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Research on nutritional health of Vietnamese children

Huynh Phuc Minh*

Hue Central Hospital, Hue City, Vietnam

Abstract

Children's nutrition is an urgent global health problem, confirmed by many studies, which emphasize the problem of malnutrition - a state of nutritional deficiency or imbalance, affecting children's development, resulting in poor physical and intellectual development and leaving long-term consequences in adulthood. This study discusses children's nutritional health in terms of malnutrition in children under 5 years old; Analyze the influence of genetic, environmental, social factors, and health care factors on child malnutrition. Based on the theoretical framework built, the author conducted a survey in Da Nang city, Vietnam, with a sample size of N = 180 women raising children under 5 years old. Research and survey results help identify the actual situation of child malnutrition and identify the main causes leading to child malnutrition, from which the author suggests appropriate interventions to optimize the health of Vietnamese children, towards the goal of sustainable development.

Keywords: Children's malnutrition, Genetic, Environmental and social factors, Health care factors, Vietnam

1.Introduction

Vietnam is a country with rapid urbanization and high economic growth in the last 10 years, causing many health problems for its people, including problems with children's nutritional health. That is, malnutrition and stunting are still high, especially in ethnic minority areas, while overweight and obesity are increasing in urban children; Micronutrient deficiencies such as zinc are also common, affecting children's long-term health. The main causes include limited family finances, lack of nutritional knowledge and unsatisfactory living conditions...

According to national survey data in Vietnam (LB New, 2024), the rate of stunting in children under 5 years old in Vietnam is 18.2% (belonging to the group of countries with the rate of stunting in children below 20%, which is the average level according to WHO classification). However, this rate is still high in the Northern Midlands and Mountains (24.8%) and the Central Highlands (25.9%). In addition, there is an increase in the rate of overweight and obesity in all subjects, including overweight and obesity in children 5-19 years old increasing from 8.5% in 2010 to 19.0% in 2020 (more than doubling after 10 years).

In fact, in Vietnam, administrative units include 34 provincial-level localities (provinces and cities); Each provincial-level locality is structured into a commune level, and the whole country has 3,221 commune-level administrative units (GN, 2025). But even in a provincial-level locality in Vietnam, the rate of stunting malnutrition in children under 5 years old also has disparities between urban and rural and mountainous areas. Therefore, research on children's nutritional health overall and in each specific local area is necessary to help identify the actual situation of each locality and provide reference for appropriate policy adjustments.

With that meaning, the author chose to research children's nutritional health in Da Nang city - a locality with a high proportion of urban residents concentrated in the coastal area, but also a large proportion of rural and mountainous residents in the border areas. This is also a locality with disparities in development areas in urban and rural and mountainous areas right within the administrative boundaries, which is one of the factors that greatly affects children's nutritional health.

2. Literature Review

Child malnutrition has been analysed by many studies, confirming that it is a nutritional deficiency or imbalance, affecting the physical and intellectual development of children; Recognizing signs include slow growth in height and weight, easy illness, and

Correspondence: Huynh Phuc Minh, Hue Central Hospital, Hue City, Vietnam, **e-mail:** huynhphucminh2020@gmail.com **Received:** October 5, 2025
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impaired memory and communication ability (WHO, 2020). According to Binh, T.H. et al. (2023), childhood malnutrition results in poor physical and intellectual development and has long-term consequences in adulthood. Nghi, N.T.H. et al. (2023) confirm that malnutrition in children in the first years of life reduces their health, increases the risk of infection and death, and limits their future physical and mental development.

Explaining in detail the signs of malnutrition in children, recent studies have identified: (1) Slow physical development - lower weight and height than standard age; (2) Anorexia, malabsorption - eat less, lose appetite, leading to the body not absorbing enough nutrients; (3) Weakened immune system - susceptible to infections, especially respiratory and digestive diseases; (4) Decreased mental development - may manifest as delayed speech, poor memory, and limited ability to learn and socialize; (5) Other signs - skin and hair may change, bones weaken. And, to prevent child malnutrition, it is necessary to ensure a scientific, nutritious diet, pay attention to food hygiene and safety, and monitor children's growth charts.

Along with explaining child malnutrition and identifying signs of child malnutrition, recent studies have shown and analyzed many factors affecting child malnutrition, including objective factors (genetics; environment; society), subjective factors (health care).

- First, in terms of objectivity, Garza, C. et al. (2013) affirmed that genetic factors, especially the height of the parents, determine the child's stature; demonstrates a strong correlation between the average height of parents and the child's height-for-age Z-score. The results of the study by Garza, C. et al. (2013) is similar to the research results of Silventoinen, K. (2003), that 60-80% of height variation in developed countries is genetically determined. Besides genetic factors, environmental and social factors have a significant influence on child malnutrition. These are aspects of hygiene, available food sources, family income level... Humphrey, J. H. (2009) said that hygiene and environmental factors affect children's nutritional absorption; and estimates that poor sanitation is responsible for 20-30% of stunting in low- and lower-middle-income countries due to increased intestinal infections. Popkin, B. M. (2012) describes the nutrition transition in developing countries, where urbanization promotes a shift from undernutrition to overnutrition due to increased access to high-calorie, processed foods. The NIN (2019) assessment report noted that in Ho Chi Minh City, Vietnam, the overweight rate among urban children under 5 years old was 42%, in contrast to the national average of 6%, reflecting rapid economic growth and the nutritional status of children in the city. This report has similarities with the research results of Do, L. M. et al. (2017), that urban children from middle-income families in Ho Chi Minh City, Vietnam, are twice as likely to be overweight as children of the same age in rural areas, showing that economic and social factors have a two-way influence (positive and negative) on children's nutritional status.

- Second, on the subjective aspect, child health care from the family, directly the mother, has the most direct influence on child malnutrition. Accordingly, mothers need to have knowledge about nutritional health and have appropriate, scientific nutritional health care methods to help children develop healthily and overcome physical limitations from genetic factors. Black, R. E. et al. (2013) explains that maternal education is the foundation for child health outcomes; conducted research in 54 low- and middle-income countries and found that each year of maternal education reduces stunting rates by 4-7%. Previously, research by Smith, L. C. et al. (2011) in South Asian countries, affirmed that mothers with a secondary education who have good child care methods are 50% more likely to provide a diverse diet for their children than mothers who do not have a formal education, directly affecting the weight-for-age Z-score and height-for-age Z-score. Similarly, Nghi, N.T.H. et al. (2023) confirm that low educational level of mothers and large number of children in the family are factors that increase the risk of malnutrition in children under 5 years old. And according to Duc, P.X. et al. (2025), in order to reduce the rate of malnourished children being underweight, stunted or wasted, it is necessary to pay attention to the mother's nutrition during pregnancy so that the child reaches a minimum weight of > 2500g; increasing caregivers' knowledge, including improving knowledge about breast milk; Proper and sufficient vitamin A supplementation; Knowledge about weaning, when and how to feed children, especially when children are sick.

It can be seen that theoretical and empirical studies have emphasized both objective factors (genetics; environment; society) and subjective factors (health care) as factors that directly and indirectly affect child malnutrition. However, the level of impact of each factor varies in each region depending on the development conditions of each country. In this study, the author inherits and develops the results of previous studies and hypothesizes: *Genetic, environmental, and social factors (H1), Health care factors (H2) directly affect child malnutrition.*

Through comprehensive research, the author inherits and develops the results of previous studies and builds a theoretical framework on child malnutrition and factors affecting child malnutrition. The theoretical model includes 02 independent scales/variables "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) and 01 independent scale/variable "Children's malnutrition" (CHM). The scales include 9 observed variables, designed into 9 questions in the survey and measured using a 5-level Likert scale: 1 - Strongly disagree; 2 - Disagree; 3 - No opinion; 4 - Agree; 5 - Strongly agree (Table 1, Figure 1).

Table 1. Theoretical framework

Research content	Related research	Developing new research scales
1. Genetic, environmental, social factors (GES)		
- Parental height. - Food sources; food hygiene. - Family economy/ income level.	Silventoinen, K. (2003); Humphrey, J. H. (2009); Popkin, B. M. (2012); Garza et al. (2013); Do, L. M. et al (2017) NIN (2019).	GES1. Parents' height determines the child's stature, helping the child develop healthily. GES2. Family food source; Food hygiene is guaranteed, helping children grow healthily. GES3. The family's economy is stable, helping to ensure children's nutrition and healthy development.
2. Health care factors (HEC)		
- Knowledge about the mother's nutritional health. - Scientific and appropriate nutritional skills/methods of the mother. - Mother's health care and nutritional regimen.	Smith, L. C. et al. (2011); Black, R. E. et al. (2013); Nghi, N.T.H. et al. (2023); Duc, P.X. et al. (2025).	HEC1. Mothers who have knowledge about nutritional health will take care of and ensure the nutritional health of their children. HEC2. Mothers who have scientific and appropriate nutritional skills/methods will take care of and ensure the nutritional health of their children. HEC3. Mothers who take care of their own health and have a good diet will take care of and ensure the nutritional health of their children.
3. Children's malnutrition (CHM)		
- Slow physical development; anorexia, poor absorption of food. - Weakened immune system; Skin and hair may change, bones may weaken. - Reduced brain development.	WHO (2020); Binh, T.H. et al. (2023); Nghi, N.T.H. et al. (2023)	CHM1. Children eat less, have slow physical development, and have lower weight and height than the standard age. CHM2. Children with weakened immune systems are susceptible to infections, respiratory and digestive diseases; Skin and hair may change, bones may weaken. CHM3. Children with delayed mental development may have slow speech, poor memory, and limited ability to learn and communicate socially.

Source: Compiled by the author through the review

Research model

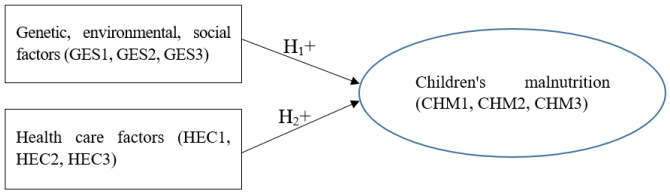

Figure 1. Research model

3. Research Methods

- Qualitative research: The author conducted qualitative research through collecting and analyzing secondary documents to build a theoretical model, including: 02 independent scales/variables "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) and 01 independent scale/variable "Children's malnutrition" (CHM) (Table 1, Figure 1).

- Quantitative research: The author conducts quantitative research through surveys to collect and analyze primary data to test theoretical models and test hypotheses. In quantitative research, the minimum survey sample size is determined according to the formula N = m*5, in which m is the number of observed variables (Hair, J.F. et al., 2009). Applying this formula, the model with 3 scales and 9 observed variables determines the minimum survey sample size to be N = 9 * 5 = 45.

In fact, the author conducted an official survey with a sample size of N = 180 (N > 45) women raising children under 5 years old in 20 rural communes of Da Nang city, Vietnam. The survey was conducted selectively to collect information from respondents with a high school education or higher and are raising children under 5 years old. The distribution of survey forms is conducted on the basis of preliminary interviews and consent of respondents; The results were 180/180 valid answers, reaching a valid response rate of 100%.

4. Research Results and Discussion

From data collected through a survey with a sample size of N = 180 women raising children under 5 years old, the author tested the reliability of the scale and observed variables as a basis for performing exploratory factor analysis and regression analysis. In quantitative research, scales are reliable when they meet the standard Cronbach'alpha > 0.6; Observed variables are reliable when they meet the standard condition of Corrected Item-Total Correlation > 0.3 (Hair, J.F. et al., 2009; Jam et al., 2025). The test results show that all 3 scales and 9 observed variables in the theoretical model are reliable (Table 2).

Table 2. Statistical results and testing results of the scale

Scales	Observed variables	N	Min	Max	Mean	Std. Deviation	Cronbach' Alpha	Corrected Item-Total Correlation
1. Genetic, environmental, social factors (GES)	GES1	180	1	5	4.13	.609	.712	GES1 = .478
	GES2	180	1	5	4.07	.592		GES2 = .493
	GES3	180	1	5	4.10	.611		GES3 = .384
2. Health care factors (HEC)	HEC1	180	1	5	4.01	.621	.676	HEC1 = .411
	HEC2	180	1	5	4.04	.608		HEC2 = .359
	HEC3	180	1	5	4.02	.613		HEC3 = .432
3. Children's malnutrition (CHM)	CHM1	180	1	5	4.10	.585	.694	CHM1 = .473
	CHM2	180	1	5	4.08	.614		CHM2 = .506
	CHM3	180	1	5	4.12	.626		CHM3 = .492

Source: Author's survey results

The statistical data in Table 2 shows that the observations of the scales "Genetic, environmental, social factors" (GES), "Health care factors" (HEC), "Children's malnutrition" (CHM) are rated at an average level of Mean ≥ 4.01, all statistically significant according to the Likert scale (1-5). This shows that child malnutrition in Vietnam is still occurring, affecting the physical, intellectual, and immune system development of children: Weight and height are lower than standard ages; susceptible to infections, respiratory and digestive diseases due to weakened immune system; slow speech, poor memory... The survey results also show similarities with the statistical results and assessments of health authorities in Vietnam, that the rate of stunting (height for age) in children under 5 years old in

Vietnam is 19.6%, < 20%, but still high compared to the WHO classification, especially in mountainous areas, ethnic minorities, and difficult conditions (NIN, 2020).

In specific aspects, there are differences in the observed values of the scales. Accordingly, the observed values of the "Health care factors" (HEC) scale are evaluated at a lower level: Mean (HEC1) = 4.01, Mean (HEC2) = 4.04, Mean (HEC3) = 4.02. This shows that, in rural and mountainous areas - areas with difficult conditions in Da Nang city, many mothers have limited knowledge of nutritional health; limited scientific nutrition skills/methods; and health care and nutrition regimes are not good, affecting the care and ensuring nutritional health of children, becoming one of the direct causes of child malnutrition.

The above empirical research results contribute to reflecting the reality of nutritional health care issues in rural areas in Vietnam today; shows similarities with the assessments and assessments of some recent studies. Research by Tran, B. X. et al. (2019) concluded that urban mothers with access to health education programs were significantly more likely to adhere to WHO-recommended nutritional practices, leading to improved weight-for-height Z-score. Or as researched by Binh, T.H. et al. (2023) emphasized that communication work to improve knowledge for mothers is extremely important; Mothers with the right knowledge have a lower rate of malnourished children. Duc, P.X. et al. (2025) analyzed the significance of organizing training and communication classes to improve nutritional knowledge and practices for mothers, especially focusing on the following contents: How to feed children when sick, express milk when the mother is at work, number of meals a day, and proper weaning regimen; Encourage and support mothers to maintain proper employment during pregnancy to reduce the risk of malnutrition and low birth weight in their children.

With standard testing results, all 3 scales and 9 observed variables of the theoretical model can be used to perform subsequent analysis techniques. The author conducted exploratory factor analysis with Varimax rotation to preliminarily evaluate the one-dimensionality, convergent value, and discriminant value of the scales to have more basis for drawing research conclusions about the appropriateness of the theoretical model.

Table 3. Total variance explained

KMO and Bartlett's Test									
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.765							
Bartlett's Test of Sphericity	Approx. Chi-Square	1571.372							
	df	36							
	Sig.	0							
Total Variance Explained									
Component	**Initial Eigenvalues**			**Extraction Sums of Squared Loadings**			**Rotation Sums of Squared Loadings**		
	Total	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**	**Total**	**% of Variance**	**Cumulative %**
1	3.871	43.013	43.013	3.871	43.013	43.013	2.674	29.711	29.711
2	2.75	30.552	73.565	2.75	30.552	73.565	2.61	29.004	58.715
3	1.143	12.695	86.26	1.143	12.695	86.26	2.479	27.545	86.26
4	0.351	3.905	90.165						
5	0.309	3.434	93.599						
6	0.23	2.558	96.157						
7	0.169	1.873	98.03						
8	0.105	1.164	99.194						
9	0.073	0.806	100						
Extraction Method: Principal Component Analysis.									

Source: Author's survey results

Table 4. Rotated component matrix

Rotated Component Matrix[a]				
Scales	**Observed variables**	**Component**		
		1	**2**	**3**
1. Genetic, environmental, social factors (GES)	GES1	.737		
	GES2	.735		
	GES3	.854		
2 Health care factors (HEC)	HEC1		.868	
	HEC2		.891	
	HEC3		.869	
3. Children's malnutrition (CHM)	CHM1			.774
	CHM2			.842
	CHM3			.788
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. a. Rotation converged in 5 iterations.				

Source: Author's survey results

From a theoretical perspective, exploratory factor analysis is performed in accordance with the data set as shown by the following values: 0.5 ≤ KMO ≤ 1; The Bartlett test has an observed significance level Sig. < 0.05; Eigenvalue ≥ 1; Total Variance Explained ≥ 50%; Factor Loading ≥ 0.5 (Hair, J.F. et al., 2009). Table 3 and Table 4 data show:

- KMO = 0.765 > 0.5, confirming that exploratory factor analysis is appropriate for the data set; The Bartlett test has an observed significance level Sig. = 0.000 < 0.05, showing that the observed variables are linearly correlated with the representative factor. Total variance extracted with Cumulative % = 86.260% > 50% (Table 3), showing that 86.260% of the variation of representative factors is explained by observed variables; All observed variables have Factor Loading > 0.5 (Table 4), showing that the observed variables have good statistical significance. The initially proposed theoretical research model is consistent with actual survey research.

- The observed variables were extracted into 03 factors corresponding to the 03 original factors with Eigenvalues > 1 (Table 3), continuing to confirm the appropriateness of the original research model. And the original research model remains the same, including: 02 independent variables "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) and 01 dependent variable "Children's malnutrition" (CHM) with a total of 9 observed variables with good statistical significance. Multivariate linear regression analysis can be performed to consider the relationship of variables in the model.

Next, the author conducted multivariate regression analysis to test the correlation and draw research conclusions about the influence of 02 independent variables "Genetic, Environmental, Social factors" (GES), "Health Care Factors" (HEC) and 01 dependent variable "Children's Malnutrition" (CHM). The results of the regression analysis are shown in Table 5 below.

Table 5. Multivariate regression results

Coefficients							
Model		**Unstandardized Coefficients**		**Standardized Coefficients**	**t**	**Sig.**	**VIF**
		B	**Std. Error**	**Beta**			
1	(Constant)	1.062	.247		11.659	.000	
	1. Genetic, environmental, social factors (GES)	.538	.415	.510	9.586	.000	1.821
	2. Health care factors (HEC)	.464	.352	.383	8.745	.000	1.784
a. Dependent Variable: Children's malnutrition (CHM) R^2 = 0.715; Durbin-Watson = 2.005							

Source: Author's survey results

Table 5 data shows:

+ R^2 = 0.715, confirming that the scales "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) explain 71.5% of the variation of the scale "Children's malnutrition" (CHM); VIF = 1.821 and VIF = 1.784 (1 < VIF < 2), showing that the regression model does not have multicollinearity; Durbin-Watson = 2.005 (1 < d < 3), showing that the regression model has no autocorrelation phenomenon, confirming that the scales "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) are independent and have the same impact on the scale "Children's malnutrition" (CHM), confirming the suitability of the theoretical research model with the survey data set.

+ The regression coefficients of the two independent variables "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) are both statistically significant (Sig. < 0.05) and have positive values: B(GES) = 0.538 and B(HEC) = 0.464, confirming the positive relationship between the two independent variables "Genetic, environmental, social factors" (GES), "Health care factors" (HEC) and 01 dependent variable "Children's malnutrition" (CHM); Hypotheses H1, H2 are accepted; The initial research model continues to be confirmed as suitable.

+ The regression model is determined as: CHM = 1.062 + 0.538*GES + 0.464*HEC. The degree of correlation of the independent and dependent variables in descending order is: "Genetic, environmental, social factors" (GES), "Health care factors" (HEC).

The statistical and testing data in Table 2 and the regression analysis results in Table 5 show similarities with the assessment level of child malnutrition; The influence of genetic, environmental, social and health care factors on child malnutrition contributes to further confirming the results of empirical research in Vietnam, that:

- First, child malnutrition in Vietnam is still occurring, especially in rural and mountainous areas with difficult conditions, affecting the physical, intellectual, and immune system development of children: Weight and height are lower than standard

ages; susceptible to infections, respiratory and digestive diseases due to weakened immune system; slow speech, poor memory…

- Second, in rural and mountainous areas with difficult conditions, women have limited knowledge of nutritional health; limited scientific nutrition skills/methods; and health care and nutrition regimes are not good, affecting the care and ensuring nutritional health of children, becoming one of the direct causes of child malnutrition.

From the above research conclusions, the author implies a number of policy contents aimed at population development and limiting child malnutrition in Vietnam.

(1) Localities actively organize communication and support in fostering knowledge and skills, improving understanding of maternal health and children's nutritional health through community education programs. The significance of this solution is demonstrated by Bhutta, Z. A. et al. (2013), can reduce malnutrition, maintaining effectiveness against child stunting in low- and lower-middle-income countries; and in this case, it is the rural, mountainous, and difficult-conditioned areas of localities in Vietnam.

(2) Localities proactively research the integration of nutritional counseling into maternal health care. The significance of this solution is demonstrated by Kelly, B. et al. (2019), will promote awareness and action of entities directly caring for children's health, thereby overcoming the problem of child malnutrition in Vietnam from within.

The above solutions are meaningful in state governance, because limiting/overcoming child malnutrition helps localities build social human resources with good physical and mental health and support human resource criteria in the goal of sustainable development (UN, 2015). Therefore, this study emphasizes maternal education and health literacy as key and modifiable determinants of children's nutritional health in Vietnam.

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