The Relationship between Socioeconomic Factors and Malnutrition in Under-5 Iranian Children

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Abstract

Background: Malnutrition is a major contributor to children's low growth, development and also disease. To inform policymakers' planning and action, this study aimed to assess malnutrition in under-5 children and its relationship with the household socioeconomic status.

Methods: The data of this cross-sectional survey was collected through a valid and reliable questionnaire including demographic, nutritional and socioeconomic data. Through proportional and random cluster sampling, 3980 children aged 6 to 59 months old were selected as the participants of the study. The data were analyzed through Chi-Square and ANOVA tests using EpiNut and Stata software.

Results: 138 (3.5%) had severe stunting (height for age), 58 (1.5%) severe low weighting (weight for age), 81 (2%) severe weight loss, 87 (2.2%) obesity based on BMI for age, 66 (1.7%) severe wasting and 84 (2.1) obese based on weight for height. Height and weight for age were significantly associated with father's job and BMI for age was associated with household socio-economic status ($p<0.05$).

Conclusion: In spite of performing nationwide programs targeting under 5 children, the prevalence of malnutrition problems was high. This study indicated that the household socio-economic status is an effective factor. This indicates that the supporting measures such as insurance and free services for the poor are not well designed, targeted and administered.

Key Words: Iran, Malnutrition, Markazi province, Obesity, Socioeconomic status, Stunting, Wasting, Weight loss.

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1- INTRODUCTION

Early months and years of birth are very sensitive to nutrient materials by which the optimal physical, mental and performance growth and development of a child is ensured.

Black RE, Allen LH, Bhutta ZA, Caulfield LE, de Onis M, Ezzati M, et al. Maternal and child undernutrition: global and regional exposures and health consequences. Lancet. 2008; 371(9608):243–260

Children due to special and different dietary requirements and also rapid linear growth are exposed to malnutrition risk. Imbalance, deficiency or excess in protein, energy, or other nutrients can cause a state named malnutrition that leads to unfavorable effects on performance and body form (1). Regarding the importance of paying attention to malnutrition in children, it is enough to state that more than half of the under-5-year-old (U-5) deaths, especially in low and middle income countries, occur due to malnutrition (2, 3). The statistics indicate that roughly 156 million and 50 million U-5 children are, respectively, estimated to be stunned (low height for age) and wasted (low weight for height) globally (4).

There are high malnutrition inequalities between and within countries; so, children belonging to lower socio-economic status (SES) groups bear a higher malnutrition status. Various SES factors may affect children's nutritional status including parents' education, income, employment and demographic characteristics (5-8).

In developing and developed countries, some common socioeconomic factors such as gender inequality, education (especially low maternal schooling) and poverty determine malnutrition status (9). As purchasing power directly affects food affordability, so those with lower socioeconomic status bear a higher malnutrition status (10). Mothers with higher schooling rates, having higher awareness of healthy practices and optimal resource allocation for their kids, play a good role in reducing malnutrition 73, 86. In the same way, higher schooling rates of the fathers are also positively associated with malnutrition rate, through providing adequate income, and then better family nutrition, sanitation and shelter (11).

A previous study in Iran performed based on the data extracted from the national Demographic and Health Survey indicated that there is inequality in stunting and underweight and also indicated that children in the lower quintiles are more malnourished. However, the data of the current study are collected through questioning from household heads and also using the household health records. Moreover, this is a comprehensive study on the social burden and socio-economic factors related to child malnutrition.

Identifying the challenges ahead of preventing malnutrition is very important to stimulate monitoring and action, and to ensure appropriate growth and development and optimal health status. This study aimed at estimating malnutrition burden and the relationship between socioeconomic factors and malnutrition among under-5-year-old children.

2- MATERIALS AND METHODS

2-1. Study setting

This cross-sectional study was carried out in 2020 through questioning the household heads and also extracting the data from households' health records in Markazi province, located 293 km southwest of Tehran, in the central area of Iran with a population near 1,500,000. This province is located in the central area of Iran which can be the representative of Iran. Moreover, this province is one of the main targets of immigrants from all over the country due to its being highly industrial. Thus, a variety of all the

ethnicities of Iran live in this province. Another factor to consider is that the province is highly polluted due to the focus of industries in it. The air pollutants may affect malnutrition and health related indices such as wasting, stunting, and obesity.

2-2. Participants and sampling

All households with 5-65-month-old children living in the rural and urban areas of Markazi province were included in the study. Accordingly, on the basis of data of Markazi province health center that indicates the prevalence of malnutrition to be about 50% (p) in the province, the confidence level (α) of 99%, the sampling error (d) equal to 0.02, and also on the basis of following sampling formula, the sample size was estimated at 3200; and to increase the accuracy and the study power, 3987 children aged 6-59 months were included in the study.

$$N = [Z(1-\alpha/2)^2 pq] \, d^2$$

The participants were selected through random cluster sampling. The cluster heads were determined on the basis of postal code in urban areas and census in rural areas. If one household head did not respond to the trained interviewers, the next household head was entered into the study.

2-3. Instruments

Demographic and socioeconomic data including age and gender of children, parents' educational level, employment status and job title, household income, marital status, health insurance status, place of residence (rural or urban), birth time and current height and weight were extracted from the child and family health record deposited in the healthcare center. The researcher-made questionnaire was also used for collecting data. The questionnaires were completed via house by house visiting. The validity of the questionnaire was confirmed through content validity, experts' opinions, and literature review. The reliability was confirmed through the test-retest method. Stadiometer and balance devices were used to measure height and weight of the children.

2-4. Administration method

All of the households in Markazi province are covered by healthcare centers. Therefore, proportional to the population covered by each center, the number of samples for each center was determined. For each health center, one house was selected randomly on the basis of the municipality plaques. After completing the first questionnaire for the first house, by moving to the right side of that house, other questionnaires were completed. This process was performed for all health centers. The interviewers were the healthcare employees of Arak University of Medical Sciences who were trained before the onset of the study.

If the household had U-5 children, the questionnaire was completed for them by questioning the mothers and measuring the child's height and weight. However, if the household didn't have any U-5 child, the interviewer visited the right-hand house and continued the questioning in the same way.

The household income level was categorized as < 20, 20-40, 40-60, and > 60 million Rial (the monetary unit of Iran).

2-5. Analysis

The softwares of Excel, EpiNut, and Stata were used to calculate the status of malnutrition, overweight, obesity, underweight, wasting, and stunting and also their relationship with SES. Chi-Square and ANOVA tests were used to assess the relationship between the quantitative and qualitative variables with SES variables.

3- RESULTS

This study was performed on 3987 children aged 6-59 months, 1990 girls (49.9%) and 1997 boys (50.1%). Mean age of the children was 26.4 with the standard deviation (SD) of 16.4 months. Mean weight and height of the participants were 11.8 (SD: 3.7) and 85.7 (SD: 14.9). 56.4% of the fathers and 54.9% of the mothers had university education. 20.4% of fathers were employees and 2% of them were unemployed. 87.2% and 16.6% of the children had social insurance and supplemental insurance, respectively (**Table 1**).

Table-1: Frequency of the variables among the participants

Variables		Frequency	Percent	Variables		Frequency	Percent
Child's gender	Girl	1990	49.9	Father's job	Unemployment	79	2
	Boy	1997	50.1		Worker	1246	31.3
Child's age	<6 months	519	13		Employee	815	20.4
	6-17 months	862	21.6		Farmer	262	6.6
	18-29 months	958	24		Other	1585	39.8
	30-41 months	778	19.5	Mother's job	Working at home	51	1.3
	42-53 months	629	15.8		Employee	245	6.1
	54-59 months	241	6		housekeeper	3691	92.6
Father's Education	Illiterate	39	1	General Insurance	Iran's Health insurance	490	12.3
	High school	1702	42.7		Armed forces	4	0.1
	Associate Degree	660	16.6		Social insurance	3476	87.2
	Bachelor's and above	1586	39.8		No coverage	6	0.2
Mother's Education	Illiterate	52	1.3		Other	11	0.3
	High school	1744	43.7	Complemental insurance	Yes	660	16.6
	Associate Degree	695	17.4		No	3327	83.4
	Bachelor's and above	1495	37.5	Mother's marital status	Living with husband	3797	95.2
Place of residence	Urban	3138	78.7		Dead husband	5	0.1
	Rural	849	21.3		Divorced	185	4.6

The results indicated that 138 (3.5%) of children had severe stunting and 211 (5.3%) were stunting on the basis of height for age index. Weight for age index indicated that 58 (1.5%) and 594 (14.9%) were underweight and overweight, respectively. BMI index for age indicated that 81 (2%) had severe weight loss, 177 (4.4%) weight loss, 120 (3%) overweight, and 87 (2.2%) were obese. Weight for age index indicated that 66 (1.7%) had severe wasting, 148 (3.7%) wasting, 119 (3%) overweight, and 84 (2.1%) obese.

The results indicated that there is no significant relationship between the indices of height for age, weight for age, BMI for age and weight for height with both parents' educational level, mother's job, place of residence, and mother's marital status (p>0.05). The results indicated that father's job is significantly correlated with height for age and weight for age (p<0.05) (Table 2).

Table-2: The association between anthropometric indices and socioeconomic variables in the studied under-5 children

Variables		Height for age Mean ± SD	Weight for age Mean ± SD	BMI for age Mean ± SD	Weight for height Mean ± SD
Father's Education	Illiterate	-0.32 ±1.4	-0.21 ±1.2	-0/02 ± 1.24	0.06 ± 1.7
	High school	0.06 ± 2.1	-0.08 ± 1.4	-0/14 ± 1.62	-0.04 ± 1.5
	Associate degree	0.039 ± 2.6	-0.01 ± 1.5	0/01 ± 1.65	-1.2 ± 1.5
	Bachelor degree	-0.05 ± 2	-0.16 ± 1.3	-0.15 ± 1.6	-0.11 ± 1.5
P-value		0.372	0.697	0.717	0.480
Mother's Education	Illiterate	-0.2 ± 1.2	-0.21 ± 0.98	-0.136 ± 1.13	-0.06 ± 1.9
	High school	0.036 ± 2.2	-0.09 ± 1.4	-0.123 ± 1.6	-0.11 ± 1.5
	Associate degree	-0.0005 ± 2.4	-0.05 ± 1.4	-0.037 ± 1.62	-0.11 ± 1.5
	Bachelor degree	-0.009 ± 2.05	-0.14 ± 1.3	-0.159 ± 1.6	-0.12 ± 1.5
P-value		0.577	0.946	0.839	0.472
Father's Job	Unemployed	-0/13 ± 2/4	-0/24 ± 1/46	-0/15 ± 1/46	-0/06 ± 1/2
	Worker	-0/11 ± 1/8	-0/18 ± 1/2	-0/08 ±1/8	-0/08 ± 1/6
	Employee	-0/06 ± 2/3	-0/12 ±1/5	-0/08 ± 1/8	-0/14 ± 1/5
	Farmer	0/13 ± 2/3	-0/12 ±1/5	-0/24 ± 1/3	-0/08 ± 1/5
	Other	0/13 ± 2/3	-0/02 ± 1/4	-0/1 ± 1/6	-0/05 ± 1/5
P-value		0/006	0/027	0/276	0/766
Mother's Job	Working at home	-0/16 ± 1/9	-0/08 ± 1/1	0/06 ± 1/1	0/08 ± 1/4
	Employee	-0/11 ± 1/9	0/17 ± 1/35	-0/14 ± 1/3	-0/1 ± 1/9
	Housekeeper	0/01 ± 2/2	-0/1 ± 1/4	-0/12 ± 1/6	-0/08 ± 1/5
P-value		0/870	0/694	0/557	0/716
Place of Residence	Urban	-0/09 ± 1/4	0/02 ± 2/2	-0/11 ± 1/6	-0/08 ± 1/5
	Rural	-0/16 ± 1/2	-0/03 ± 1/8	-0/16 ± 1/5	-0/09 ± 1/4
P-value		0/166	0/496	0/426	0/880
Mother's Marital Status	Living with husband	-0/11 ± 1/4	0/007 ± 2/2	-0/13 ± 1/6	-0/08 ± 1/5
	Dead husband	0/37 ± 1/2	0/16 ± 0/6	0/38 ± 1/7	0/39 ± 0/9
	Divorced	0/05 ± 1/06	0/03 ± 1/8	0/05 ± 1/3	0/007 ± 1/5
P-value		0/971	0/215	0/237	0/557

The results indicated that the indices of height for age, weight for age, BMI for age, weight for height are not significantly associated with demographic variables of gender, age, place of residence (rural or urban) (p>0.05). Regarding the economic status, 40% of the participants were weak, 20% were moderate and 39.9% weak. No significant relationship was found between the SES status between and the indices of height for age, weight for age, and weight for height (p>0.05). However, SES status was significantly associated with BMI index for age (p<0.05) (**Table 3**).

4- DISCUSSION

Malnutrition in children is among the most important challenges of the health system in developing countries. The most important causes of malnutrition include infectious diseases, insufficient caring, inadequate dietary intake, and household socioeconomic status (12-15). It has been indicated that various household demographic and SES factors are effective on children's malnutrition indices. A study on U-5 Indonesian children indicated that there is a significant correlation between stunting and gender of children, father employment status and household income level (16).

Table-3: Distribution of anthropometric indices in terms of socioeconomic status

Variable		Very weak	Weak	Average	Good	Very good	P-value
		Frequency (%)					
Height for age	Severe stunting	19(12.5)	34(22.4)	42(27.6)	28(18.4)	29(19.1)	0.098
	Stunting	717(20.6)	704(20.2)	682(19.6)	691(19.8)	694(19.9)	
	Normal	41(19.4)	30(14.2)	49(23.2)	45(21.3)	46(21.8)	
	Tall	22(16.2)	29(21.3)	25(18.4)	34(25)	26(19.1)	
Weight for age	Severe underweight	101(17)	123(20.7)	125(21)	132(22.2)	113(19)	0.335
	Underweight	649(20.4)	637(20.1)	631(19.9)	617(19.4)	641(20.2)	
	Normal	39(24.4)	24(15)	30(18.8)	33(20.6)	34(21.3)	
	At risk of overweight	10(17.2)	13(22.4)	12(20.7)	16(27.6)	7(12.1)	
BMI for age	Severe wasting	16(18.4)	12(13.8)	15(17.2)	24(27.6)	20(23)	0.011
	Wasting	17(14.2)	26(21.7)	22(18.3)	32(26.7)	23(19.2)	
	Normal	79(17.9)	105(23.8)	96(21.7)	81(18.3)	81(18.3)	
	At risk of overweight	646(21)	581(18.9)	612(19.9)	608(19.7)	633(20.6)	
	Overweight	26(14.7)	51(28.8)	33(18.6)	38(21.5)	29(16.4)	
	Obesity	15(18.5)	22(27.2)	20(24.7)	15(18.5)	9(11.1)	
Weight for height	High wasting	14(21.2)	13(19.7)	11(16.7)	17(25.8)	17(25.8)	0.732
	Wasting	35(23.6)	22(14.9)	34(23)	22(14.9)	35(23.6)	
	Normal	623(19.9)	631(20.1)	629(20.1)	640(20.4)	614(19.6)	
	Probability of overweight	90(20.8)	94(21.7)	83(19.2)	82(19.6)	81(18.7)	
	Overweight	24(20.2)	18(15.1)	23(19.3)	27(22.7)	27(22.7)	
	Obesity	13(15.5)	19(22.6)	18(21.4)	13(15.5)	21(25)	

Mother educational level, awareness about using complementary foods and awareness about children's nutritional needs were found to be effective in children's underweight and wasting (17).

It has been indicated that urban areas due to higher healthy diet regimen and better access to health care services have reduced frequencies of stunting and wasting. However, no significant difference was found between rural and urban areas in terms of malnutrition indices including stunting, weight for age, BMI for age and wasting. The reason behind it can be the extensive public Primary Health Care (PHC) system in Iran that provides geographical, cultural and economic access to the services for all Iranians living in farthest to nearest villages and cities (18). Previous research has indicated that provinces with higher specialized medical equipment and professionals don't necessarily have better public health status. What provides a difference is investment in PHC services not specialized medical centers. These services have higher returns to scale and have higher cost-effectiveness (19). Investment on primary healthcare increases the individuals' knowledge, attitude, and performance, engages people in self-care, improves self-reliance and self-confidence and promotes social capital (20).

The results, further, indicated that there is a significant association between height and weight for age and father's job and also between BMI index and household socio-economic status. These results confirm the findings of previous studies (21-23). The logic behind these associations is that households with food shortage and low SES status have higher malnutrition disorders. Although this seems a simple relationship, it emphasizes

the role of the government to prepare financial and insurance support for low SES households. Unfortunately, most children with malnutrition disorders live in low- and middle-income countries, where there are weak established supporting systems.

4-1. Study limitations

As this is a cross-sectional study, the causal interpretation of the relationship between demographic and SES data with malnutrition variables should be done with caution. In other words, the associations identified may be difficult to interpret. Also, these types of studies only measure prevalence not incidence rate.

5- CONCLUSION

The Iranian Ministry of Health has implemented various nationwide programs to track children's nutritional status and has gained many improvements. However, the prevalence of undernutrition, overweight and obesity are high.

The cause of this contradiction is that the prevention programs are concentrated at the national level without considering local level needs, variations and constraints. This study provides guidance for monitoring the status and progress towards malnutrition control.

6- ETHICAL Considerations

This study was reviewed and approved by the Ethical Committee of Arak University of Medical Sciences (Ethical code number: IR.ARAKMU.REC.1397.201).

Furthermore, written informed consent was obtained from the participants of the study. The study was performed on the basis of the Helsinki Declaration.

7- CONFLICTS OF INTEREST

None.

8- FUNDING

9- AUTHOR CONTRIBUTIONS

JN, NY and SA designed the study, performed the statistical analysis, and drafted the manuscript. JN, NY, SK, MAO, MD, SE, and SA revised the manuscript critically for important intellectual content and gave the final approval of the manuscript. JN, SA and MD contributed to the conception and design of data. All authors contributed to the article and approved the submitted version.

10- ACKNOWLEDGEMENTS

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