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NUTRITIONAL STATUS ACCORDING TO Z-SCORE (WHO 2006) IN CHILDREN ≤ 5 YEARS OLD AT THE PEDIATRIC DEPARTMENT OF 108 MILITARY CENTRAL HOSPITAL

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ABSTRACT

Objective: To assess the nutritional status of children ≤ 5 years old at 108 Military Central Hospital.

Subjects and methods: A cross-sectional descriptive study was conducted on 433 children ≤ 5 years old treated at the Pediatric Department of 108 Military Central Hospital from February 2023 to February 2025. The nutritional status of children was assessed using the Z-Score according to the World Health Organization (WHO 2006) growth standards.

Results: Of the 433 children participating in the study, 60.3% were boys and 39.7% were girls (boys/girls ratio 1.5:1). The overall malnutrition rate was 42.4%, with stunting accounting for the highest proportion (28%), followed by underweight (9.5%) and wasting (4.9%). The rate of overweight/obese children was 11.3%. Children with respiratory illnesses had the highest rate of malnutrition compared to other disease groups. The majority of hospitalized children had acute illnesses (59.6%), while 40.4% had chronic illnesses.

Conclusion: The rate of malnutrition in children ≤ 5 years old treated at the hospital remains high, with stunting being the predominant form of malnutrition.

Keywords: Malnutrition, Z-Score WHO 2006, children under 5 years old, stunting.

1. INTRODUCTION

Nutrition is the fundamental factor for the comprehensive development of children, as well as for the prevention of acute and chronic diseases throughout their growth. The World Health Organization (WHO) emphasizes that poor nutritional status in young children increases the risk of illness, developmental delays, and premature mortality, while leaving long-term consequences for physical health, cognition, and future learning capabilities [1].

According to the 2019-2020 National Nutrition Census, the prevalence of stunting among children under 5 years old was 19.6%, wasting was 5.2%, and overweight/obesity was 7.4% - showing that nutritional disorders remain prevalent and multifactors[2]. Especially, inpatients group need more energy requirements alongside a decreased capacity for absorption, while their dietary intake may be restricted by medical conditions and hospital environmental factors...

The 108 Military Central Hospital is Viet Nam special national-level grade hospital, possessing top-tier professional experts with numerous best techniques. With a modern infrastructure system located in the capital center, the Pediatric Department is admitted to the hospital large number of patients annually for examination and treatment across a wide range of medical conditions and varying levels of severity. However, no studies have yet been conducted to evaluate the nutritional status of these children. Therefore, we conducted this study with the objective: "Assessment of nutritional status in children ≤ 5 years old at 108 Military Central Hospital". The findings aim to provide a scientific foundation for nutritional interventions and pediatric healthcare follow-up.

2. SUBJECTS AND METHODS

2.1. Subjects: 433 inpatient pediatric ≤ 5 years old in Pediatric Department of 108 Military Central Hospital from February 2023 to February 2025.

2.2. Medthod: A cross-sectional descriptive study.

2.3. Inclusion criteria: Children under 5 years old admitted to the hospital and whose parental/guardians agree to consent to participate in the research.

2.4. Exclusion criteria: Lack of parental/guardians' consent, children requiring emergency intervention, or those presenting with coma or altered states of consciousness.

2.5. Contents

Methods for measuring variables

- Crown-heel length/Statue height and Weight Measurement:

+ Children are measured for crown-heel length/statue height and weight using standardized procedures and equipments, which are regularly checked for accuracy. Children under 2 years old are measured for crown-heel length, while those over 2 years old are measured for statue height [3].

- Criteria and methods for nutritional status assessment:

+ In this study, we utilized the WHO classification standards for nutritional status, based on the WHO Child Growth Standards (2006) as the reference population [4].

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$$\text{Z-score} = \frac{\text{Measured value} - \text{Mean of reference population}}{\text{Standard deviation (SD) of reference population}}$$

Table 1. Nutritional status assessment based on Weight-for-age index

Z -Score	Weigh for length/ height	Weigh for age	Length/ Height for age
< -3 SD	Severe wasting	Severe underweight	Severe stunting
< -2 SD	Wasting	Underweight	Stunting
-2 SD ≤ Z-score ≤ + 2 SD	Normal	Normal	Normal
> + 2 SD	Overweight	Overweight	
> + 3 SD	Obesity	Obesity	

Sample size and Samling methods

The sample size was calculated using the formula for single proportion, based on the study by Vu Thi Van Anh (2019), which reported a malnutrition prevalence of 11% ($p = 0.11$) [5]. Applying this value to the formula yielded a required sample size of 421 children. In our study, we successfully have total 433 children for the study.

2.5. Data and statistical analysis: Using SPSS software version 22.0.

2.6. Research Ethic: This research was reviewed and approved by the Institutional Review Board of 108 Military Central Hospital (Decision No. 4066/QD-BV).

3. RESULT

3.1. General Characteristics of the Study Subjects

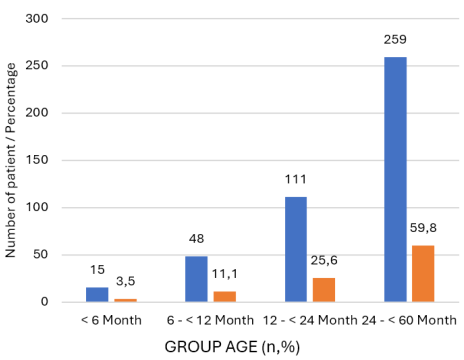


Figure 1. General Characteristics

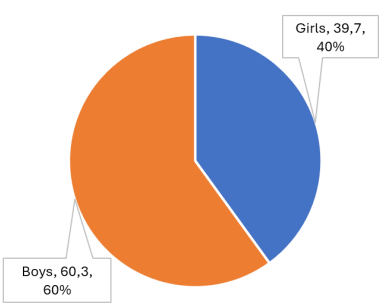


Figure 2. Patient Gender

Discussion: Among the total of 433 children, the age group from 24 to before 60 months accounted for the highest proportion (59.8%). Boys represented 60.3% of the sample, which was 1.5 times higher than the proportion of girls (39.7%).

Table 2. Pathological Characteristic of Inpatient Children

Characteristic		n	%
Group	Respiratory	213	49.2
	Gastrointestinal	41	9.5
	Cardiovascular	4	0.9
	Oncology	70	16.2
	Others	105	24.2
Clinical Course	Acute	258	59.6
	Chronic	175	40.4

Discussion: Respiratory infections predominated the clinical profile at admission (49.2%), followed by oncological disorders (16.2%). This was followed by oncological diseases at 16.2%. A majority of the children (59.6%) were admitted due to acute state.

3.2. Nutritional Status of Inpatient Pediatric

Table 3. Nutritional Status based on Weight-for-age index

Classification	n	%
Severe underweight	12	2,8
Moderate underweight	29	6,7
Normal	376	86,9
Overweight	8	1,8
Obesity	8	1,8
Total	433	100

Discussion: the prevalence of underweight children was 9.5%, of which moderate and severe was 6.7 % and 2.8%, respectively. Overweight and obesity rates were equally low at 1.8% each.

Table 4. Nutritional Status based on Length/Height-for-age index

Classification	n	%
Severe stunting	57	13,2
Moderate stunting	64	14,8
Normal	312	72,0
Total	433	100

Discussion: The prevalence of stunting was 28.0%, consisting of 13.2% severe and 14.8% moderate.

Table 5. Nutritional Status based on Weigh for length/height

Classification	n	%
Severe wasting	9	2,1
Moderate wasting	12	2,8
Normal	363	83,8

Classification	n	%
Overweight	30	6,9
Obesity	19	4,4
Total	433	100

Discussion: While the proportion of wasting remained relatively low at 4.9% (2.1% severe, 2.8% moderate), the prevalence of overweight and obesity was notably higher, recorded at 6.9% and 4.4%, respectively.

4. DISCUSSION

Regarding gender distribution, our study showed a higher proportion of boys compared to girls. This finding is consistent with the research by Vu Thi Thanh (2024), which reported that boys accounted for 54.7% and girls accounted for 45.3% of the study population [6]. The boy predominance in our study potentially reflects a broader trend in pediatric hospitalization. Furthermore, our study population was more concentrated in the 24–<60 months age bracket (59.8%) compared to Vu Thi Van Anh (2019), who reported a lower prevalence of 37.3% for the same group. This difference in age distribution may stem from variations in the study settings or the specific clinical profiles of the admitted patients [5].

Regarding the disease for admission, respiratory diseases accounted for the highest proportion at 49.2%. Our findings are also consistent with the study by Vu Thi Thanh (2024), which also reported that the primary cause of hospitalization was respiratory infections, representing 39.9% of cases. [6].

The results indicated that children admitted with acute conditions (59.6%) accounted for a higher proportion compared to those with chronic diseases (40.6%).

Among the 433 children, the overall prevalence of malnutrition in hospitalized children under 5 years old was 42.4%, of which the prevalence of underweight was 9.5% (Table 3.2). Our findings are consistent with the study by Vu Thi Van Anh (2019) conducted at Bac Ninh Obstetrics and Children's Hospital, which reported an underweight prevalence of 11% [5]. This result is lower than Nguyen Thi Thu Lieu's research at Vietnam National Children's Hospital (17,6%) [7]. As the National Children's Hospital is a tertiary referral center specializing so more children with complicated cases were transferred to diagnosed and treated. As the result bringing to higher prevalence of malnutrition observed in our study.

The prevalence of stunting was 28.0% (severe and moderate was 13.2% and 14.8%, respectively) (Table 3.3). Furthermore, oncological diseases accounted for 16.2% of the cases, as our Pediatric Department admits a significant number of children for radiotherapy and PET-CT scan. The chronic status of these malignancies, combined with treatment side effects such as fatigue and anorexia, severely impairs dietary intake, consequently leading to poor nutritional outcomes. This prevalence is considerably higher than the findings of Vu Thi Thanh (2024) at Tam Anh General Hospital in Hanoi, where the rate of moderate stunting was only 6.6% [6]. As such in Tam Anh Hospital, the majority of patients come from high socioeconomic backgrounds. These families tend to have greater health awareness and invest more in nutritional care; therefore, their malnutrition rates are significantly lower than those observed in our study.

The prevalence of wasting was 4.9%, while the rates of overweight and obesity were 6.9% and 4.4%, respectively (Table 3.4). According to the study by Nguyen Thi Yen (2021) at the Nutrition Ward in Vietnam National Children's Hospital, the prevalence of wasting was 18.4%, while the rate of overweight/obesity was 6.8% [8]. According to UNICEF/WHO reports, global malnutrition rates have shown a declining trend over time due to socio-economic status, improved healthcare services, and better nutrition plans. Compared to the year 2000, the prevalence of stunting in children decreased from 32.4% to 21.3% by 2019. However, the global propotion of overweight and obesity has increased from 4.9% to 5.6%, according to the same report [9]. These results are consistent with our findings. Our results align with the broader national and global context. The observed reduction in certain malnutrition indicators can be attributed to robust socio-economic growth and the increased accessibility of pediatric healthcare services, which have collectively optimized the dietary standards for children.

6. CONCLUSION

In conclusion, our study results demonstrate a high prevalence of malnutrition among children under 5 years old treated at 108 Military Central Hospital, with the majority of cases manifesting as stunting.

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