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ORIGINAL ARTICLE

Prevalence of Stunting in Primary School Age Children in Baghdad, Iraq 2024

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ABSTRACT

Stunting represents a crucial measure of long-term nutritional deficiencies which continues to challenge public health systems especially in developing metropolitan areas. The research focused on establishing both the magnitude of stunting along with its socioeconomic variables which affect primary school children in Baghdad's Washash neighborhood. The research employed a cross-sectional survey method in 2024 to examine 357 children between the ages of 6 and 12 from eight public primary schools. The study collected height and weight measurements together with comprehensive information about personal demographics and family socioeconomic status. The study revealed that 17.4% of the children were stunted. The study demonstrated that specific factors including child gender together with guardian employment status and family monthly earnings and socioeconomic standing showed statistical significance in relation to stunting. The analysis showed no meaningful relationships between stunting and the child's age or guardian education level or number of people living in the household. The data demonstrates how financial hardship and unemployment lead to stunted growth in children thus creating a requirement for specialized nutritional and social programs in neglected urban areas. The research establishes basic guidelines to develop future public health strategies which will reduce child malnutrition while ensuring equal health benefits for Iraqi children.

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1- INTRODUCTION

Optimal growth in children is one of the essential indicators for assessing individual and collective health, nutritional status, and sustainable development in any community[1]. Among the key indicators in measuring physical growth, "stunting" is defined as height for age being more than two standard deviations below the median of the World Health Organization growth standards[2]. This indicator reflects chronic malnutrition during childhood, resulting from a lack of nutrients, frequent infections, and unfavorable environmental conditions[3]. Stunting is recognized as one of the most serious public health challenges, especially in low-income and developing countries, and its effects are not limited to childhood; rather, it impacts mental growth, learning capacity, academic success, economic productivity in adulthood, and even the health of future generations. In other words, stunting is not only a health problem but also a social, economic, and developmental challenge[4]. According to statistics from international organizations, in 2020, approximately 149 million children under the age of five worldwide suffered from stunting[8]. Although the overall trend globally has been decreasing, this issue remains persistent in the

African continent and some Middle Eastern countries, including Iraq. In Iraq, unstable economic conditions, wars, forced migrations, food insecurity, lack of primary healthcare services, water pollution, and inadequate health education within families are among the most significant factors contributing to the increased prevalence of malnutrition and stunting in children[5].

While numerous studies have focused on the nutritional status of children under five, limited information is available regarding the prevalence and risk factors of stunting in school-aged children (6 to 12 years), particularly in urban areas with specific demographic characteristics such as the Washash neighborhood in Baghdad. These ages are associated with rapid physical growth and cognitive development, and any nutritional disruption at this stage can have long-term effects on an individual's quality of life and social functioning in the future.

The continuous study and monitoring of the nutritional status of school-age children is not only an effective tool for measuring health equity, but it can also serve as a basis for designing health-oriented policies, nutritional interventions, and health promotion programs in schools. Furthermore, in order to achieve the Sustainable Development Goals (SDGs), it is essential for countries like Iraq to adopt scientific and localized strategies to combat stunting[5]. Therefore, this research was conducted to examine the prevalence of stunting and its associated risk factors among school-age children in the Washash neighborhood of Baghdad in 2024. The results of this study could serve as a valuable foundation for designing and implementing school- and family-based health-nutrition programs in vulnerable urban areas.

2- MATERIALS AND METHODS

2.1 Study Design and Setting

This study was conducted as a descriptive cross-sectional study from January to April 2024 in the Washash area located in the west of Baghdad, Iraq. The Washash area is one of the densely populated neighborhoods with a diverse socio-economic structure that houses a significant population of school-aged children. The study population included students from 8 public primary schools located in this area, selected to achieve an accurate representation of the nutritional status of children.

2.2 Statistical population and inclusion and exclusion criteria

The target population included all male and female students aged 6 to 12 years enrolled in the aforementioned schools. The inclusion criteria for the study included:

- Age between 6 to 12 years;
- Obtaining written consent from the parents or legal guardians of the child.

The exit criteria included:

- Suffering from chronic diseases affecting height growth;
- Congenital disorders or known syndromes associated with short stature;
- Refusal of parents to cooperate or fill out the questionnaire.

2.3 Sample size and sampling method

In this study, our statistical population is 5013 students from 8 primary schools, of which the statistical sample was determined based on Cocoran's formula of 357 children. To increase the accuracy and statistical representation, sampling was done randomly stratified based on educational grade and gender.

$$n = \frac{\frac{pqz^2}{d^2}}{1 + \frac{1}{N}\left[\frac{pqz^2}{d^2} - 1\right]}$$

- In this formula, N is the volume of the population.
- The p statistic is the percentage of the distribution of the trait in the society, i.e. the proportion of people who have the trait under study.
- The p statistic is the percentage of the distribution of the trait in the society.

- The Q statistic is also the percentage of people who do not have the studied trait.
- The z-statistic at the level of a 5% error is 1.96 and Z^2 is 3.8416.
- The value of d is also the difference between the actual ratio of the trait in the population and the estimation rate with the highest accuracy from the maximum value of d equal to 0.05.

2.4 Data collection tool

The data collection tool was a structured and pre-validated questionnaire that was completed by the parents or legal guardians of the students. The questionnaire, which was designed based on the localized version of the Kupuswami Socio-Economic Status Scale, consisted of four main sections:

- Child demographic information: including age, gender, and educational level.
- Household information and socio-economic status: including the number of family members, education and occupation of the parent/guardian, number of bedrooms, and monthly income in Iraqi dinars.
- Living environment and health conditions: housing density index, history of breastfeeding, presence of chronic diseases.
- Anthropometric measurements: Measurements of height (in centimeters) and weight (in kilograms) by a trained researcher, using calibrated instruments.

2.5 Statistical analysis of data

The collected data were entered into SPSS software version 22, and statistical analysis was performed using the following methods:

• Describing continuous variables with mean ± standard deviation;
• Describing qualitative variables with frequency and percentage;
• Chi-square test to investigate the relationship between stunting and demographic and socioeconomic variables;
• A significance level was considered at $P < 0.05$.

3- RESULTS

This study was conducted on 357 children aged 6 to 12 years who were studying in eight public elementary schools in the Washash area of Baghdad in 2024. We will now discuss the results obtained from this research.

3.1 Demographic and Socioeconomic Characteristics

The distribution of participants by age and gender is essential to understanding the representativeness of the sample and potential age-related trends in growth patterns. Assessing the socioeconomic background of the families provides insight into living conditions that may contribute to malnutrition and growth delays.

Table (1): Age and Gender Distribution of Study Participants

Age (years)	Male	Female	Frequency	Percentage (%)
6	35	20	55	15.4%
7	42	17	59	16.5%
8	41	21	62	17.4%
9	36	18	54	15.1%
10	32	15	47	13.2%
11	28	14	42	11.8%
12	23	15	38	10.6%
Total	237	120	357	100%

The results obtained from Table 1 show that out of 357 children, 66.4% were boys and 33.6% were girls, indicating a high participation rate of boys due to the demographic structure of the schools studied. The age group of 8 years has the highest rate at 17.4%, which indicates a balanced age distribution among all age groups and allows for reliable comparisons among age groups in the short stature analysis.

Table (2): Socioeconomic Characteristics of Families

Variable	Frequency	Percentage (%)
Education of guardian		
Illiterate	71	%19.9
Primary school	107	%30
Middle school	71	%19.9
Secondary school	53	%14.8
Diploma/Technical	36	%10.1
University/Postgraduate	19	%5.3
Occupation of guardian		
Uunemployed	89	%24.9
Unskilled worker	71	%19.9
Semi-skilled worker	53	%14.8
Skilled worker	53	%14.8
Clerical, shop-owner	36	%10.1
Semi-profession	28	%7.8
Profession	27	%7.7
Monthly family income (IQD)		
≤ 299,000	71	%19.9
300,000 – 599,000	89	%24.9
600,000 – 899,000	71	%19.9
900,000 – 1,199,000	53	%14.8
1,200,000 – 1,599,000	36	%10.1
1,600,000 – 2,399,000	19	%5.3
> 2,400,000	18	%5

The results in Table 2 indicate that the largest group of household heads received primary-level education early in life (30%). In terms of employment, they are mostly unemployed and unskilled; their income, primarily from families earning less than 900,000 Iraqi dinars per month, is categorized as lower middle to lower income. These socioeconomic norms highlight their vulnerability to nutritional deficiencies.

3.2 Prevalence of Stunting

Stunting is one of the most prominent indicators for assessing the status of chronic malnutrition in children and specifically reflects the impacts of nutrient deficiencies and unfavorable environmental conditions over time. This research aims to determine the prevalence of this condition in the studied population, assess the level of risk, and prioritize public health interventions.

3.2.1 Distribution of Stunting by Age

In this section of the research, an analysis related to age regarding short stature in the studied population is examined to identify specific growth stages that are more exposed to chronic malnutrition.

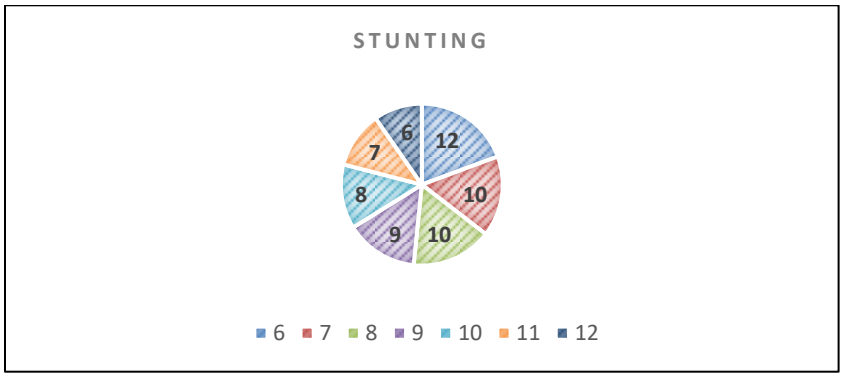

Figure (1): Distribution of Stunting by Age Group

Table (3): Distribution of Stunting by Age Group

Age	Stunting		No Stunting		p-value	Chi-square
	No.	%	No.	%		
6	12	21.8%	43	78.2%		
7	10	17.9%	49	82.1%		
8	10	16.1%	52	83.9%		
9	9	16.7%	45	83.3%	0.089	0.364
10	8	17.0%	39	83.0%		
11	7	16.7%	35	83.3%		
12	6	15.8%	32	84.2%		
Total	62	17.4%	295	82.6%		

The results of Table 3 show that by distributing stunting by the age of participants, stunting was found in 21.8% of the participants aged 6 years, 17.9%of those aged 7 years, 16.1%of those aged 8 years, 16.7%in participants aged 9 years, 17% in those aged 10 years, and among the participants aged 11 and 12 years, stunting was found in 16.7% and 15.8% , respectively. However, no statistically significant association was found between stunting and age (X^2 = 0.364, P = 0.089).

3.2.2 Distribution of Stunting by gender

This section of the research analyzes gender concerning stunting in the study population. Gender differences in stunting are essential to consider, as biological and cultural factors may influence nutritional access and care.

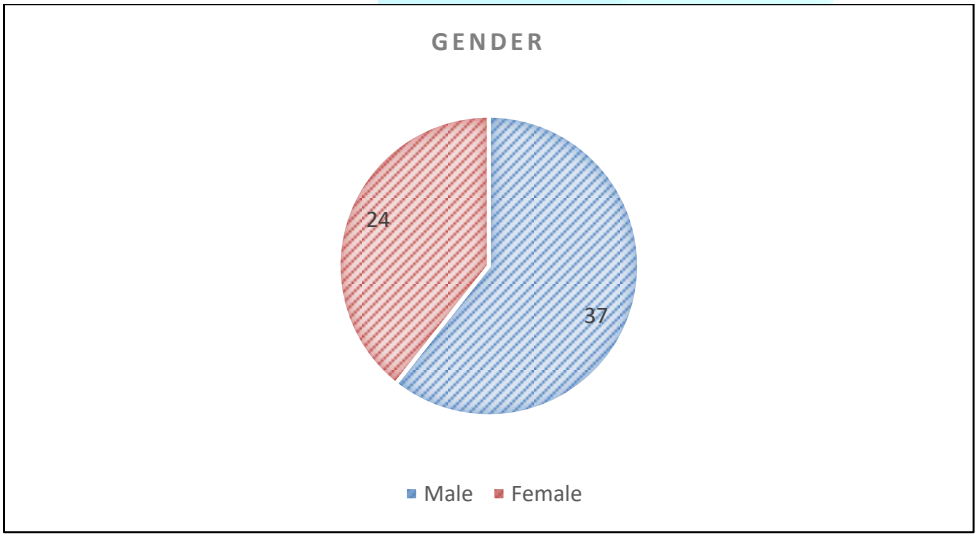

Figure (2): Distribution of stunting by gender

Table (4): Distribution of stunting by gender

Gender	Stunting		No Stunting		p-value	Chi-square
	No	%	No	%		
Male	37	13.2%	195	86.8%		
Female	25	21.6%	100	78.4%	0.028	4.812
Total	62	17.4%	295	82.6%		

The results of Table 4 show that stunting was found in 37 (13.2%) of the males and 25 (21.6%) of the females. This indicates that stunting is more frequent among males than females, and there was a statistically significant association between male gender and stunting (X^2 = 4.812, P = 0.028).

3.2. 3 Distribution of Stunting by level of education of family guardian

Table 5, shows the distribution of stunting according to the level of education of the family guardians of the 357 schoolchildren involved in this study. Stunting was not significantly associated with SES score (X^2= 1.991 , P= 0.373). Stunting was found in 2(11.5%) of children whose family guardians had a Higher education level of education, 5(15.9%) of Bachelor,7(16.2%) of Diploma, 10(15.1%) of Secondary School, 21(18.6%) of Primary and Middle school, and 17(25.9%) of children whose family guardians were illiterate.

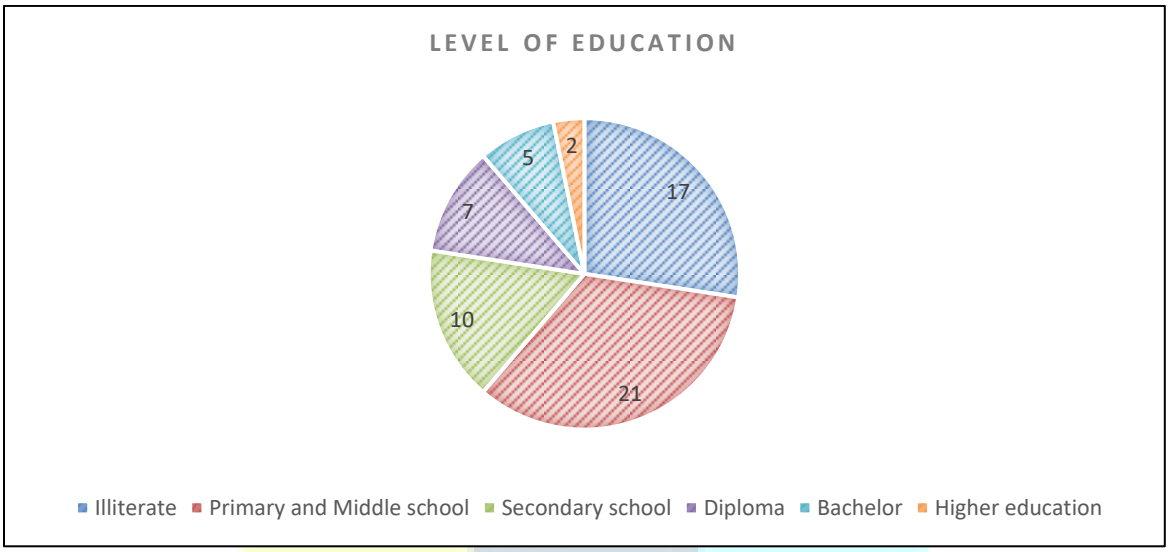

Figure (3): Distribution of stunting by education of family guardian

Table (5): Distribution of stunting by education of family guardian

Level of education	Stunting		No Stunting		Total	p-value	Chi-square
	No.	%	No.	%			
Illiterate	17	25.9%	54	74.1%	71	0.373	1.991
Primary and Middle school	21	18.6%	86	81.4%	107		
Secondary school	10	15.1%	61	84.9%	71		
Diploma	7	16.2%	46	83.8%	53		
Bachelor	5	15.9%	31	84.1%	36		
Higher education	2	11.5%	17	88.5%	19		
Total	62	17.4%	295	82.6%	357		

3.2. 4 Distribution of Stunting by family guardian's job

Table 6, summarizes the results of cross-tabulation between job of children family guardians and stunting. No statistically significant association had been found between stunting and job of children's family guardians (X^2= 12.5 , P=0.002).Stunting was found in 1(6.7%) of children whose family guardians had professional job, in 2(8.1%)children of semi-professional,4(16%) of children of clerical and shop-owners , 7(17.2%) of children of skilled workers, 9 (18%) of children of semi-skilled workers,15(17.1%) of children of unskilled workers and 24(38.9%) of children of unemployed family guardians.

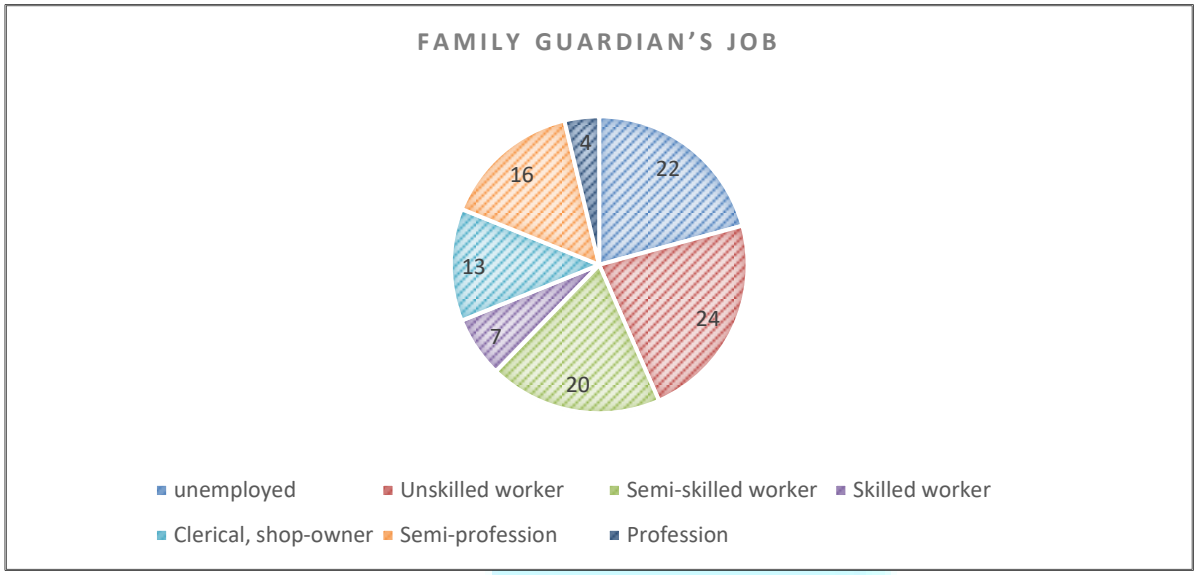

Figure (4): Distribution of stunting by family guardian's job

Table (6): Distribution of stunting by family guardian's job

Family guardian's Job	Stunting		No Stunting		Total	p-value	Chi-square
	No.	%	No.	%			
Unemployed	24	38.9%	65	61.1%	89	0.002	12.5
Unskilled worker	15	17.1%	56	82.9%	71		
Semi-skilled worker	9	18.0%	44	82.0%	53		
Skilled worker	7	17.2%	46	82.8%	53		
Clerical, shop-owner	4	16.0%	32	84.0%	36		
Semi-profession	2	8.1%	26	91.9%	28		
Profession	1	6.7%	26	93.3%	27		
Total	62	17.4%	295	82.6%	357		

3.2. 5 Distribution of Stunting by monthly family income

Stunting was found in 2 (13.1%) of children whose monthly family income exceeded 2,400,000 IQD, while stunting was present in 2 (12.5%) of children with a family income of 1,600,000 – 2,399,000 IQD, 5 (13.9%) of those with a family income of 1,200,000 – 1,599,000 IQD, 7 (14.5%) of children with a family income of 900,000 – 1,199,000 IQD, 11 (17.5%) of 600,000 – 899,000 IQD family income, 17 (23.1%) of 300,000 – 599,000 IQD family income, and 18 (27.4%) of children whose family income was ≤ 299,000 IQD. However, no statistically significant association was found between stunting and low monthly family income ($X^2 = 9.304$, $P = 0.016$).

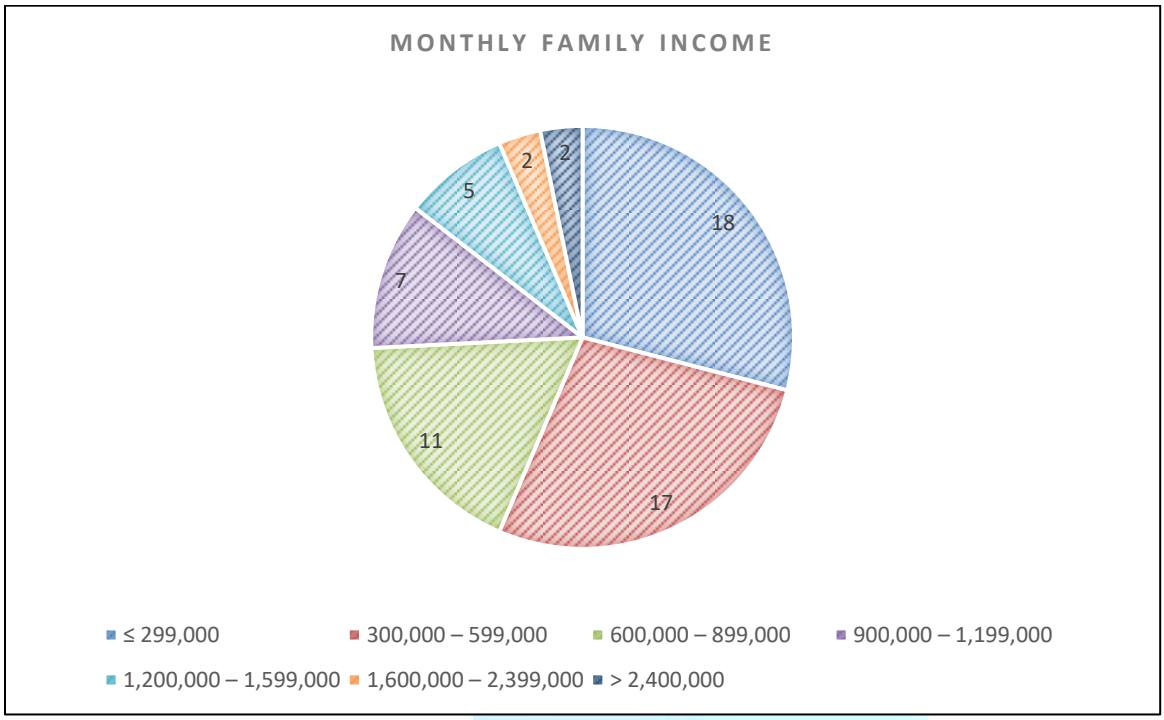

Figure (5): Distribution of stunting by monthly family income

Table (7): Distribution of stunting by monthly family income

Monthly family income (IQD)	Stunting		No Stunting		Total	p-value	Chi-square
	No.	%	No.	%			
≤ 299,000	18	27.4%	53	72.6%	71	0.016	9.304
300,000 – 599,000	17	23.1%	72	76.9%	89		
600,000 – 899,000	11	17.5%	60	82.5%	71		
900,000 – 1,199,000	7	14.5%	46	85.5%	53		
1,200,000 – 1,599,000	5	13.9%	31	86.1%	36		
1,600,000 – 2,399,000	2	12.5%	17	87.5%	19		
> 2,400,000	2	13.1%	16	86.9%	18		
Total	62	17.4%	295	82.6%	357		

3.2. 6 Distribution of Stunting by crowding index

Stunting was found in 34 children (17.9%) of those lived in crowded houses and 28 children (16.9%) of those lived in not crowded houses, there was no statistically significant association between stunting and living in crowded houses, (X^2= 0.325 , P= 0. 553).

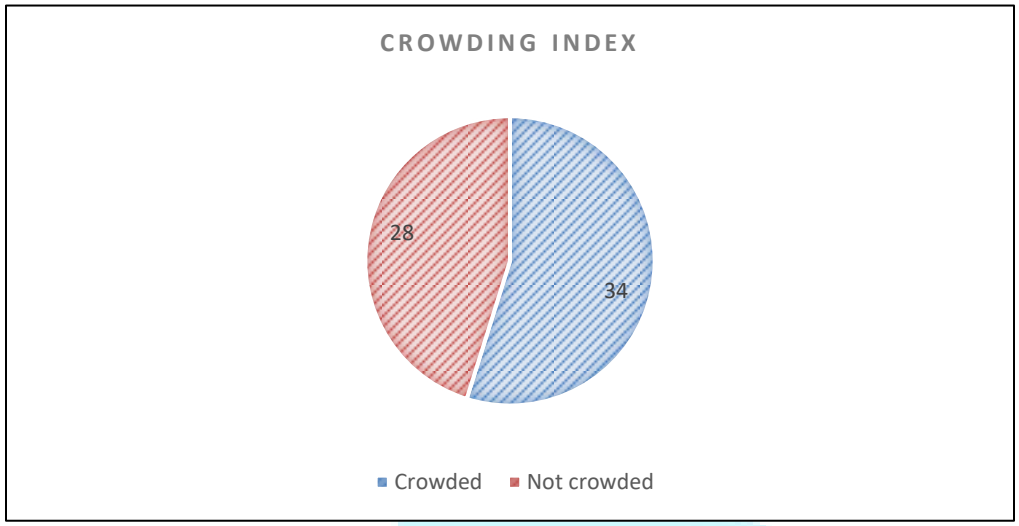

Figure (6): Distribution of stunting by crowding index

Table (8): Distribution of Stunting by crowding index

Crowding index	Stunting		No Stunting		p-value	Chi-square
	No	%	No	%		
Crowded	34	17.9%	149	82.1%	0.553	0.325
Not crowded	28	16.9%	146	83.1%		
Total	62	17.4%	295	82.6%		

3.2. 7 Distribution of Stunting by SES class

Stunting was in 1 (7%) children of upper SES class, stunting was found in 5 (13.6%) of children of upper middle SES class, 10 (15.5%) of lower middle, 22 (24.4%) of upper lower, and the largest number of children with stunting was in the 24 (26.6%) of lower SES class, however the association between stunting and low SES was statistically not significant, (X^2= 13.418 , P= 0.009).

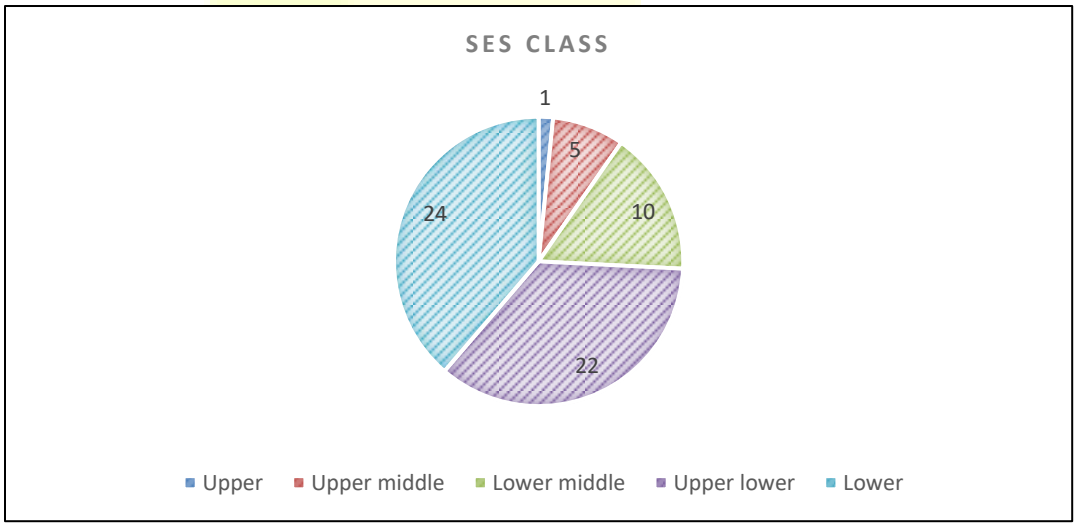

Figure (7): Distribution of stunting by SES class

Table (9): Distribution of stunting by SES class

SES class	Stunting		No Stunting		p-value	Chi-square
	No.	%	No.	%		
Upper	1	7.0%	16	93%	0.009	13.418
Upper middle	5	13.6%	42	86.4%		
Lower middle	10	15.5%	59	84.5%		
Upper lower	22	24.4%	84	75.6%		
Lower	24	26.6%	94	73.4%		
Total	62	17.4%	295	82.6%		

4- DISCUSSION

The prevalence of stunting among children aged 6-12 in the current investigation held in Washash, Baghdad, stood at 17.4%. This indicates a moderately high level of chronic malnutrition among urban school children and somehow parallels local and global reports. On the other hand, a study in Dhi Qar Governorate (southern Iraq) found stunting among sixth-grade students to be as low as 3.6% [7], thus underlining stark intranational disparities within Iraq itself. In 2020, the World Health Organization estimated the prevalence of stunting in Iraqi children under five at 11.6%, which marks a stark reduction from 28.4% in 2000 [8]. Nonetheless, national-level statistics tend to hide the differing urban-rural dichotomy and age specifications. Thus, our study on school-age children goes hand-in-hand with the regional trend in the MENA region. A systematic review found that the mean prevalence of stunting among children aged six and above in MENA countries was 16.5%, very close to our findings in Baghdad [6]. The same review demonstrated significantly higher prevalence in rural areas (34.1%) compared to urban zones (12.4%), and emphasized the role of socioeconomic development: countries with low Human Development Index (HDI) reported 30.1%, while those with high HDI had just 13.1% [6]. Comparing Iraq with other developing countries reveals that stunting remains a widespread issue. In Afghanistan, for instance, the prevalence of stunting among school-age children in urban areas reached a staggering 47.4%, one of the highest in the region [11]. Similarly, a study in Madagascar documented 28.6% stunting in public primary school children [12]. On the other hand, lower rates were reported in some parts of sub-Saharan Africa. In Ethiopia's Gudeya Bila district, the stunting prevalence among primary students was only 8.2% [10], while in South Africa it was 9% [5]. At the global level, international agencies have emphasized the persistence of stunting as a public health burden. The joint UNICEF/WHO/World Bank 2020 estimates reported that 149 million children under five were stunted worldwide [13], with the global average prevalence at around 21.3% [14], slightly decreasing but still unacceptably high. MENA countries collectively averaged 22%, confirming the public health importance of this condition in our region [15].

5- CONCLUSION

The research confirms the initial worries regarding the continuing problem of stunted children in urban areas with minimal resources like Washash which is located in Baghdad. The measured rate of 17.4% matches Middle East and North African regional statistics and reveals how socioeconomic factors such as insufficient parental education combined with unemployment and inadequate income continue to affect populations. The study results demand immediate action from policymakers to develop specific nutritional and public health programs which should begin within schools and extend to other settings. The current research establishes a foundation for upcoming studies which should examine continuous growth tracking initiatives together with school nutrition program assessments and protective health policies for disadvantaged urban children.

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