



Nutritional Status Assessment of Primary School Children in Different Socioeconomic Areas

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ABSTRACT

Nutritional status is a key indicator in children's health, since it shows both muscular growth and dietary consumption. The early school years are an essential period for both mental and physical development. This study evaluated the nutritional value and amount of food consumed at several mealtimes in order to compare elementary school students from rich and low socioeconomic backgrounds. To assess the differences in nutritional status between the two groups, the association between dietary intake and different growth indicators has been studied. A study was conducted among (n= 180) primary school children aged (6, 7, 8, and 9) years from poor (n= 90) and rich (n= 90) socioeconomic statuses. Socioeconomic data were gathered from questionnaires administered to their parents.

Common anthropometric measurements used in this study like this was weight, height, and mid-upper arm circumference. The questions to determine food and nutrient intakes included in the questionnaire concerned the number of consumed meals, types of products eaten by children, and the form conducted by their parents.

The results were interpreted according to World Health Organization standards of 2007 growth charts. A total of 180 students from two different primary schools showed that the higher mean of food consumption was recorded in rich states compared to poor children. Cereal products in both genders from different statuses were taken in maximum amounts, especially during lunchtimes. Anthropometric results showed that most of the students were normal in their growth curves, but older age groups from poor female groups recorded higher rates due to different nutritional factors.

Keywords: Primary school, Nutritional assessment, Nutrient, Mid-upper arm circumference, Growth curve.

INTRODUCTION

School-age children are a crucial group for nutritional studies due to their rapid growth and development. Their nutritional status can have a significant impact on their future well-being, academic performance, and overall health. This age period is a critical opportunity for intervention since dietary habits in childhood frequently continue into adulthood. By concentrating on this age range, it is possible to detect nutritional issues early and implement strategies early to promote healthy eating habits, which can benefit people and the public's health in the years to come (Kusol and Kaewpawong, 2025).

An anthropometric measurement is practically essential in any study that evaluates children's health and nutritional status. Physical characteristics such as height, weight, arm and calf circumference, and children's triceps skin fold have been widely employed to characterize the nutritional and health status of populations. Height-for-age and weight-for-height are two examples of the indices that have been proposed based on age, body weight, and height. Three standards are used to categorize the children: "underweight" (low weight for age), "stunting" (low height for age), or "wasting" low weight for height (Srivastava *et al.*, 2012).

In Poland, between the ages of 7 and 9, almost 30% of children are overweight or obese, and the percentage is growing. Over the previous 30 years, the percentage of children affected by this problem has increased by nearly 5 percentage points (Rolf *et al.*, 2024). Research and data on the actual nutritional status of schoolchildren in developing and transitioning countries are limited. According to reports, nutrition surveillance does not include school-aged children (Zackaria and Mohammed, 2019). The amount of different food categories ingested over a given reference period is referred to as dietary variety, and it is one potentially useful indicator. In order to support a child's nutritional needs and healthy development during the early years of life, nutrient-rich food from various groups is essential. A diverse diet that includes food from all food categories is also necessary for population groups to meet their requirements for vital nutrients. The number of foods consumed, or food variety (FV), has been demonstrated to be a good indicator of the diet's nutrient sufficiency. Consuming a wider variety of food is associated with a diet that is more nutritionally adequate (Sealey-Potts and Potts, 2014). A diet rich in fruits, vegetables, and complex carbohydrates is less likely to be consumed by people who live in socioeconomically poor areas. A balanced diet may also be more difficult for children from lower-income families to attain when economic problems intersect with cultural, psychological, and social reasons (particularly peer influences), publicity promotions, and nutrition expertise (Anderson *et al.*, 2002). Consuming high-calorie, low-nutritional snacks in between meals might result from skipping the main meals and from their inconsistency. The results of the study showed that eating low-nutrient food in between meals and leaving the house without breakfast are two factors that raise the chance of being overweight or obese (Galczak-Kondraciuk *et al.*, 2018).

To assess school-age children's nutritional status, the World Health Organization proposed a number of anthropometrically based indicators. It is now commonly acknowledged that the Body Mass Index (BMI) is the most reliable indicator of teenagers' nutritional status (Salloum *et al.*, 2023).

The use of anthropometry, a crucial and straightforward technique for assessing nutritional status, has been especially important in developing nations. Many measurements, including height for age, weight for age, BMI for age, and others, are computed using anthropometry. Data from such nutritional assessments has to be gathered regularly. This is particularly significant from a public health standpoint since it would offer solid framework for putting into practice suitable actions to pinpoint and address the causes of children's nutritional abnormalities and monitor the efficacy of ongoing malnutrition prevention initiatives (Manmohan Gupta *et al.*, 2015).

This study assesses the nutritional understanding of primary school students from low-income, poor, and rich areas and measures growth using various anthropometric methods in order to compare the daily consumption of certain food groups among these students.

MATERIALS AND METHODS

Data collection and participants

Data collection was performed by utilizing a researcher-designed questionnaire. The first section of the questionnaire was aimed at gathering data on demographic characteristics of the children (including age, gender, and grade) and their parents (including marital status, employment, level of education, and family history of obesity). Its second section was related to the child's nutritional behavior. For measurement of the socio-economic status, we used a questionnaire that contained information about the parents that was related to the educational level. The questionnaires were completed through face-to-face interviews with the children's parents at their school.

The population of this study consisted of 180 students enrolled in primary schools located in the Erbil-Kurdistan region. The General Direction of Health assisted in locating schools in both rich and poor areas so that they could choose the students for the study in Erbil city. The inclusion criteria targeted school-aged children between 6 and 9 years old, specifically those enrolled in grades 1 to 3, from areas with differing socioeconomic backgrounds (90 students from high-income areas and 90 from low-income areas). Students who met the eligibility criteria were enrolled in the study. Prior to participation, school principals, teachers, and parents were informed about the study protocol and data collection methods. A structured interview schedule was developed, and face-to-face interviews were conducted to gather the required data. Informed consent forms were obtained from the parents or caregivers of all participating children.

Ethical approval

Before data collection, the study had been approved by the national ethics committee, and ethical clearance was obtained for this purpose. After approval of this study by the National Ethics Committee at Salahaddin University/ Erbil, approval was then obtained from the General Direction of Health in Erbil/ Kurdistan. In addition, informed consent was taken from each parent; various schools' authorities have been met and informed of the objectives of our study in order to obtain their consent and solicit their support and assistance. Informed consent- was then handed over and explained to parents and teachers. Mothers who signed consent-had their children participate in the study, and the confidentiality of results was observed.

Anthropometric measurements

With the assistance of qualified personnel volunteers, anthropometric assessments of previously trained students were assessed. Anthropometric measurements were collected in the morning, during the physical activity class, ensuring privacy for each child, and following the WHO guidelines. The child, without shoes or heavy clothing, stood with both feet in the center of the scale, and the weight was recorded to the nearest decimal fraction of 0.1 kg by using an electronic scale designed in Germany, model: 874 1021658, with the child wearing fewer clothes. Height was measured accurately by making the child remove shoes, bulky clothing, and hair ornaments that interfere with the measurement on the flooring against a flat surface. The child was made to stand with feet flat together against the wall legs straight, arms at their sides, and shoulders at level. Height was measured to the nearest 0.1 cm using a UNICEF-manufactured portable stadiometer. A simple tape was used to measure each child's arm nearest 0.1

Food preferences

The questionnaire was modified based on Iraqi dietary culture and food habits. The questionnaire included the different main meals in a day that the child ate by themselves (breakfast, lunch, and dinner). The questions included in the questionnaire concerned the number of consumed meals, types of products eaten by children, and the form conducted by their parents. Then, it composed favorite food categories in a different group, such as dairy products (milk, yogurt, cheese, etc.) cereal products (rice, bread, noodles, grain snacks, pasta etc.), legume products (beans, dried beans, chickpeas, lentils, peas, soy, etc.), meat products (red meats, fish, seafood, chicken, etc.), and sweet drinks (sugary beverages, etc.). fruits, vegetables, nuts and seeds, eggs and egg products, and tea (Sadowska *et al.*, 2010; Nolla *et al.*, 2014).

Statistical analysis

Data were analyzed statistically using the ready statistical program SAS (2002-2003) (Statistical Analysis System) to study and (the Questionnaire transferred to (0, 1) as threshold characters) depending on the general linear model by the following mathematical equation:

$$Y_{ij} = U + G_i + e_{ij}$$

Where Y_{ij} is the observation value of j to the type of food i . U , is overall mean and G_i , the effect of the food type, and e_{ij} the effect of random error. The (Duncan Multiple Range Test) (1955) was used to compare the differences between the treat means.

RESULTS AND DISCUSSION

Demographical characteristics

A total of 180 students from different place status of primary school (90 rich place and 90 poor place) were included. Their age group ranged from (6-9) years. Seven-year-old students represented the highest percentage (36.11%), followed by six-year-olds (23.88%), while nine-year-olds had the lowest percentage (16.66%). As shown in (Table 1).

Table (1): Classifications of primary school children

Student age/years	Rich children				Poor children				Total	
	Male no.	%	Female no.	%	Male no.	%	Female no.	%	No.	%
6	17	27.86	9	31.03	8	17.39	9	20.45	43	23.88
7	25	40.98	7	24.13	16	34.78	17	38.63	65	36.11
8	11	18.03	10	34.48	13	28.26	8	18.18	42	23.33
9	8	13.11	3	10.34	9	19.56	10	22.72	30	16.66
Total	61	100	29	100	46	100	44	100	180	100

(Table 2) shows sociodemographic distribution among all children in primary school compared to the different places where the study was carried (mother and father education, occupation, and family history of obesity). The findings show an increased percentage of mothers from different parts of the state who have a family history of obesity (46.7) of rich and (41.1) among poor mothers, respectively.

Table (2): Sociodemographic distribution of primary school children

Sociodemographic Variables	Category	Frequency (N) Rich states	Percentage (%)	Frequency (N) Poor states	Percentage (%)
Mother's educational level	Illiterate	1	1.1	10	11.1
	Primary school graduate	5	5.5	30	33.3
	Secondary school graduate	29	32.2	32	35.5
	Institute	25	27.8	13	14.4
	University or higher education	30	33.3	5	5.5
Total		90	100	90	100
Father's educational level	Illiterate	0	0	3	3.3
	Primary school graduate	2	2.2	7	7.8
	Secondary school graduate	15	16.7	49	54.4
	Institute	28	31.1	22	24.4
	University or higher education	45	50	9	10
Total		90	100	90	100
Mother's Occupation	Governmental Employee	40	44.4	9	10
	Non-Governmental Employee	11	12.2	10	11.1
	Not employee	39	43.3	71	78.9
Total		90	100	90	100
Father's Occupation	Governmental Employee	52	57.8	28	31.1
	Non-Governmental Employee	38	42.2	59	65.6
	Not working	0	0	3	3.3
Total		90	100	90	100
Family History of Obesity	Nobody	32	35.6	31	34.4
	Father	16	17.8	22	24.4
	Mother	42	46.7	37	41.1
Total		90	100	90	100

Weight measurement

Children in primary school are in a critical stage of growth and development, both physically and mentally. During these years, their bodies undergo rapid changes, including increases in height, weight, and muscle mass, as well as brain development that supports learning and emotional regulation. Fig. (1) demonstrate the results of growth per primary student per weight for two different genders, male and female, in rich and poor states. For the comparison of growth, primary students in a study have used the WHO growth charts in different age groups (6, 7, 8, and 9 years old).

The results in Fig. (1) shows the weight growth patterns among female students in both socioeconomic groups. The weight of female students for both states was recorded within the normal range in all age groups except the 8-years olds of the poor state, which recorded a low amount of weight (23 kg), indicating underweight status compared to standard growth references, where the growth curve fell between the 15th and 50th percentiles, with the highest weight recorded at age 9 years old (31.89kg) respectively. Milk and fruit products were consumed in greater amounts by 8- and 9-years-olds in female genders. Also, larger consumption of food types for growth taken by their age group. These findings support the theory that milk consumption improves bone mass, which may positively affect peak bone mass if it continues throughout adulthood and during the pubertal growth stage. Our results are consistent with those of a study on dairy supplements in females who are just entering puberty (Chan *et al.*, 1995).

Two studies conducted by Zemel, (2003) and Davies *et al.*, (2000) research indicate that dairy products and dietary calcium may help prevent weight gain and support weight loss, although the results obtained contradict these findings. On the other hand, for the result of growth of weight in male groups, which is shown in Fig. (1) the highest amount of weight was recorded in the age group of (8 years old) in rich states (35.38 kg), the line growth was plotted over the 97th percentile. Overall, the weight of children is slightly higher in rich states than in poor states for male groups, especially for the age group (6 years old). For both states, rich and poor, the line growths were plotted among the (85- 97th) percentiles; their weights are (26.34 and 24.19) kg, respectively. For those reasons, at (6 years old) cereal products were eaten with an adequate amount of fast-food in the highest amount (100%), and meat products were consumed in a higher amount at 8 years old than other age groups.

The findings of Rosenheck, (2008) systematic review began to clarify a positive correlation between fast food consumption and the risk of weight gain or obesity. Additionally, further studies suggest that not everyone in society is equally exposed to fast food restaurants or the associated health risks. Previous studies indicated that children from upper socioeconomic backgrounds, those attending private schools, and those residing in urban areas have greater rates of overnutrition (overweight and obesity). Rapid urbanization, dietary changes toward a more sedentary lifestyle, and increased intake of fast food, high-carbohydrate foods, and sugar-filled carbonated and energy beverages are most likely the causes of this trend (Khan *et al.*, 2022).

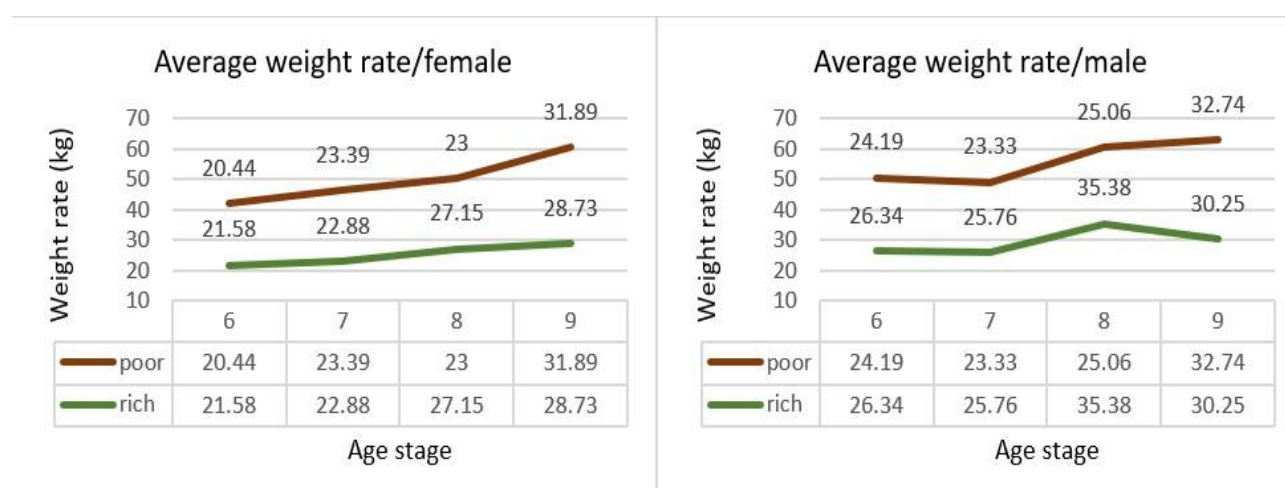


Fig. 1: Growth weight development for primary school (rich and poor) students

Height measurement

During primary school, height growth varies greatly and is impacted by several important factors. Diet is one of the most crucial elements. The vital elements required for bone formation and general physical growth are found in a balanced and nourishing diet. Fig. (2) shows the results concerning children's height (cm) of the females were demonstrated in the study, and growth curves for both states (rich and poor) were within a normal range. Children for height estimation were plotted under the normal range for both genders, but in the age group (9 years old), poor states were recorded with the highest level (132.07cm) to compare with other age groups. Conversely, in the rich state at (9 years) old, the growth was plotted to the lower point of height (127.67 cm) which is nearest to the 15th percentile, because at 9 years old, the poor states female groups have had more levels of milk and milk products, macronutrient - rich foods as compared to male groups.

Our results are consistent with those of Okada (2004), who observed that a height gain in the children who consumed a high amount of cow milk. Milk is regarded as the best nutritional support for neonatal growth and development. In pubertal children, cow milk may also be an important nutrient for growth and for achieving optimal bone mass to prevent osteoporosis in later life. The obtained result is in agreement with the findings reported Kusol and Kaewpawong (2025), they discovered that Muslim children who suffer from severe stunting, consume less protein than is advised from foods including meat, fish, eggs, and milk.

In contrast, Fig. (2) shows the results for male height growth in a study for both different states. The highest levels for height growth recorded in rich states, at the age group 8 years old, were 132.4 cm, compared to 126.88 cm recorded for poor states for males at that age. Poor state children at 7 years old had not grown well, as a height of 120.94 cm was plotted under the 50th percentile. Generally, the height growth for male groups was in the normal range; it was due to the consumption of milk products with high levels. Had not grown well in height; children's stunting may be due to the consumption of a large amount of tea at 7 years old by male students. According to a cross-sectional study conducted among schoolchildren near Paris, France, caffeine consumption was found to disturb children's sleep patterns. Inadequate sleep may impair the secretion of growth hormone, potentially affecting height development (Urrila *et al.*, 2017).

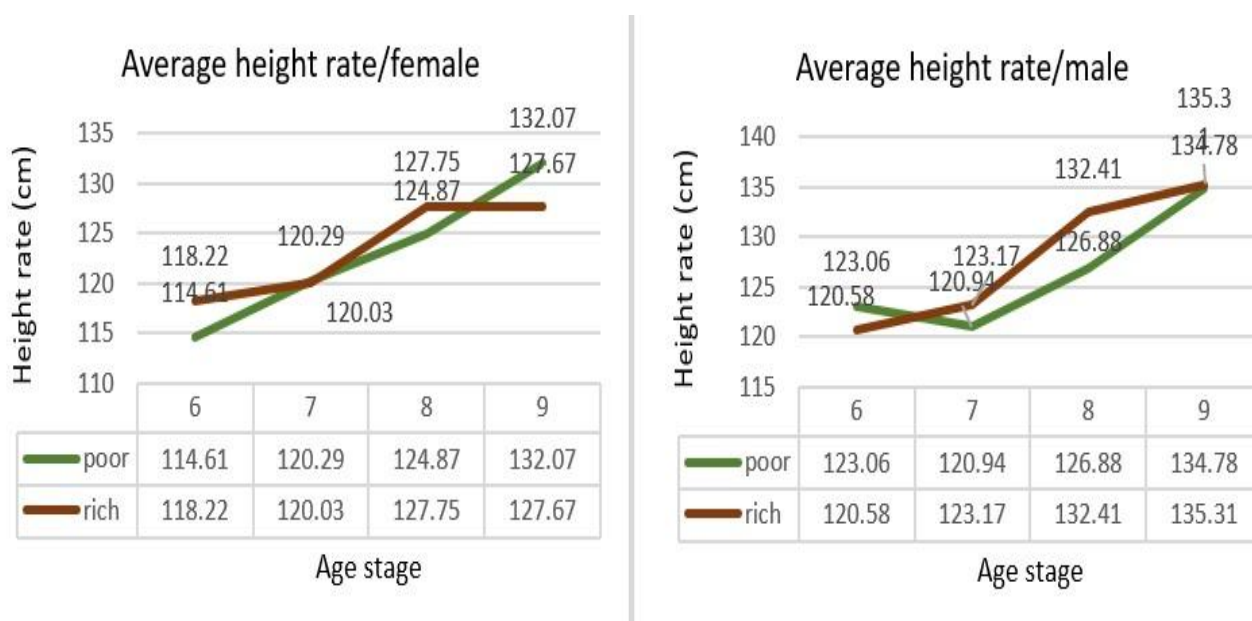


Fig. 2: Growth height development for primary school (rich and poor) students

Mid-upper arm circumference measurement

Mid-Upper Arm Circumference (MUAC) is a simple, reliable indicator, like other indicators used to assess nutritional status in children. Fig. (3) shows the results for growth in mid-upper arm circumference of children at different age groups and states (rich and poor). The results demonstrate that the growth of MUAC for primary school children in the study has been recorded with the normal result except, for the age group (8 years old) in poor states of females recorded with abnormal (17.5 cm) for that age group among children. Age groups compared to the WHO for growth of children; the line plotted to under (15th) percentiles as compared to rich children where results have recorded to normal range. The reason it is at that age group (8 years old) is the students have not consumed enough nutritious food to get available energy for daily use, especially (meat and legume) products as sources for essential proteins. Amugsi *et al.*, (2014) discovered that rural female children's lower MUAC was linked to a lack of dietary diversity, including a low intake of meat and legumes.

However, the 8-year-old age group in the rich state recorded the highest amount (22.49 cm) for the same parameter in Fig. (3) for the growth of MUAC male students. This indicates that the line plots for the growth of arm circumference presented over the 85th percentile versus children of the same age groups.

The findings indicate that male gender groups' mid-upper arm circumferences have grown more in rich state than in poorer ones. The higher consumption of nutrient-dense food categories by male students in rich states is probably the cause of these favorable growth outcomes. Saaka and Osman (2013) discovered that higher MUAC scores were positively correlated with having access to nutrient-dense diets.

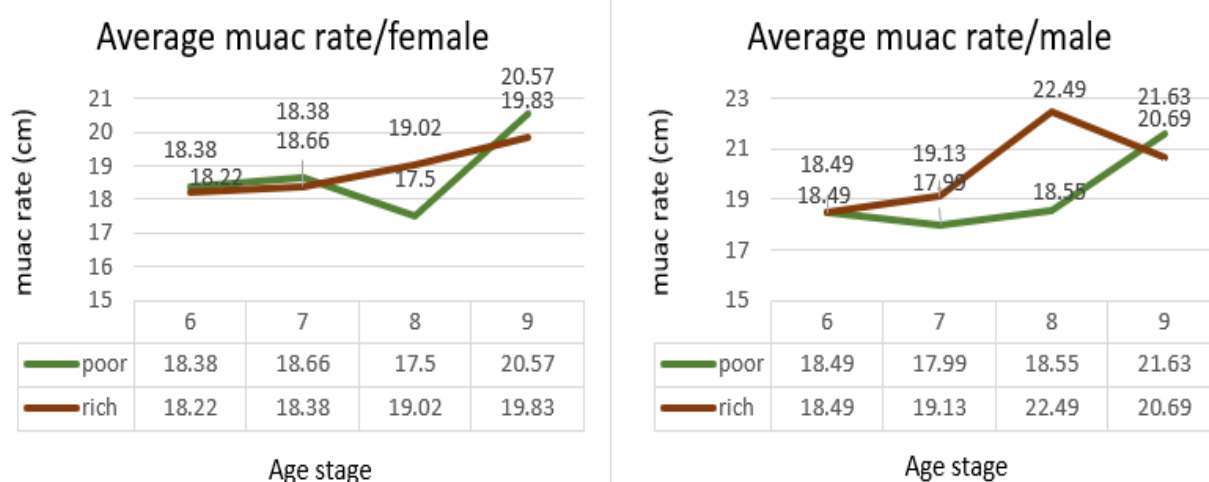


Fig. 3: Growth MUAC development for primary school (rich and poor) students

Food variety consumption:**Table (3): Types of food groups consumed by students in the main meals of 24 -hour.**

AGE/YEAR			6			7			8			9		
MEAL	Gender	List of Food Items	Rich	Poor	P-value	Rich	Poor	P-value	Rich	Poor	P-value	Rich	Poor	P-value
BREAKFAST	Male	Milk products	0.88	0.50	0.145	0.80	0.75	0.590	0.73	0.77	0.734	0.50	0.44	0.178
		Eggs	0.70	0.38	0.459	0.72	0.56	0.633	0.82	0.54	0.561	0.87	0.67	0.384
		Sweet drink	0	0.25 ^a	0.105	0.64 ^a	0.19 ^b	0.0007	0.54 ^a	0 ^b	0.004	0.50 ^{bc}	0.11 ^{bc}	0.0003
		Tea	0.23	0.12	0.501	0.24 ^b	0.75 ^a	0.0003	0.18 ^b	0.69 ^a	0.029	0.25	0.55	0.119
		Nuts	0.06	0	0.221	0.04	0.06	0.677	0	0.07	0.834	0	0.11	0.527
		Legume	0	0.25	0.079	0.04	0.19	0.348	0	0	0.372	0	0	0
		Fruits	0.23	0	0.218	0.12	0	0.175	0 ^b	0 ^b	0.081	0.25	0	0.122
		Meat	0.06	0	0.653	0.04	0.06	0.726	0	0.07	0.541	0	0	0
		Vegetable	0.12	0.12	0.532	0.16	0.12	0.421	0.27 ^{ab}	0.07 ^{ab}	0.099	0.12 ^{ab}	0 ^b	0.167
		Cereal	0.59	1.00	0.192	0.68	0.75	0.575	0.73	0.92	0.222	0.75	0.67	
	Female	Milk products	0.88	0.78		0.57	0.82		0.90	0.87		0.67	0.90 ^a	
		Eggs	0.55	0.67		0.71	0.76		0.60	0.62		0.33	0.60	
		Sweet drink	0.11 ^a	0		0.57 ^a	0.12 ^b		0.50 ^a	0.12 ^b		1.00 ^a	0 ^{bc}	
		Tea	0.22 ^b	0.44		0	0.59 ^a		0.20 ^b	0.50 ^{ab}		0.33	0.80	
		Nuts	0	0.22		0	0.12		0.20	0.12		0	0	
		Legume	0	0.22		0	0.12		1.00	0		0	0	
		Fruits	0.22	0		0	0		0.20 ^a	0 ^b		0	0	
		Meat	0.11	0		0	0		0	0		0	0	
		Vegetable	0	0		0.14	0		0.40 ^a	0 ^b		0.33 ^a	0 ^b	
		Cereal	0.78	0.67		0.57	0.52		0.70	1.00		1.00	0.80	
LUNCH	Male	Legume	0.30	0.62	0.227	0.52	0.69	0.503	0.54	0.69	0.914	0.37 ^{ab}	0.33 ^b	0.717
		Vegetable	0.77	0.87	0.810	0.68 ^{ab}	0.94 ^a	0.042	0.54	0.85	0.435	0.87	0.55	0.116
		Meat	0.94	0.75	0.290	0.88	0.81	0.337	0.82	0.69	0.557	1.00	0.55	0.317
		Cereal	1.00	1.00	0	1.00	1.00	0	1.00	1.00	0	1.00	1.00	0.054
	Female	Legume	0.67	0.55		0.71	0.47		0.60	0.62		1.00 ^a	0.70 ^{ab}	
		Vegetable	0.67	0.77		0.43 ^{ab}	0.82 ^{ab}		0.60	0.62		1.00	0.80	
		Meat	0.89	0.67		0.57	0.82		0.70	0.50		1.00	0.50	
		Cereal	1.00	1.00		1.00	1.00		1.00	1.00		1.00	1.00	

DINNER	MALE	Milk Products	0.41	0.37	0.991	0.28	0.37	0.416	0.09B	0.77A	0.008	0.37	0.22	0
		Fruits	0	0.12	0.141	0.08	0.12	0.515	1.00	1.00	0.081	1.00	1.00	0.446
		Vegetable	0.59	0.87	0.332	0.60	0.56	0.756	0.73	0.38	0.175	0.62ab	0.55ab	0
		Meat	0.52	0.5	0.038	0.68	0.31	0.223	0.73A	0.07B	0.0009	0.50A	0.11A B	0.205
		Cereal	1.00 a	1.00a	<.000 1	1.00a	0.56ab	0.002	1.00a	0.69ab	0.032	1.00	0.55	0.021
		Legume	0B	0.37B	<.000 1	0.20B	0.87A	<.000 1	0.36	0.38	0.240	0.50	0.67	0.125
		Eggs	0.06	0.25	0.336	0.08ab	0.25ab	0.153	0.09	0.15	0.326	0.12	0.11	0.691
		Tea	0.00	0.25A	0.105	0B	0.56A	<.000 1	0.18	0.54	0.300	0.25	0.11	0.850
	Female	Milk Products	0.44	0.44		0.28	0.53		0.50ab	0.50ab		0.67	0.20	0.343
		Fruits	0.22	0		0.14	0		0.20A	1.00		1.00	1.00	
		Vegetable	0.44	0.67		0.57	0.41		0.30	0.62		0b	0.70a	
		Meat	0.55	0		0.57	0.47		0.70A	0.25B		0B	0B	
		Cereal	1.00 a	0.22b		0.86ab	0.82ab		1.00a	0.62b		1.00	0.70	
		Legume	0.22 B	1.00A		0.28B	0.88A		0.30	0.70		0.67	0.40	
		Eggs	0.11	0		0.43a	0.29ab		0.30	0		0	0.20	
		Tea	0.00	0.11A		0B	0.41A		0.40	0.25		0.33	0.50	

*Values in the same row followed by different letters are significantly different according to Duncan's multiple range test (DMRT) at $P \leq 0.05$

Food variety consumption among primary school children is defined as the number of different separate foods and food groups consumed within a specified reference period (such as 24-hours or 7 days). It is used as a nutritional indicator of dietary variety and the likelihood of adequate intake of essential macro and micronutrients which is demonstrated in (Table 3). The types of food were classified for various groups in the main meal (breakfast, lunch, and dinner), respectively. Cereal products are composed of (bread, breakfast cereals, grain snacks, pasta, noodles, and rice); milk and milk by-products like (cheese, yogurt, milk and milk - based beverages); fruit and vegetable products; egg products; meat products (red meats, chicken, fish and seafood, etc.); legume products (chickpeas, lentils, beans, and peas); nuts; tea and sweet drink beverages (Traoré *et al.*, 2022).

Eating a healthy breakfast helps primary school children behave better, stay focused, and do well in learning and physical activities (Al-Saadi *et al.*, 2020). As shown in (Table 3) for the breakfast had by children males, and females for all age groups with rich and poor states, the groups of (cereals, eggs and milk) products were consumed among the other food groups. Children from age groups of 6 and 8 years old in a poor state have consumed the highest number of cereal products, which was 100% recorded.

Egg products in the males' group of rich states (9 years old) were consumed at the highest rate (0.87), as opposed to females with the same age and states, recorded with the lowest point (0.33). For the milk and milk by-products in a male group with poor and rich states, rich male students across all age groups consumed a higher amount than poor male students. The lowest amount of food groups taken by students are nuts, legumes, meats, fruits, and vegetables, respectively. Sweet artificial drinks were consumed at a higher level at 7 and 8 years old, which are those (0.64 and 0.54) rates to students in poor states.

For the female gender, milk products were eaten more compared to male groups for two states, with the highest rate recorded in female groups (8 years) in rich states and (9 years) in poor states

(0.90, 0.90), respectively. Cereal products were among the food groups recorded with the highest amount in females, which were 100% for the 8- and 9-year-old age groups, respectively.

In addition, egg products in 7- years- old consumed at a high rate (0.76, 0.71) for both states, respectively. In the same way as male groups, females had consumed a lesser amount of those groups (nuts, legumes, and meat products) in a study, but they had taken only fruits and vegetables in a rich state for the breakfast meal. At age 9, both boys and girls in wealthier states consumed more artificially sweetened drinks compared to those in poorer states (1.00). In the study, tea consumption was higher among children from poorer states, for both boys and girls, and this level of consumption increased with age.

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Lunch is a main meal that provides a balanced diet and essential nutrients for primary school children, helping them stay active, focused, and healthy throughout the school day. Cereal products in lunch meals composed of starchy foods, were taken in a much greater amount by two different gender groups (100%). Meat products are consumed more by males than by females in a study, and the amount is eaten more by rich children. A higher amount was eaten by both genders at 9 years old, states the rate recorded with 100% to poor students, which becomes half of them, 50%.

In several age groups, there were differences by gender in the lunch choices chosen; males tended to eat more meat products, while females in some groups ate a greater number of vegetables. Previous reports have documented such gender disparities in late childhood dietary preferences (Cooke and Wardle, 2005).

Dinner is an essential meal for primary school children; a satisfying but not overly heavy dinner can promote restful sleep, which is critical for growth and cognitive function. Additionally, establishing healthy dinner habits early on can set the foundation for lifelong nutritional choices. Encouraging families to prioritize nutritious meals can significantly impact children's overall well-being and academic performance. The results of the study demonstrate that (cereal products and fruits) had taken more, but (egg products and tea) were consumed in lesser amounts compared to breakfast and lunch meals, which were in (8 and 9) years old higher amounts consumed in both states (poor and rich) by students, respectively.

Cereal products in different age groups of two genders (males and females) from the poor states of females at 6 years old with the lowest rate consumed compared to males in the same age groups were recorded with two different numbers (1.00, 0.22) in a study. Milk and milk by-products for the age group (8 years) old in both genders in different states have been consumed in different amounts, with the highest level recorded in poor states for males and females (1.00, 0.77); otherwise, the lowest level in rich children for males and females was recorded (0.20 and 0.09), respectively.

Meat products, which are sources of protein, are beneficial for the growth of children at any age. taken by age group of 8 years old in rich states, males and females (0.73 and 0.70) were recorded.

Additionally, legume products, like meat products, are a good source of protein. In 7-year-old poor states, both genders recorded the highest amounts (0.88 and 0.87), respectively. Legume consumption is often higher in lower Socio-Economic Status or rural contexts due to affordability,

cultural diets, and confidence on plant-based protein sources. In Pakistan, legumes consumption was relatively low overall in children but shifted across age groups (Iqbal *et al.*, 2017).

CONCLUSIONS

In conclusion, assessing the nutritional status of primary school children provided valuable information about their general growth and health. The results show that children's nutritional results are strongly influenced by their socioeconomic level, eating habits, and types of food especially macronutrient - rich sources. Inadequate to variable growth was more common in children from families with lower incomes than in those from families with higher incomes. As children get older, it may become more difficult to maintain an appropriate diet because of various factors that affect their eating habits and cause their growth to fluctuate.

REFERENCES

- Al-Saadi, L. S.; Ali, A.; Waly, M. I; Al-Zuhaibi, K. M. (2020). Impact of dietary patterns and nutritional status on the academic performance of Omani school students. *J. Pharm. Nutr. Sci.*, **10**(3), 74–87. doi:10.29169/1927-5951.2020.10.03.1
- Amugsi, D.A.; Mittelmark, M.B.; Lartey, A. (2014). Dietary diversity is a predictor of acute malnutrition in rural but not in urban settings: evidence from Ghana. *Child Care Pract., Reso. Care, Nutr.. Outc. Ghana: Find. from Demogr. Health Surv.*, **4**(25), 4310-4324. doi: 10.9734/BJMMR/2014/10014
- Anderson, A. S.; Bell, A.; Adamson, A.; Moynihan, P. (2002). A questionnaire assessment of nutrition knowledge–validity and reliability issues. *Public health Nutr.*, **5**(3), 497–503. doi: org/10.1079/PHN2001307
- Chan, G. M.; Hoffman, K.; McMurry, M. (1995). Effects of dairy products on bone and body composition in pubertal girls. *J. Pedi.*, **126**(4) 551–556. doi:10.1016/S0022-3476(95)70348-9
- Davies, K. M.; Heaney, R. P.; Recker, R. R.; Lappe, J. M.; Barger-Lux, M. J.; Rafferty, K.; Hinders, S. (2000). Calcium intake and body weight. *J. Clin. Endocr. Metab.*, **85**(12) 4635–4638. doi:10.1210/jcem.85.12.7063
- Duncan, D.B. (1955). Multiple range and multiple f tests. *Biom.*, **11**(1), 1-42. doi:10.2307/3001478
- Galczak-Kondraciuk, A.; Stempel, P.; Czezelewski, J. (2018). Assessment of nutritional behaviours of children aged 7-12 attending to primary schools in Biala Podlaska, Poland. *Rocz. Panstw. Zakl. Hig.*, **69**(1) 71-77.
- Iqbal, S.; Zakar, R.; Zakar, M. Z; Fischer, F. (2017). Factors associated with infants' and young children's (6–23 months) dietary diversity in Pakistan: evidence from the demographic and health survey 2012–13. *Nutr. J.*, **16**(1), 78. doi: 10.1186/s12937-017-0297-7
- Khan, D. S. A.; Das, J. K.; Zareen, S.; Lassi, Z. S.; Salman, A.; Raashid, M.; Dero, A. A.; Khanzada, A.; Bhutta, Z. A. (2022). Nutritional status and dietary intake of school-age children and early adolescents: systematic review in a developing country and lessons for the global perspective. *Front. Nutr.*, **8**, 739447. doi:10.3389/fnut.2021.739447
- Kusol, K.; Kaewpawong, P. (2025). relationship between family factors, food consumption behaviors, and nutritional status among muslim school-age students in rural Southern Thailand. *J. Multid. Healthc.*, **18**(2025), 1615–1627. doi:10.2147/JMDH.S514601
- Malik, V. S.; Pan, A.; Willett, W. C; Hu, F. B. (2013). Sugar-sweetened beverages and weight gain in children and adults: a systematic review and meta-analysis. *Am. J. Clin. Nutr.*, **98**(4), 1084-1102. doi: 10.3945/ajcn.113.058362.
- Manmohan Gupta, M. G.; Amod Borle, A. B.; Neeraj Chhari, N. C.; Sanjay Gupta, S. G. (2015). Nutritional status assessment using WHO z-scores (BMI for age) in children aged 6-15 years-a study from central India. *Natl. J. Comm. Med.*, **6**(1), 92-97.
- Nicklas, B. J.; Penninx, B.W.; Cesari, M.; Kritchevsky, S. B.; Newman, A. B.; Kanaya, A. M.; Pahor, M.; Jingzhong, D.; Harris, T. B. (2004). Association of visceral adipose tissue with incident

- myocardial infarction in older men and women: The health aging and body composition study. *Am. J. Epidemiol.*, **160**(8), 741-749. doi:10.1093/aje/kwh281
- Nolla, N. P.; Sop, M. M. K.; Mananga, M. J.; Ekoe, T.; Gouado, I. (2014). Assessment of nutritional status of preschool children in the Bangang rural community, Cameroon. *Int. J. Biotechn. Food Sci.*, **2**(2), 44-52.
- Okada, T. (2004). Effect of cow milk consumption on longitudinal height gain in children. *The American J. Clin. Nutr.*, **80**(4), 1088-1089. doi:10.1093/ajcn/80.4.1088a
- Rasheed, A. A.; Abdullah, S. A.; Gardi, N. A. H. (2020). Nutritional status of children under five years in hassan sham camp in Mosul City in Iraq. *Zanco J. Pure Appl. Sci.*, **32**(3), 85-94. doi:10.21271/ZJPAS.32.3.10
- Rolf, K.; Cebulak, T.; Kmiecik, K. (2024). Dietary habits of early school-aged children and nutritional knowledge of their parents. *Rocz. Panstw. Zakl. Hig.*, **75**(4), 349-358. doi:10.32394/rpzh/202099
- Rosenheck, R. (2008). Fast food consumption and increased caloric intake: a systematic review of a trajectory towards weight gain and obesity risk. *Obes. Rev.*, **9**(6), 535-547. doi:10.1111/j.1467-789X.2008.00477
- Saaka, M.; Osman, S.M. (2013). Does household food insecurity affect the nutritional status of preschool children aged 6-36 months? *Int. J. Popul. Res.*, **2013**(1), 304169. doi:10.1155/2013/304169
- Sadowska, J.; Radziszewska, M.; Krzymuska, A. (2010). Evaluation of nutrition manner and nutritional status of pre-school children. *Acta Sci. Pol. Techn. Aliment.*, **9**(1), 105-115.
- Salloum, K. H.; Al-Hissnawiy, F. F.; Youssef, H. Y. (2023). Nutritional status assessment among school-age children. *J. Res. Appl. Sci. Biotechn.*, **6**(2s), 257-264.
- SAS Institute Inc. (2002-2003). "SAS Statistical Analysis System: User's Guide for Personal Computer". Release 9, SAS Institute Inc., Cary, NC, USA.
- Sealey-Potts, C.; Potts, A. (2014). An assessment of dietary diversity and nutritional status of preschool children. *Austr. J. Nutr. Food Sci.*, **2**(7), 1040.
- Senbanjo, I. O.; Oshikoya, K. A.; Njokanma, O. F. (2014). Upper arm composition and nutritional status of school children and adolescents in Abeokuta, Southwest Nigeria. *World J. Pediatr.*, **10**(4), 336-342. doi:10.1007/s12519-014-0470-4
- Srivastava, A.; Mahmood, S. E.; Srivastava, P. M.; Shrotriya, V. P.; Kumar, B. (2012). Nutritional status of school-age children-A scenario of urban slums in India. *Arch. Public Health.*, **70**(1), doi:10.1186/0778-7367-70-8
- Traoré, S. G.; Kouassi, K. B.; Coulibaly, J. T.; Beckmann, J.; Gba, B. C.; Lang, C.; Long, K. Z.; Dao, D.; Gerber, M.; Probst-Hensch, N.; Pühse, U. (2022). Dietary diversity in primary schoolchildren of south-central Côte d'Ivoire and risk factors for non-communicable. *BMC Pediatr.*, **22**(1), 651. DOI: 10.1186/s12887-022-03684-6
- Urrila, A. S.; Artiges, E.; Massicotte, J.; Miranda, R.; Vulser, H.; Bézin-Frere, P.; Lapidaire, W.; Lemaître, H.; Penttilä, J.; Conrod, P. J. (2017). Sleep habits, academic performance, and the adolescent brain structure. *Sci. Rep.*, **7**, 41678. doi: 10.1038/srep41678
- Wardle, J.; Carnell, S.; Cooke, L. (2005). Parental control over feeding and children's fruit and vegetable intake: how are they related? *J. Am. Diet. Assoc.*, **105**(2), 227-232. doi: 10.1016/j.jada.2004.11.006
- Zackaria, S. S.; Mohammed, H. R. (2019). An assessment of the nutritional status of students in governmental primary schools in UAQ. *Arab J. Nutr. Exerc.*, **4**(1), 1-10. doi:10.18502/ajne.v4i1.4480
- Zemel, M. B. (2003). Role of dietary calcium and dairy products in modulating adiposity. *Lipids.*, **38**(2), 139-146. doi:10.1007/s11745-003-1044
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تقييم الحالة الغذائية لأطفال المدارس الابتدائية في مناطق مختلفة اجتماعياً واقتصادياً

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الملخص

تُعدّ الحالة الغذائية مؤشراً أساسياً لصحة الطفل، إذ تشير الى نمو العضلات وكمية الطعام المستهلك. تُعدّ السنوات الدراسية الأولى فترةً أساسيةً للنمو العقلي والبدني. قُتِمت هذه الدراسة، الكمية والقيمة الغذائية للطعام المُستهلك في عدة وجبات، وذلك لمقارنة طلاب المدارس الابتدائية من خلفيات اجتماعية واقتصادية غنية وأخرى فقيرة لتقييم الاختلافات في الحالة الغذائية بين المجموعتين، تمت دراسة العلاقة بين النظام الغذائي ومؤشرات النمو المختلفة. أُجريت الدراسة على 180 طفلاً في المرحلة الابتدائية، تتراوح أعمارهم بين 6، 7، 8، 9 سنوات، من ذوي المستويات الاجتماعية والاقتصادية الفقيرة (90 طفلاً) والغنية (90 طفلاً). جُمعت البيانات الاجتماعية والاقتصادية من استبيانات وُجّهت إلى أولياء أمورهم. ومن القياسات البشرية (انثروبومترية) الشائعة المستخدمة في مثل هذه الدراسات، الوزن، والطول، ومحيط منتصف الذراع. شملت أسئلة الاستبيان، تحديد كمية الطعام ونوع الاغذية المتناولة، عدد الوجبات التي يتناولها الأطفال، وأنواع المنتجات التي يتناولونها، وطريقة تعامل آبائهم معهم. تم تفسير النتائج وفقاً لمعايير منظمة الصحة العالمية لمخططات النمو لعام 2007، تبين من مجموع 180 طالباً من مدرستين ابتدائيتين مختلفتين، أن متوسط الغذاء المستهلك هو الاعلى في المدرسة ذو الطبقة الغنية مقارنة بالأطفال في مدارس الطبقة الفقيرة. تم تناول منتجات الحبوب لدى كلا الجنسين من مختلف الحالات بأقصى كمية، وخاصة خلال أوقات وجبات الغذاء. أظهرت نتائج القياسات البشرية انثروبومترية أن معظم الطلبة كانوا طبيعيين في منحنيات النمو لديهم في حين تغيرت منحنيات النمو لدى أطفال الفئة العمرية الأكبر بسبب عوامل مختلفة.

الكلمات الدالة: المدرسة الابتدائية، التقييم الغذائي، الاغذية، محيط منتصف الذراع MUAC، منحنى النمو.