

Malnutrition in Children at General Tinio, Nueva Ecija and the Assimilation of Interventions to Prevent the Condition

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ABSTRACT

Undernutrition is a complex issue that affects various aspects of life. Malnutrition increases the risk of various diseases and infections. Undernutrition can also lead to chronic health conditions such as obesity and diabetes. The study aims to determine the malnutrition among children below five years old at General Tinio, Nueva Ecija. The study analyzed a population of 3,693 children aged 0–5 years old from General Tinio, Nueva Ecija, based on data from the 2022 Nutrition Survey conducted by the Municipal Health Office. Using a total population sampling technique, the entire dataset was included to ensure comprehensive representation. Nutritional assessments were conducted following the World Health Organization (WHO) Classification of Nutritional Status of Infants and Children, with variables such as weight-for-age, height-for-age, and BMI-for-age analyzed against WHO standards. Data analysis employed descriptive statistics to determine the prevalence and severity of malnutrition (stunting, wasting, underweight, overweight, and obesity). Results were categorized, presented in tables, and compared across genders to identify disparities, with trends and risk factors interpreted in line with global and local benchmarks. Results: The overall prevalence of overweight is 6.04%, and the prevalence of obesity is 6.15%. Overall, undernutrition specifically overweight and obesity is also a concern for children aged 0-5 years old with a significant proportion of children in the overweight and obese categories. The global prevalence of obesity in children and adolescents aged 5-19 years has increased from 0.7% to 5.6% for girls and from 0.9% to 7.8% for boys from 1975 to 2016. In the United States, 1 in 5 children and adolescents are affected by childhood obesity. The American Academy of Pediatrics has issued its first comprehensive guideline on evaluating and treating children and adolescents with obesity, which reflects growing concerns about health later in life. The guideline recommends that pediatricians try to see children with obesity and provide comprehensive programs to help them manage their weight. Childhood obesity is a complex issue that can be caused by many factors, including behavior, genetics, and societal and community factors such as access to healthy food and beverages.

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1. INTRODUCTION

Undernutrition is a complex issue that affects various aspects of life and is deeply rooted in different health, social, economic, and political factors. The negative effects of undernutrition are severe and long-lasting, especially among those who have experienced it during their early years. Malnutrition increases the risk of various diseases and infections, which can lead to child mortality and morbidity. Undernutrition can also lead to chronic health conditions such as obesity, heart disease, and diabetes. Research has linked undernutrition in childhood with a higher risk of developing high blood pressure and obesity later in life [1]. Undernutrition in children has also been linked to poor mental development, school achievement, and behavioural abnormalities.

The immediate causes of undernutrition are inadequate dietary intake and disease, which are caused by food insecurity, inadequate access to healthcare, and poor sanitation. Poverty amplifies the risk of malnutrition and its consequences [2]. Preventing and treating malnutrition is crucial to reducing the prevalence of chronic health conditions and improving overall health outcomes [3]. According to Zerga et al. [4], child undernutrition can have negative effects on cognitive development and physical growth, leading to poorer academic performance and lower educational achievement. Members of the workforce who have experienced child undernutrition and enrolled in school have a higher risk of grade level repetition and lower educational achievement. Malnutrition among school-age children is a risk factor for high absenteeism, early dropouts, low school enrolment, and unsatisfactory classroom performance in the academic year 2013-2014, 15% of students who repeated a grade level cost the country an additional 1.23 billion pesos to cover the expenses brought by grade level repetitions.

School feeding programs have been implemented to improve the nutritional status, enrolment, attendance, retention, and completion rate of students. However, many school children still suffer from poor nutrition and academic achievement. Chronic undernutrition (stunting) is a significant public health problem that affects more than 900 million individuals worldwide and has long-lasting physiological effects, including an increased susceptibility to fat accumulation [5]. Undernutrition has a significant economic impact, including lost national productivity and economic growth. The global economy and society pay approximately US\$3 trillion a year in the form of productivity loss due to undernutrition, ranging from 3 to 16% (or more) of GDP in low-income settings. Stunting early in a child's life can cause irreversible damage to cognitive development and has educational, income, and productivity consequences that reach far into adulthood. The economic impact of undernutrition in health-related aspects was equivalent to 0.34% of GDP in 2014, which was equivalent to Ksh 18.6 billion or US\$ 211.8 million [6].

Undernutrition is responsible for the highest mortality rate in children and has long-lasting physiological effects, including an increased susceptibility to fat accumulation [7]. The economic costs of obesity and overweight are also significant, projected to range from 0.4% to 3.1% of GDP between 2015 and 2078 [8]. The preliminary study conducted at General Tinio, Nueva Ecija, through the 2022 Nutrition Survey by the Municipal Health Office, revealed critical insights into the nutritional status of children aged 0–5 years. The findings highlighted the coexistence of undernutrition and overnutrition, demonstrating a "double burden of malnutrition" within the community. Undernutrition was evident in the prevalence of stunting (8.69%), wasting (2.36%), and underweight (3.14%), with severe stunting and wasting affecting 5% and 6.39% of the children, respectively.

Boys were more likely to be stunted and wasted, while girls had higher rates of severe stunting and underweight. Overnutrition was also a significant concern, with 6.04% of children classified as overweight and 6.15% as obese, where boys exhibited a higher prevalence of overweight and girls were more affected by obesity. The phenomena observed reflect a combination of factors, including improper nutrition and food preparation, limited knowledge in the access to healthcare, and the availability of calorie-dense, nutrient-poor foods. These challenges were further exacerbated by the COVID-19 pandemic, which disrupted nutrition programs and increased economic hardships for families. In order to address this issue, the study aims to determine the malnutrition among children below five years old at General Tinio, Nueva Ecija. This study also seeks to identify and characterize stunting at its different levels of severity.

2. RESEARCH METHODOLOGY

The study utilized the UNICEF Conceptual Framework for Malnutrition (**Figure 1**) in determining the variables necessary for predicting the occurrence and severity of stunting among children aged 0 to 5 years old

to ensure comparability with other studies. The study utilized descriptive research design which is a type of research methodology that aims to describe or document the characteristics, behaviors, attitudes, and other aspects of a phenomenon, situation, or population. It helps answer the what, when, where, and how questions regarding the research problem rather than the why.

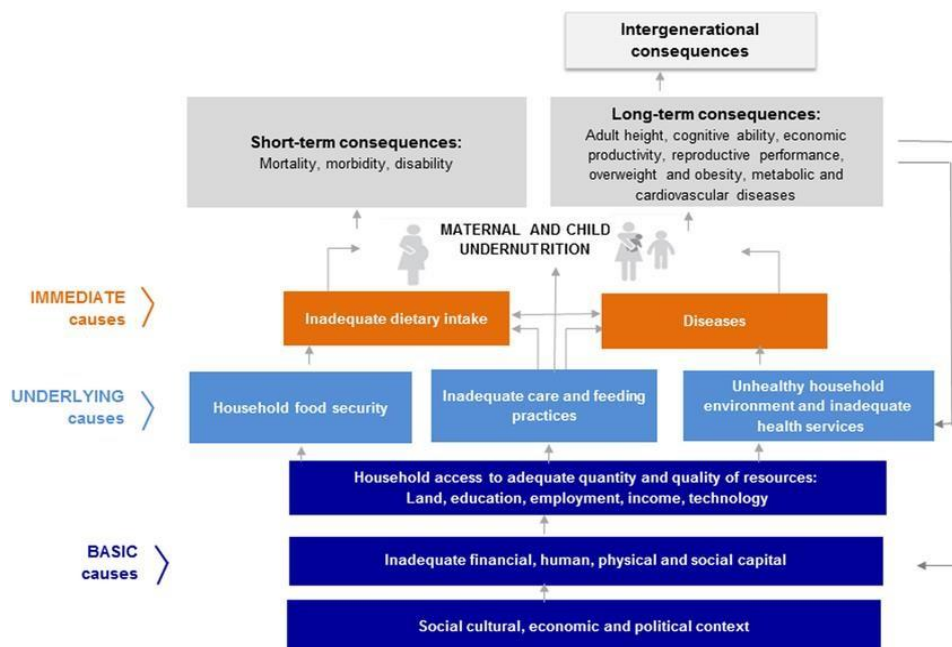


Figure 1. UNICEF Conceptual Framework of Undernutrition

Table 1. World Health Organization (WHO) Classification of Nutritional Status of Infants and Children
Nutritional status Age: birth to 5 years Indicator and cut-off value compared to the median of the WHO child growth standards^a

Obese	Weight-for-length/height ^b or BMI-for-age >3 standard deviations (SD) of the median
Overweight	Weight-for-length/height ^b or BMI-for-age >2 SD and ≤3 SD of the median
Moderately underweight	Weight-for-age <-2 SD and ≥-3 SD of the median
Severely underweight	Weight-for-age <-3 SD of the median
Moderate acute malnutrition	Weight-for-length/height ^b or BMI-for-age ≤-2 SD and ≥-3 SD of the median, or midupper arm circumference ≥115 mm and <125 mm
Severe acute malnutrition	Weight-for-length/height ^b or BMI-for-age <- 3 SD of the median or mid-upper arm circumference <115 mm, or bilateral pitting oedema
Moderately stunted (moderate chronic malnutrition)	Length/height-for-age ^b ≤-2 SD and ≥-3 SD of the median
Severely stunted (severe chronic malnutrition)	Length/height-for-age ^b <-3 SD of the median
Moderately wasted	Weight-for-length/height ≤-2 SD and ≥-3 SD of the median
Severely wasted	Weight-for-length/height <-3 SD of the median

^a a WHO child growth standard: methods and development. Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age. Geneva: World Health Organization; 2006

http://www.who.int/nutrition/publications/childgrowthstandards_technical_report_1/en/.

b Weight-for-length used in infants and young children aged 0–23 months and weight-for-height used for children aged 24 months and older

Descriptive research design can use a wide variety of research methods to investigate one or more variables, such as observational method, case study method, and survey method. Descriptive research is hypotheses producing rather than hypothesis testing, and it has specific aims and research questions. The data collection process in descriptive research is critical, and researchers must use specific methods to collect data (Siedlecki, 2020). The data used in the study is from the Municipal Health Office of General Tinio, Nueva Ecija Nutrition Survey 2022. Data for 3,693 children aged among 0 to 5 years old are considered. The variables used in the study are indicated in Figure 2 World Health Organization (WHO) Classification of Nutritional Status of Infants and Children

3. RESULTS AND DISCUSSIONS

As of 2022, malnutrition continues to be a significant problem in the Philippines, with around 30% of children under 5 years of age being stunted, which is considered high for its level of income and high compared to most of its neighbors. According to the Philippine Statistics Authority, 8.1% of children in the country are food poor. The COVID-19 pandemic has exacerbated the situation, and an estimated 6.7 million additional children under 5 could suffer from wasting during the first year of the pandemic, leading to an estimated 10,000 additional child deaths per month during this same period. The pandemic has disrupted essential health services, including nutrition services, and has led to food insecurity and economic hardship, which can further worsen malnutrition. Concerted efforts are needed to prevent and manage malnutrition during and after the pandemic, including safeguarding and promoting access to nutritious, safe, and affordable diets, improving maternal and child nutrition, and reactivating and scaling up services for the early detection and treatment of child wasting (UNICEF, 2020).

Table 2 presents information on the severity and prevalence of undernutrition specifically, stunting among children aged 0-5 years old in General Tinio Nueva Ecija. The table shows two columns for the form of undernutrition comprises of stunted, and severely stunted. The rows show subcategories of boys and girls. The percentage values in the table represent the proportion of children in each category who are stunted or severely stunted. Boys garnered 171 or 4.63% while girls garnered 150 or 4.06% in the category of stunted boys show higher percentage than girls. For severely stunted girls garnered 93 or 2.51% while boys garnered 92 or 2.49%. For the category of severely stunted girls show higher percentage than boys. Table 1 also provides an overall prevalence of stunting for all children aged 0-5 years old in General Tinio Nueva Ecija. The overall prevalence of stunting is 8.69%, and the prevalence of severe stunting is 5%.

Overall, the table suggests that undernutrition specifically, stunting is a significant concern for children aged 0-5 years old in General Tinio Nueva Ecija, with a significant proportion of children in the stunted and severely stunted categories. The overall prevalence of stunting is higher than the prevalence of underweight and overweight, indicating that stunting is a more prevalent form of undernutrition in this population. There are several potential reasons why boys are more stunted than girls. One possible reason is discrimination against girls in the allocation of food and healthcare within the household, which is now less common than before [9]. Another reason could be that boys are more often fed complementary foods at a very young age and might be at greater risk of a very early introduction of complementary foods because of preexisting lower nutritional status (Bork 2017). Additionally, boys are more likely to be undernourished than girls, which could contribute to their higher rates of stunting [9].

Table 2. Severity and Prevalence of Stunted among Children Ages 0-5 Years Old at General Tinio Nueva Ecija

Form of Undernutrition	Stunted				Severely Stunted			
	Boys	%	Girls	%	Boys	%	Girls	%
<i>Stunting</i>	171	4.63	150	4.06	92	2.49	93	2.51
Over All Prevalence	8.69%				5%			

Table 3. Severity and Prevalence of Wasted among Children Ages 0-5 Years Old at General Tinio Nueva Ecija

Form of Undernutrition	Wasted				Severely Wasted			
	Boys	%	Girls	%	Boys	%	Girls	%
Wasting	49	1.33	38	1.03	119	3.22	117	3.17

Over All Prevalence	2.36%	6.39 %
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Table 4. Severity and Prevalence of Underweight among Children Ages 0-5 Years Old at General Tinio Nueva Ecija

Form of Undernutrition	Underweight				Severely Underweight			
	Boys	%	Girls	%	Boys	%	Girls	%
Underweight	55	1.49	61	1.65	17	.46	20	.54
Over All Prevalence	3.14 %				1%			

Table 5. Severity and Prevalence of Overweight among Children Ages 0-5 Years Old at General Tinio Nueva Ecija

Form of Undernutrition	Overweight				Obese			
	Boys	%	Girls	%	Boys	%	Girls	%
Overweight	118	3.20	105	2.84	103	2.79	124	3.36
Over All Prevalence	6.04 %				6.15%			

Table 3 presents information on the severity and prevalence of undernutrition specifically, wasting among children aged 0-5 years old in General Tinio Nueva Ecija. The table is divided into two columns for the form of undernutrition, wasted, and severely wasted. The rows are further divided into subcategories of boys and girls. The percentage values in the table represent the proportion of children in each category who are wasted or severely wasted. For boys who are wasted, 49 or 1.33% of boys in this category are wasted while girls garnered 38 or 1.03%. In the row for severely wasted girls garnered 117 or 3.17% while boys garnered 119 or 3.22%. For wasted and severely wasted boys show higher percentage than girls. The table also provides an overall prevalence of wasting for all children aged 0-5 years old in General Tinio Nueva Ecija. The overall prevalence of wasting is 2.36%, and the prevalence of severe wasting is 6.39%.

Overall, the table suggests that undernutrition specifically, wasting is also a concern for children aged 0-5 years old in General Tinio Nueva Ecija, with a significant proportion of males in the wasted and severely wasted categories. The overall prevalence of wasting is lower than the prevalence of stunting, but the prevalence of severe wasting is higher than the prevalence of severe stunting, indicating that severe wasting is a more severe form of undernutrition in this population. UNICEF data provides global prevalence-based estimates of 45.4 million children under 5 affected by wasting and 13.6 million affected by severe wasting in 2020 [10]. Wasting is the most immediate, visible, and life-threatening form of malnutrition, and it results from the failure to prevent malnutrition among the most vulnerable children [10]. Wasting is associated with a higher risk of death if not treated properly. Malnutrition in children can manifest in four broad forms: wasting, stunting, underweight, and micronutrient deficiencies [11].

Stunting has declined steadily since 2000, but faster progress is needed to reach the 2030 target, while wasting persists at alarming rates. The lack of incidence data for wasting and severe wasting is a main reason why the Joint Malnutrition Estimates (JME) does not present annual trends for these forms of malnutrition [10]. **Table 4** presents information on the severity and prevalence of undernutrition specifically underweight among children aged 0-5 years old in General Tinio Nueva Ecija. The table is divided into two columns for underweight and severely underweight. The percentage values in the table represent the proportion of children in each category who are underweight or severely underweight. The row for boys who are underweight garnered 55 or 1.49% while girls garnered 61 or 1.65%. Girls in this category show higher percentage than boys who are underweight. In the row for severely underweight girls garnered 0.54% while boys garnered 17 or 0.46%. In the severely underweight category girls garnered a higher percentage.

Table 4 also provides an overall prevalence of undernutrition (underweight) for all children aged 0-5 years old in General Tinio Nueva Ecija. The overall prevalence of underweight is 3.14%, and the prevalence of severely underweight is 1%. Overall, the table suggests that undernutrition (specifically, underweight) is a concern for children aged 0-5 years old in General Tinio Nueva Ecija, with a significant proportion of children in the underweight and severely underweight categories. A study published in JAMA Network found that children with underweight and a lower growth rate in the first 2 years were a mean of 2.0 kg lighter and 0.8 cm shorter at age 10 years compared with children without underweight [12]. A study published in Nature found that the most consistent significant risk factors for undernutrition among children aged 0–23 months are male sex, older age groups, and lower wealth quintile [13]. A research article published in Eastern Mediterranean

Health Journal (EMHJ) found that the prevalence of overweight and obesity in children aged < 5 years ranged from 1 to 28.6% among European countries (Nawal Alqaoud and Abdullah Al-Taiar, 2022).

A community-based cross-sectional study published in BMC Public Health analyzed the prevalence and associated factors of stunting, underweight, and wasting among children (age < 6 years) from rural Hunan Province and found that 9.5% of children were underweight [14]. **Table 5** presents information on the severity and prevalence of undernutrition specifically overweight and obesity among children aged 0-5 years old in General Tinio Nueva Ecija. The table is divided into two columns for the condition of overweight, and obese. The percentage values in the table represent the proportion of children in each category who are overweight and obese. Boys who are overweight garnered 118 or 3.20% while girls garnered 105 or 2.84%, in this category boys garnered a higher percentage of overweight. In the row for obese girls garnered 124 or 3.36% while boys garnered 103 or 2.79%. Girls in this category got a higher percentage for obese. The table also provides an overall prevalence of overweight and obesity for all children aged 0-5 years old in General Tinio Nueva Ecija. The overall prevalence of overweight is 6.04%, and the prevalence of obesity is 6.15%.

Overall, the table suggests that undernutrition specifically overweight and obesity is also a concern for children aged 0-5 years old in General Tinio Nueva Ecija, with a significant proportion of children in the overweight and obese categories. According to recent studies and guidelines, childhood obesity is a serious health problem in the United States. The global prevalence of obesity in children and adolescents aged 5-19 years has increased from 0.7% to 5.6% for girls and from 0.9% to 7.8% for boys from 1975 to 2016 [6]. In the United States, 1 in 5 children and adolescents are affected by childhood obesity (CDC, 2022). The American Academy of Pediatrics has issued its first comprehensive guideline on evaluating and treating children and adolescents with obesity, which reflects growing concerns about health later in life (AAP, 2023). The guideline recommends that pediatricians try to see children with obesity and provide comprehensive programs to help them manage their weight [15].

Childhood obesity is a complex issue that can be caused by many factors, including behavior, genetics, and societal and community factors such as access to healthy food and beverages [16].

4. CONCLUSIONS AND RECOMMENDATIONS

The study provided information on the prevalence and severity of undernutrition and overnutrition among children aged 0-5 years old in General Tinio, Nueva Ecija. The prevalence of undernutrition is low, with stunting being the most prevalent form of undernutrition. Girls are more likely to be severely stunted, while boys are more likely to be stunted and wasted. The prevalence of underweight is also low, with girls having a slightly higher percentage than boys. In the severely underweight category, girls have a higher percentage. On the other hand, the prevalence of overweight and obesity is relatively high among children aged 0-5 years old in General Tinio, Nueva Ecija, with boys having a higher percentage of overweight and girls having a higher percentage of obesity. The overall prevalence of overweight is higher than that of obesity. The data presented highlights the importance of addressing undernutrition and overnutrition among children in General Tinio, Nueva Ecija.

Appropriate interventions should be implemented to reduce the prevalence of undernutrition and overnutrition and improve the overall health and well-being of children in the area. This study shall facilitate better understanding of the current nutritional status of the Filipino children. It will also help agencies monitor the progress of their projects based on the targets that these institutions have set. Public health professionals can better understand the structure of relationships that exist among the chosen explanatory variables and this form of undernutrition, and use this study as a basis for future research with newly-obtained survey data. Policymakers may also use the model as a guide for the implementation of Presidential Decree 1569 strengthens the Barangay Nutrition Program by providing for a Barangay Nutrition Scholar (BNS) in every barangay to assist in the coordination and implementation of nutrition programs, projects and activities and the barangay level. Letter of Instruction 441 of 1976 Instructs various departments of government to address malnutrition.

This issuance authorizes the Department of the Interior and Local Government (DILG) to establish functioning nutrition committees at different administrative levels (barangay, municipality, city, province, and region). The Local Government Code of 1991 (Republic Act 7160) mandates local government units to exercise their powers and discharge their functions as are necessary and appropriate for the effective provision of basic services including child welfare and nutrition services. By reducing the incidence and prevalence of undernutrition, we are one step closer to making our country a better place to live in not just for the children of today, but also for the children of tomorrow.

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