low MUAC.

Out of 160 parents, 67 of them were graduates, 53 of them were completed their education with higher secondary (PUC), 34 of them were completed their education with secondary education (SSLC) and 6 of them were illiterate. Among 160 majority of them were self-employed (53.8%), 27.5% of them were house wives, 10.6% of them were working in private sector and 8.1% of them were government employees. Most of them were having less than 1 lakh of income (47.5%), 31.9% of them were having income 1 lakh to 2.5 lakh and 20.6% of them having above 2.5lakh of income. Majority of them were belongs to joint family (53.8%) and 46.3% of them belongs to nuclear family. (Table 2).

Table 3: Association between Age group and the Nutritional status

Age group	Malnourished	Well nourished	Total	Percentage	P value
6 months to 2 years	25 (37.31%)	42 (62.68%)	67	41.9	0.006*
3 years to 5 years	36 (63.15%)	21 (36.84%)	57	35.6	0.011*
6 years to 7 years	23 (63.8%)	13 (36.11%)	36	22.5	0.943
Total	84	76	160	100	

This table 3 shows that out of 160 participants, 25 (37.31%) of them were malnourished and 32 of them were well nourished who belongs to age group of 6months to 2 years. In the age group of 3 to 5 years, 36 (63.15%) of them were malnourished and 21 of them were well nourished and in the age group of 6 to 7 years, 23 (63.8%) of them were malnourished and 13 of them were well nourished. The study shows that there is significance relationship between the age group and nutritional status.

(52.5%) of them were underweight was malnourished. The study shows that there is a significance relationship between Nutritional status and BMI. (P=0.000**).

Table 5) Out of 160, majority of them had less than 1 lakh of family income (47.5%), 31.8% of them had 1 lakh to 2.5 lakh and 20.6% of them had above 2.5 lakh of family income. The study shows that there is significance relationship between Family income and the Nutritional status.

Table 4, shows that out of 160 participants, 76(47.5%) of them who had normal BMI were well nourished and 84

Table 4: Association between BMI and Nutritional status

Nutritional status	BMI		Total	Percentage	P value
	Normal	Underweight			
Malnourished	0	84	84	52.5	0.000*
Well nourished	76	0	76	47.5	
Total	76	84	160	100.0	

Table 5: Association between Family income and Nutritional status

Nutritional status	Malnourished	Well nourished	Total	Percentage	P- value
Less than 1 lakh	44 (57.89%)	32 (42.10%)	76	47.5	0.029
1 lakh to 2.5 lakh	19 (37.25%)	32 (62.74%)	51	31.8	0.575
Above 2.5 lakh	21 (63.63%)	12 (36.36%)	33	20.6	0.020
Total	84	76	160	100	

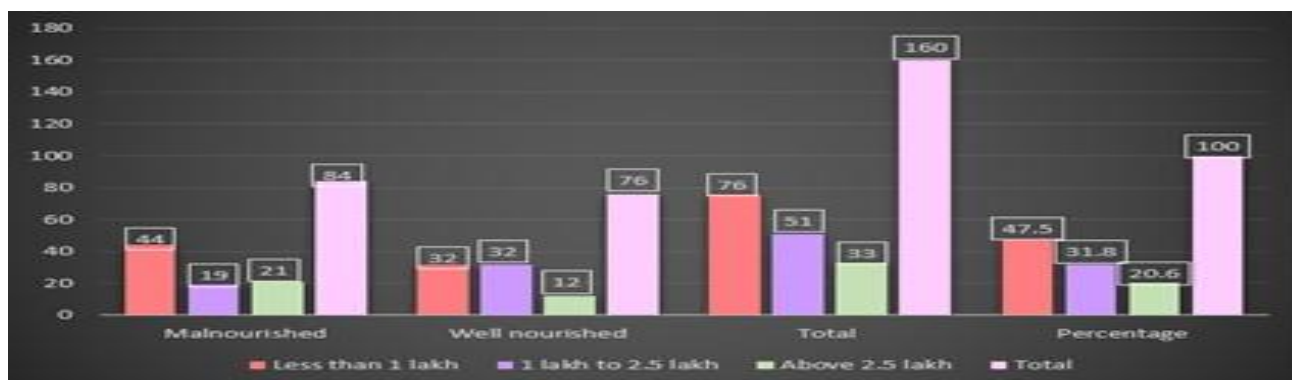


Table 6: Association between Nutritional status and MUAC

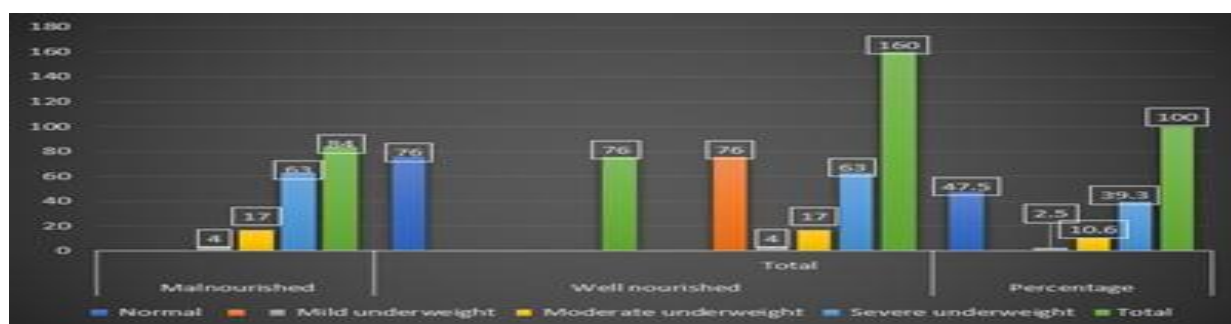
Nutritional status	MUAC		Total	Percentage	P value
	Normal	Low MUAC			
Malnourished	67(79.76%)	17 (20.2%)	84	52.5	0.000*
Well nourished	75 (98.68%)	1 (1.31%)	76	47.5	
Total	142	18	160	100.0	

Table 6, shows that out of 160 children, 142 of them had normal MUAC in which 67 (79.76%) were malnourished and 75 were well nourished and 18 of them had low MUAC in which 17 (20.2%) were malnourished and 1 were well nourished. The study shows that there is a significant relationship between MUAC and the malnutrition status with p value of 0.000**.

Table 7: Association between Underweight category and Nutritional status

Underweight	Malnourished	Well nourished	Total	Percentage	P value
Normal	0	76	76	47.5	0.000
Mild underweight	4	0	4	2.5	0.000
Moderate underweight	17	0	17	10.6	0.054
Severe underweight	63	0	63	39.3	0.000
Total	84	76	160	100	0.000

Table 7, shows that out of 160 children, 76 of them were well nourished. Out of 84 malnourished children, majority of them are severely malnourished 63(39.3%), 10.6% (17) of them were moderately malnourished and 2.5% (4) of them were mild malnourished. There is a significant relationship between the underweight and nutritional status with p value of 0.000**.



And the results shows that 52.5% of children were malnourished and 47.5% of children were well nourished. It is clear that greater information on nutrition and dietary habits is needed for the general public, as well as sufficient attention and care for children, in order to reduce the prevalence of childhood malnutrition.



DISCUSSION

Nutrition is crucial for human growth and is at the heart of health and happiness. Preschoolers are one of the most nutritionally sensitive groups of people. Nutrition in the first five to 7 years affects not only growth and morbidity throughout childhood, but also nutritional status in adolescence and adulthood. Growth is one of the most crucial indications of a child's health. The main goal of nutritional assessment research is to ascertain the true extent of undernutrition.

There were 88 (55%) male children and 72 (45%) female children among the 160 persons who took part in this observational prospective study. The bulk of the 160 people are between the ages of 6 months and 2 years (41.9%), 35.6% are between the ages of 3 and 5, and 22.5% are between the ages of 6 and 7. Out of 84 malnourished children, majority of them were belongs to age group 3 to 5 years (36). As per our study there is a significant relationship between the age group and the malnutrition status.



Similarly in another study, there were 570 (52.8%) male children and 510 (47.2%) female children in the other cross-sectional study. 311 (28.8%) of the 1080 children were between the ages of two and three, 384 (35.5%) were between the ages of three and four, and 385 (35.6%) were between the ages of four and five. This research was conducted at a tertiary level hospital in Udaipur. Similarly, in the five highly populated Zones of southern Ethiopia, 44.8 percent of children aged 3 to 36 months are chronically undernourished. The findings of this study are similar to the findings of our study.

The body mass index (BMI) is a useful tool for determining the current state of malnutrition and obesity. BMI is the weight-to-height ratio in kilograms divided by the height in centimeters.

Based on BMI, 47.5% (76) of the people in our research were normal, whereas 52.5% (84) were underweight. In addition, the survey found that 84 out of 160 youngsters are malnourished, with the majority 39.3% of them being seriously malnourished, 10.6% were moderately malnourished, and 2.5% were mildly malnourished. There is a significant relationship between the underweight and malnutrition status.

Another study revealed that more than half of the boys and girls in the study were severely underweight (BMI 16 kg/m). Only around 20% of the girls and fewer than 10% of the boys had a normal BMI. More than 15% of the boys were significantly underweight, with the rest being mildly underweight.

MUAC was the best tool to assess malnutrition status in children. Out of 160 children, 142 had a normal MUAC, with 41.8% malnourished and 46.8% well-nourished children, and 18 had a low MUAC, with 10.6% malnourished children and 1 well-nourished child. Hence, in our study MUAC and malnutrition status have a significant relationship.

According to the findings of another study, 43.2% of children (221) had mild malnutrition, 65.7% (65) had moderate malnutrition, and 10.2% (52) had severe malnutrition. Similarly, the study conducted in north Bengal, the total prevalence of wasting (low MUAC) among boys and girls was 62.3 percent and 63.3 percent, respectively. When the current study's findings were compared to those of non-Indian children, a considerably higher prevalence of wasting was found among Ugandans (21.60 %), Kenyan, 43 (47.00 %) Nepalese (32), (17.00 %), Nigerian (44) (25.70 %)

Economic development or even food deficiency at home are not the only factors that influence a child's nutritional status; the mother's education and employment can also have an impact. In our study, 84 children were underweight, with 44 having a family income of less than 1 lakh (about 8000 per month), 19 having a family income of 1 lakh to 2.5 lakh (10000–20000 per month), and 21 having a family income of more than 2.5 lakh (around 20,000 per month). According to the data, there is a

positive relationship between malnutrition and incomes of less than one lakh and more than 2.5 lakh.

Similarly, in research conducted in Mysore, 54.4 percent of parents of children had a monthly income of 3000-5000 Rs, 41.0 percent of parents had a monthly income of 5000-10000 Rs, and 3.2 percent of parents had a monthly income of 10000 Rs.

According to our study shows that among 160 parents, 41.8% of them had graduation, 33.1% of them had higher secondary education, 21.2 of them had secondary education and 3.7% of them were illiterate.

According to the findings of another study, 51.3 percent of them had primary education, 29.3% had secondary education, 5.3 percent had higher secondary education, and 1.6 percent had graduated.

In another study conducted in Mysore, 11.3% of daily labors, 55.6% were doing agriculture, 21.0% were unemployed, and 4.6% were doing business.

Similarly in our study result reveals that out of 160 parents, majority of them were self-employed (53.8%), 27.5% of them were house wives, 10.6% of them were working in private sector and 8.1% of them were government employees.

However, the survey found that a large percentage of children were malnourished. A number of socioeconomic and sociodemographic characteristics have been linked to the incidence of undernutrition. This study discovered that, in addition to giving food, promoting nutrition and health activities, as well as periodic medical examination, are all equally or more vital for a kid with severe malnutrition.

CONCLUSION

Quality of future human resources is dependent on today's children, improving their nutritional status should be a key focus. Being underweight is linked to a number of factors, some of which may be changed and others that cannot. This study suggests that, despite ongoing nutritional programmes in the community, due to carelessness, a lack of knowledge, or improper cooking practice results, nutrition education should be started for pregnant women and parents of children in order to improve their child health and nutritional status.

Family income is one of the most important socio-economic variables to consider when determining the nutritional condition of children. Income, on the other hand, does not necessarily contribute directly to children's nutritional well-being. Because of a lack of understanding of children's nutritional needs, vital food may be withheld even when it is readily available. This emphasizes the value of parental education and family income in determining the nutritional condition of children. Education, particularly maternal education, is a strong predictor of nutritional status in children.



This study concluded children's underweight measures acute and chronic malnutrition and wasting represents a failure to receive adequate nutrition. Likewise, children's gender, age, size at birth, height, weight and low MUAC also predicts wasting among children. Family income and low BMI also affects nutritional status of children. Hence these parameters had significant relationship with nutritional status. There is requirement of more education on nutrition and dietary habits to population including proper attention and care provided to the children.

Recommendations

- Further studies, at large scales and on distinctive populations, concerning dietary reputation of the populace must be carried out.
- Special interest ought to be paid kids at suitable age.
- nutrition education should be started for pregnant women and parents of children in order to improve their child health and nutritional status.
- Children with excessive malnutrition with medical complications have to be admitted to medical institution for inpatient care.

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Abbreviations

BMI- Body mass index, MUAC: Mid upper arm circumference, UNICEF: United Nations International Children's Emergency Fund, WHO: World Health Organization

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