Assessment of Nutritional Status of Quran pupils in El-Obeid City, North Kordofan State (2020-2023AD)

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Abstract:

The study have been conducted in El-Obeid city, North Kordofan State, Sudan, 2020-2023.The aim of th study in is to assess the nutritional status of Quran pupils (6-14 years) living in dormitories of khalwas (traditional Quran schools) by determining the body mass index, the Anthropometric measurements to determine the stunting and wasting. The study has been carried out according to cross sectional design using the analytic and descriptive curriculum. The importance of the study is to know the major causes which lead deteriorate the nutritional status and the health of the Quran pupils . Simple random techniques were adopted in selecting the khalwas (ten out of twenty, each accommodate about 28 – 30 child of 6 – 14 year) as well as the responded children (146 out of 280). Quran pupils of more than 14 years old were excluded. A structured interview questionnaire was used to collect data about the nutritional pattern. The basic Anthropometric measurements (weight and height) were done according to the standard procedures. The anthropometric data which includes; weight, Height and ages were manipulated using WHO Anthro-plus program to generate key nutritional indicators such as Height for Age Z score etc. Data collected were analyzed using descriptive statistics with the aid of SPSS software version 18.00 (SPSS Inc. Chicago, IL, USA). Cross-Tabulation was performed to compare various factors. Chi-Square was used to check the significance of the differences ($p \leq 0.05$).The study showed that, the most important results are the majority of khalwas

boys get food from outside the dormitories (mainly begging in the neighborhood). Data indicated that all Quran pupils got no pocket money to purchase food and their food was lacking animal foods as well as fresh fruits and vegetables. Weight of the surveyed children ranged between 18 and 47 Kg, 45% demonstrated weights varying from 18 to 27 Kg. Heights were 114 - 154 cm, half of the children (52%) showed heights of 127 – 139 cm. Statistical analysis revealed that weight significantly related to family size and paternal occupation. Height was found to be significantly related to source of food, age, weight and period of stay at the khalwa boarding houses. Only 18% of the khalwa boys obeyed the typical weight per age growth curve, 28% complied with the standard weight per height growth curve, whereas 61% of them were under weight.

Keywords: Quran pupils Body mass index Anthropometric measurements

تقييم الحالة التغذوية لطلبة القرآن بمدينة الأبيض -شمال كردفان

(2020-2023م)

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المستخلص:

أجريت هذه الدراسة بمدينة الأبيض - ولاية شمال كردفان في الفترة 2020-2023 في طلبة القرآن عمر 6-14 سنة الذين يسكنون سكناً داخلياً(خلاوي القرآن التقليدية)، وهي دراسة قطاعية عرضية استعمل فيها المنهج الوصفي التحليلي, تهدف هذه الدراسة إلى تقييم الحالة التغذوية لطلبة القرآن وذلك بقياس مؤشر كتلة الجسم واستعمال القياسات الجسمانية لمعرفة التقزم والنحول. تكمن أهمية الدراسة في معرفة الأسباب التي أدت إلى تدهور الحالة التغذوية والصحية لطلبة القرآن ومعالجة هذه الأسباب. تم اختيار عينات الدراسة بالطريقة العشوائية البسيطة ، حيث تم اختيار عدد 10 خلاوى من بين عشرين خلوة يسكن طلابها سكناً داخلياً فعلياً وكل خلوة تأوي من 30-28 طفل عمر 6-14 سنة تم اختيار 146 طفل من مجموع 280 طفلاً وتم إبعاد أطفال الخلوة الذين في عمر أكثر من 14 سنة. تم جمع المعلومات التغذوية بملأ الاستبيان بمقابلة شخصية , تمت القياسات الجسمانية تبعاً للطرق المعيارية الوزن بالكلجم , الطول بالسم , معلومات القياسات الجسمانية والتي تحتوي على الأوزان والعمر تم معالجتها باستعمال البرنامج المعد بواسطة هيئة الصحة العالمية (WHO-Anthro-Plus-Program) فظهرت المقارنة للأوزان والأطوال ومؤشر كتلة الجسم , المعلومات الأخرى التي تم جمعها تم تحليلها باستخدام البرنامج الإحصائي (SPSS) برمجية حاسوب نسخة 18 (SPSS Inc. Chicago, IL, USA)) لتحليل البيانات , استخدمت الجداول المتقاطعة لمقارنة العوامل المختلفة واستخدم اختبار كاي (Chi-Square) لقياس القيمة المعنوية ($p \leq 0.$

05).. أهم النتائج التي أظهرتها الدراسة بأن معظم أطفال الخلاوي يتحصلون على طعامهم خارج السكن الداخلي (يشحذون من الأحياء المجاورة).المعلومات كشفت بأن كل أطفال الخلاوي لا يملكون نقود لشراء طعام وطعامهم الذي يتحصلون عليه لا يحتوي على أغذية حيوانية المصدر ولا يحتوي على خضروات وفواكه طازجة. الأوزان متدرجة بين 18-47 كلجم ,45 %منهم بين 18-27 كلجم . الأطوال بين 114-154 سم 52% منهم أطوالهم بين 127-139 سم. التحاليل الإحصائية كشفت بأن الأوزان بشكل ملحوظ لها علاقة بعدد أفراد الأسرة ومهنة الأب .الأطوال لها علاقة بشكل ملحوظ بمصدر الطعام , العمر, الوزن والمدة التي مكثها الطفل في السكن الداخلي بالخلوة.18 % فقط من أطفال الخلاوي وزنهم مثالي في مقارنة منحنى أوزانهم بأطوالهم مع المنحنى المثالي لمنظمة الصحة العالمية للأطفال في نفس أعمارهم حيث وجد أن من النتائج أن هنالك نسبة 61% منهم يعانون من نقصان في الوزن.

Methodology and Data Collection

Study Area:

The study was accomplished in Elobeid, Shiekan locality, Northern Kordofan State-Sudan, its total area of the locality is 8080 square km with population of 540,898 (CBS, 2009) and consist of three rural administrative areas (Kazegil, Abu Haraz and Um Simema) in addition to Elobeid city.

Study Design and sampling:

The study has been carried out according to cross sectional design. Only khalwas (traditional Quran schools) with dormitory were considered. Simple random techniques were adopted in selecting the khalwas (ten out of twenty, each accommodate about 28 – 30 child of 6 – 14 year) as well as the responded children (146 out of 280). Quran pupils of more than 14 years old were excluded.

Anthropometric measurements:

The basic Anthropometric measurements (weight and height) were done according to the standard procedures. Weight was measured to the nearest 0.1 kg using an electronic bathroom scale, capacity of 125 kg, designed for personal body weighing. Measurements of height to the nearest 0.1 cm were done using the Stanley (Mobo 04-116 Microtoise) steel tape. The anthropometric data which includes; weight, Height and ages were manipulated using WHO Anthro-plus program to generate key nutritional indicators such as Height for Age Z score etc.

Statistical Analysis:

Data collected were analyzed using descriptive statistics with the aid of SPSS software version 18.00 (SPSS Inc. Chicago, IL, USA). Cross-Tabulation was performed to compare various factors. Chi-Square was used to check the significance of the differences ($p \leq 0.05$).

Results and Discussion

Nutritional pattern:

The study revealed that, about 38% of the studied children acquire their food from khalwa (Fig. 1), whereas the majority gets food from other sources (mainly begging in the neighborhood). On the other hand, all of the eligible boys experienced no regular meals. Data collected indicated that all respondents got no pocket money to purchase food. Beside that their food was lacking animal foods (milk, ghee, egg, liver etc) as well as fresh fruits and vegetables. Similarly, Naresh et al. (2011) stated that poor intakes of green vegetables were significantly associated with malnutrition among primary school pupils of Ahmedabad city-India. However, poverty was ranked first among reasons for malnutrition followed by improper dietary choices and unavailability of healthy foods (Sardar et al., 2021).

Also, the weight of the surveyed children was found to range between 18 and 47 Kg. About 55% showed weight of more than 27 Kg (28 – 37 Kg for 50%; 38 – 47 Kg for 5%), while the rest of the khalwa students (45%) demonstrated weights varying from 18 to 27 Kg (Fig. 2). Moreover, the minimum and maximum heights were 114 and 154 cm, respectively. Half of the children (52%) showed heights in the range of 127 – 139 cm, about 29% were above 139 cm, although 19% were below 127 cm (Fig. 3). In a study carried out in northern Ethiopia in children aged between 6 – 9 years, the mean body weight ranged from 18.4 to 19.0 Kg with overall mean of 18.7 Kg, whereas he average height varied between 115 and 117 cm with overall mean of 116 cm (Kassaye et al., 2001). Also, in study carried out at district Abbottabad, Pakistan among school going children, results showed that the mean age was

11.67 years, height was 144.93 cm and weight was 37.69 kg (Marwat et al., 2019). From Table 1 it can be realized that most of the children in the weight categories 18 – 27 and 28 – 37 Kg (71% and 56%, respectively) get their food from outside sources, while the remaining children relied exclusively on the food provided by the khalwa. Conversely, 57% of the children who weighed 38 – 47 Kg ate just the food supplied by the khalwa. Equally, the majority of boys in the height groups 114 – 126 and 127 – 139 cm (82% and 64%, correspondingly) obtain their food from other sources. In contrast, 56% of children with 140 – 152 cm height depended solely on food given by the khalwa (Table 1). Statistical analysis revealed no significant relationship between food source and weight ($\chi 2 = 4.53$; p value 0.10). Conversely, food source showed significant relationship with height ($\chi 2 = 11.36$; p value 0.010).

The Anthropometric measurements

Weight

As presented in Table 2, two thirds (67%) of the khalwa pupils of less than 27 Kg body weight were 6 to 10 years old. While 33% were 11 to 14 years old. Conversely, 92% of the 28 – 37 Kg children their age ranged between 11 to 17 years. On the other hand all children of the weight category 38 – 47 Kg were 11 to 14 years old. It is obvious that the majority (%88) of the 6 – 11 years old children fall within the 18 – 27 Kg category. On the other hand, 70% of the 11 – 14 years old boys showed body weight of 28 – 37 Kg. However, statistical analysis revealed highly significant relation between weight and age ($\chi 2 = 56.41$; p value 0.000).

Half of the children (50%) who lived for less than one year in the dormitories showed body weight of 18 - 27 Kg, 44% were 28 – 37 Kg and merely %6 were 38 – 47 Kg. For those resided for 1 – 3 years, 53% were of 28 – 37 Kg,% 44 were 18 – 27 Kg and only %3 acquired body weight higher than 37 Kg. Similarly, pupils settled in the khalwa boarding houses for more than three years %56, %33 and 11% of them recorded 28–37, 18–27 and 38– 47 Kg, respectively (Table 1). Insignificant relation was noticed between weight and living duration in the dormitories ($\chi 2 = 2.59$; p value 0.63).

More than two thirds (%72) of the children who enjoyed holidays at home showed moderate body weight of 28 – 37 Kg, while the rest of the children gained weight of 18 – 27 Kg. However, none of them weighed more than 37 Kg. In contrast, nearly half of the Quran pupils who dwell continuously throughout the year in the boarding houses (48%) gained body weight of 18 - 27 Kg. Similar portion (%47) of boys' demonstrated weight of 28 – 37% Kg. However, just 5% weighed 38 – 47 Kg. It is obvious that, children who stay entirely in the dormitories all through the year constitute 92%, 82% and 100% of the three body weight groups 18 – 27, 28 – 37 and 38 – 47 Kg, respectively (Table 2). Statistical analysis revealed no significant relationship between weight and period of stay at the boarding houses of the khalwa ($\chi 2$ = 4.39; p value 0.11)

As illustrated in Table 3. More than half (59%) the children who belong to families of 4 – 9 members showed body weight of 18 – 27 Kg. The rest of them (41%) were 28 – 37 Kg. On the other hand, the majority (56%) of the pupils who came from families of 10 – 15 and more than 15 persons gained weight of 28 – 37 Kg. . Statistical analysis revealed highly significant relation between weight and family size ($\chi 2$ = 11.73; p value 0.02). Similarly, Asim and Nawaz (2018) stated that large family size, early marriages and higher birth rate were major reasons for malnutrition in children.

From Table 4, it was obvious that when fathers were local traders and traditional farmers, the weights of more than half of the children (58% and 55%, respectively) range between 28 and 37 Kg. Conversely, when the fathers were manual workers, 56% of the children showed body weight of 18 – 27 Kg, whereas 42% showed 28 – 37 Kg and merely 2% were 38 – 47 Kg. Present investigation indicated that weight was significantly associated with paternal occupation ($\chi 2$ = 14.65; p value = 0.020).

Height

All children of 6 – 10 years old showed heights shorter than 140 cm, while %97 of children of 11 – 14 years old demonstrated heights longer than

140 cm. Similarly, the heights of 99% of the boys with body weight of 18 – 27 Kg were less than 140 cm, whereas the same percentage of children with weights of 28 – 37 Kg recorded heights of more than 140 cm. On the other hand, all the 7 pupils weighted 38 – 47 Kg; their heights were in the range of 140 – 152 cm (Table 5). However, statistical analysis revealed highly significant relation between height and age ($\chi 2 = 59.60$; p value 0.000) as well as height and weight ($\chi 2 = 71.80$; p value 0.000).

Approximately half of the children who lived in the dormitories for duration less than 3 years (70 out of 137; 51%) showed medium heights of 127 – 139 cm. Likewise, two thirds (67%) of those lived in boarding house for more than 3 years showed the same height range, but 33% of them demonstrated greater heights of 140 – 152 cm. Roughly 50% of the Khalwa boys who take occasional holidays their height were from 127 to 139 cm, 44% of them 140 to 152 cm and only 6% have height of less than 127 cm. On the other hand, 52% of Quran pupils who stay in the dormitories throughout the entire year gained heights 0f 127 – 139 cm, 27% of them their heights were found to measure up to 140 – 152 cm and about 21% showed heights ranging between 114 – 127 cm (Table 5). Height was found to be insignificantly related to duration of residence in the dormetories ($\chi 2 = 7.63$; p value 0.27), but significantly related to period of stay at the khalwa boarding houses ($\chi 2 = 9.97$; p value 0.020).

Body mass index BMI (malnutrition)

As illustrated in Fig. 4, only 39% of the target children were found to have normal body weight. On the other hand 61% were under weight. However, in a study conducted at the urban Bareily District-India, nearly 48.5% of children (3 – 12 years) were found to be underweight (Swati and Esam, 2012). Among primary school children in Assiut city-Eygpt aged 9 – 13 years, distribution of BMI values indicated that 41.2% of the students were underweight, 14.4% overweight and 44.4% of them had normal BMI (Marzouk et al., 2021)

Weight/age growth curve (stunting):

As depicted in Fig. 5, greater part (39%) of the investigated children have moderate stunting (Z score >-1SD), 30% demonstrated mild stunting (Z score >-2SD) and merely 13% complained from severe stunting (Z score >-3SD). However, 18% of the khalwa boys obeyed the typical weight per age growth curve. Recent reports concluded that the overall prevalence of stunting was 22.5% among school children aged 6 to 15 years in Gombe State, Nigeria (Danjin et al.; 2020), 7.8% in Egyptian governmental primary school children aged 6–12 years (Metwally et al., 2020) and 15.13% among public primary school pupils of Bahir Dar city, Ethiopia, with the mean age of 10.15 years (Bantie et al., 2021).

Weight/height growth curve (wasting)

Referring to Fig. 6, the biggest segment of the respondents (47%) showed mild wasting (Z score >-1SD), 21% have moderate wasting (Z score >-2SD) and only 4% suffered severe wasting (Z score >-3SD). Though, 28% of the respondents complied with the standard weight per height growth curve. The magnitude of wasting among primary School Children in Myanmar was 15% (Hlaing et al., 2021), in Kallin District, Kafr El-Sheikh Governorate-Egypt was 8.3% (Koabar et al., 2018) and 9% in Gondar town, northwest, Ethiopia (Getaneh et al., 2019). Nevertheless, Kassaye et al. (2001) reported that 10.4% of northern Ethiopian children in the age of 6 -9 years were wasted.

Conclusion

It is quite evident from the findings of this study that underweight, stunting and wasting are prevalent among the majority of khalwa children and thus constitutes a major public health in the study area.

Recommendations

It is recommended that a multi-sectoral approach to addressing the problem be instituted by government and all stakeholders. The situation calls for urgent and prompt action in term of primordial and primary prevention. Also, knowledge about healthy eating and good health practices and how to

make use of the available resources should be disseminate among khalwas children and supervisors.

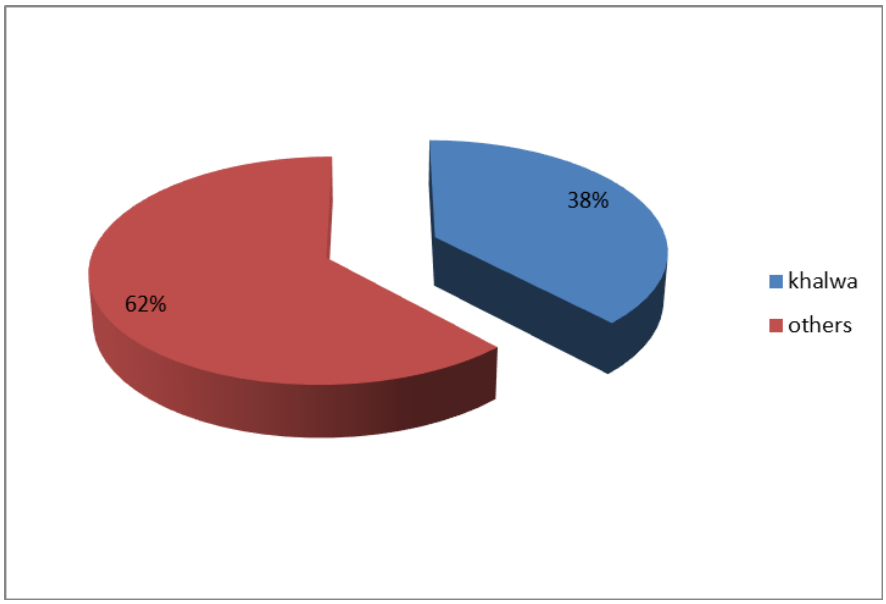

Fig. 1: Source of food
(Haroun,2023) the researcher

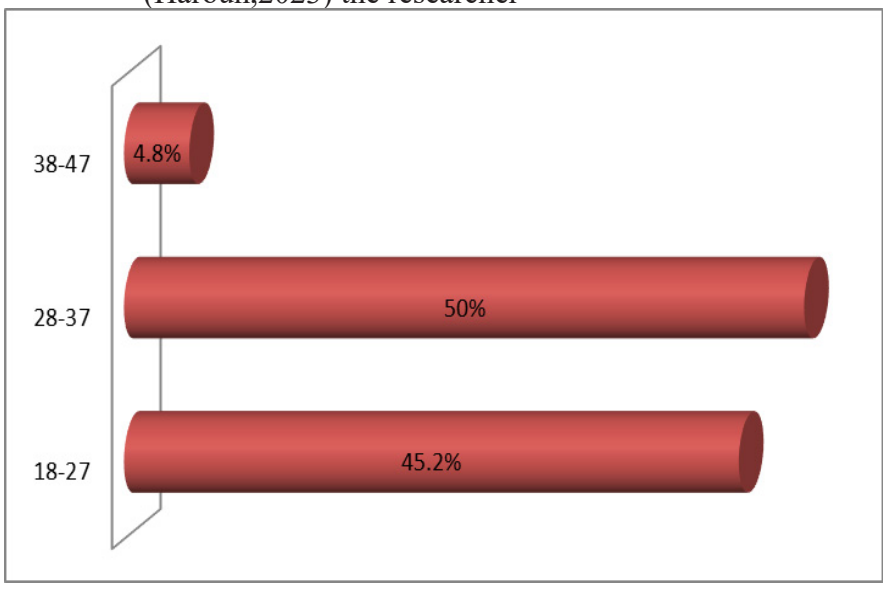

Fig. 2: Weight (Kg)
(Haroun,2023) the researcher

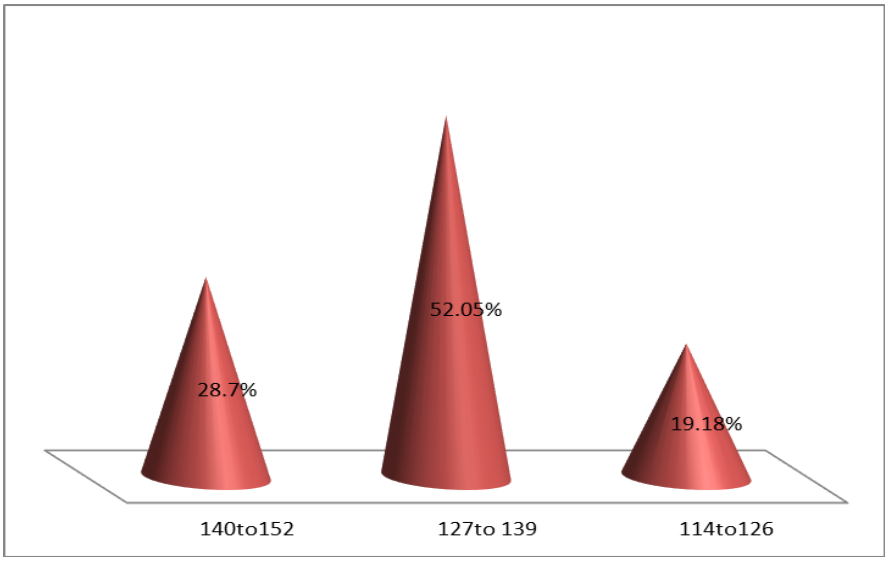

Fig. 3: Height (cm)

(Haroun,2023) the researcher

Table 1: Weight and height according to source of food (descriptive statistics with the aid of SPSS software version 18.00)),2023

			Food source		χ^2	p value
			Khalwa	Other		
Weight (Kg)	18-27	Count	19	47		
		%within weight	%29	%71		
		%within source	%35	%52		
	28-37	Count	32	41		
		%within weight	%44	%56		
		%within source	%58	%45		
	38-47	Count	4	3		
		%within weight	%57	%43		
		%within source	%7	%3		
					4.53	0.10
Height (cm)	114-126	Count	5	23		
		%within height	%18	82%		
		%within source	%9	25%		

			Food source		χ^2	p value
			Khalwa	Other		
	127-139	Count	27	49		
		%within height	%36	%64		
		%within source	%49	%54		
	140-152	Count	23	19		
		%within height	%56	%44		
		%within source	%42	%21		
					11.36	0.01

Table 2: Age, living duration and period of stay in the dormitories for each weight group
(descriptive statistics with the aid of SPSS software version 18.00)),2023

			Weight (Kg)			χ^2	p value
			18-27	28-37	38-47		
Age (Year)	6-10	Count	44	6	0		
		% within age	%88	%12	%0		
		% within weight	%67	%8	%0		
	11-14	Count	22	67	7		
		% within age	%23	%70	%7		
		% within weight	%33	92%	%100		
						56.41	0.00
Living duration	<1 years	Count	23	20	3		
		% within duration	%50	%44	%6		
		% within weight	%35	%27	%43		
	1-3 years	Count	40	48	3		
		% within duration	%44	%53	%3		
		% within weight	%61	%66	%43		
	>3 years	Count	3	5	1		
		% within duration	33%	56%	%11		

			Weight (Kg)			χ^2	p value
			18-27	28-37	38-47		
		% within weight	4%	7%	%14		
						2.59	0.63
Period of stay	holi-days	Count	5	13	0		
		% within period	%28	%72	%0		
		% within weight	%8	%18	%0		
	No	Count	61	60	7		
		% within period	%48	%47	%5		
		% within weight	%92	%82	%100		
						4.39	0.11

Table 3: Family size for each weight group(descriptive statistics with the aid of SPSS software version 18.00)),2023

Size		Weight (Kg)			χ^2	p value
		18-27	28-37	38-47		
4 – 9	Count	35	24	0		
	% within size	%59	%41	%0		
	% within weight	%53	%33	%0		
10 – 15	Count	26	40	5		
	% within size	%37	%56	%7		
	% within weight	%39	%55	%71		
>15	Count	5	9	2		
	% within size	%31	%56	%13		
	% within weight	%8	%12	%29		
					11.73	0.02

Table 4: Paternal occupation for each weight group(descriptive statistics with the aid of SPSS software version 18.00)),2023

Occupation		Weight (Kg)			χ^2	p value
		18-27	**18-27**	**18-27**		
Trader	Count	10	15	1		
	% within occupation	38	%58	%4		
	% within weight	%15	%20	%14		
Farmer	Count	26	35	3		
	% within occupation	%40	%55	%5		
	% within weight	%40	%48	%43		
Worker	Count	28	21	1		
	% within occupation	%56	%42	%2		
	% within weight	%42	%29	%14		
Shepherd	Count	2	2	2		
	% within occupation	%33	%33	%33		
	% within weight	%3	%3	%29		
					14.65	0.02

Table 5: Age, weight, living duration and period of stay in the dormitories for each height group (descriptive statistics with the aid of SPSS software version 18.00),2023

			Height (cm)			χ^2	p value
			114-126	127-139	140-152		
Age (year)	6-10	Count	25	25	0		
		%within age	%50	%50	%0		
		%within height	%89	%33	%0		
	11-14	Count	3	51	42		
		%within age	%3	%53	%44		
		%within height	%11	%67	%100	59.60	0.00
Weight (Kg)	18-27	Count	27	38	1		
		%within weight	%41	%58	%1		
		%within height	%96	%50	%2		
	28-37	Count	1	38	34		
		%within weight	%1	%52	%47		
		%within height	%4	%50	%81		
	38-47	Count	0	0	7		
		%within weight	%0	%0	%100		
		%within height	%0	%0	%17	71.80	0.00
Duration (year)	< 1	Count	13	18	15		
		%within duration	%28	%39	%33		
		%within height	%46	%24	%37		
	1-3	Count	15	52	24		
		%within duration	%17	%57	26%		
		%within height	%54	%68	56%		
	> 3	Count	0	6	3		
		%within duration	%0	%67	%33		
		%within height	0	%8	%7	7.63	0.27
Period	holiday	Count	1	9	8		
		%within period	%6	%50	%44		

			Height (cm)			χ^2	p value
			114-126	127-139	140-152		
		%within height	%4	%12	%17		
	No	Count	27	67	34		
		%within period	%21	%52	%27		
		%within height	%96	%88	%83	9.97	0.02

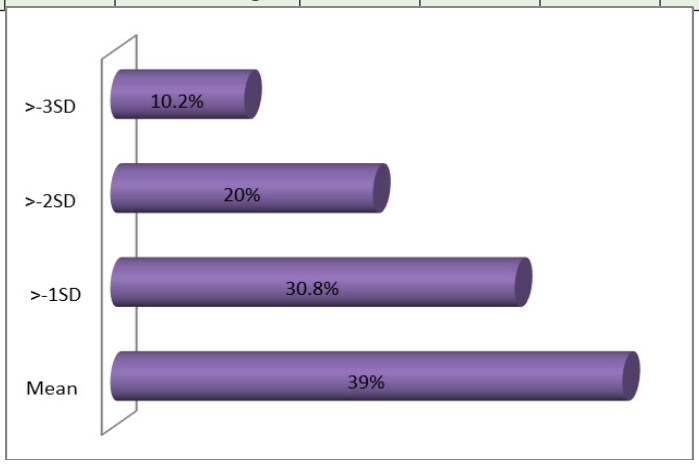

Fig. 4: Body mass index (Z score)

With the aid of WHO Anthro-plus program :(Haroun,2023) the researcher

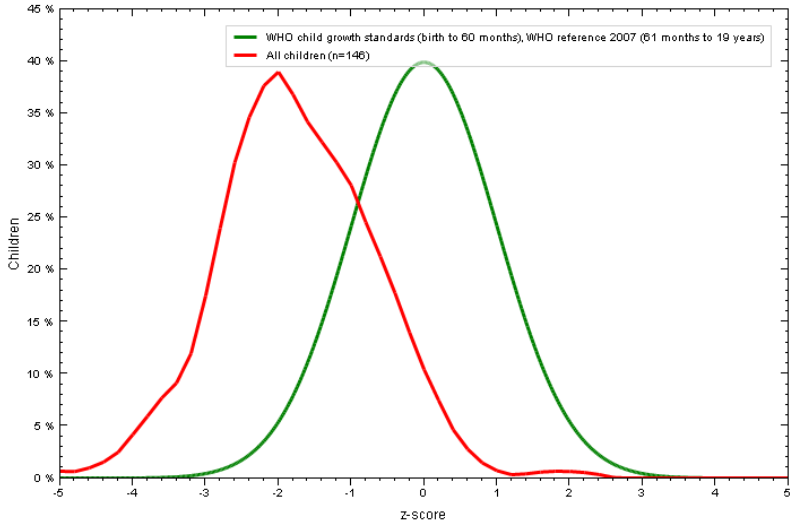

Fig. 5 Weight/age growth curve compared to WHO standards

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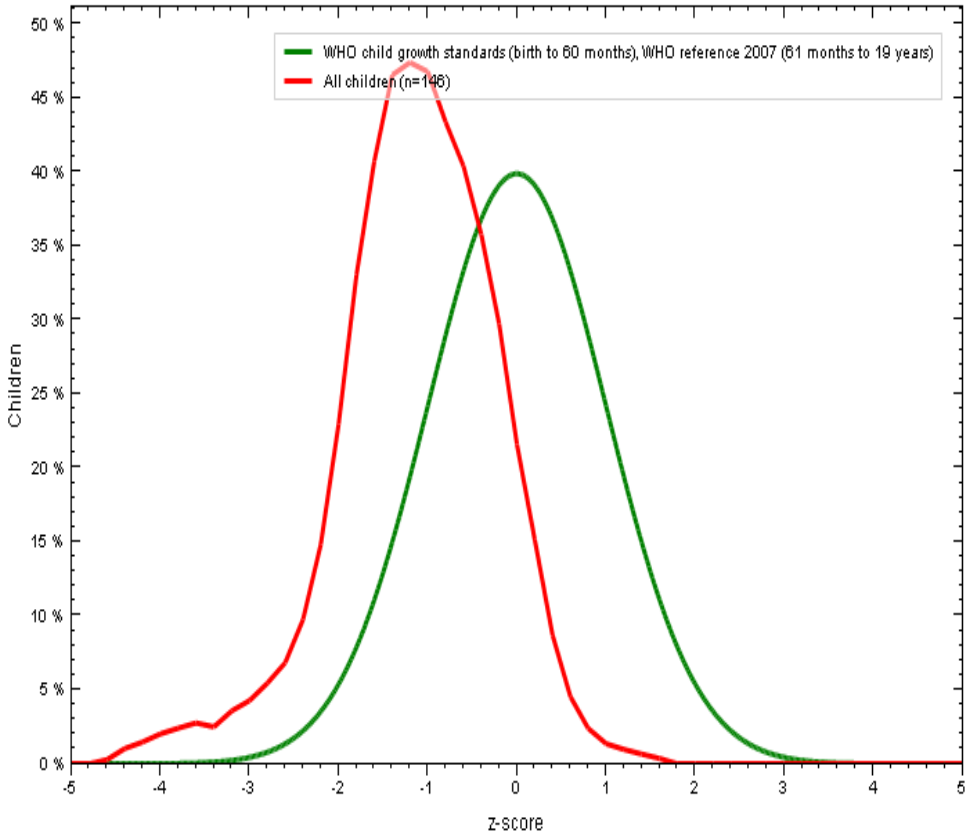

Fig. 6: Weight/height growth curve compared to WHO standards
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