

EPIDEMIOLOGICAL STUDY OF NUTRITIONAL STATUS AMONG CHILDREN IN ASSIUT GOVERNORATE

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ABSTRACT

Background: Malnutrition is a major health problem, especially in developing countries. It affects almost 800 million people. Incidence rates vary among different continents of the world. PEM is undoubtedly the most serious nutritional problem affecting several thousand young children in Egypt. **This study was aimed** to find out the epidemiology of under-nutrition and PEM among children less than 5 years old. **Patients and methods:** a cross sectional randomized study was carried out on 1026 children of age group from one month to 5 years old. Ethical clearance was obtained and permission from respective authorities was also taken. The instrument used is a randomized method (simple random sample) from MCH centers and OPD of Al-Azhar University hospital in Assiut. History taking, physical examinations including nutritional assessment clinically and anthropometrically (using WHO growth charts) was done. Data was collected and statistically analyzed and represented in tables and figures. **Results:** we found that age of 17.1 % of studied children was less than one year, 21.4% aged 1 -2 years and 61.5 % of children aged 2 – 5 years, 54.7 % were females, 63.9 % were from rural areas and 54.5 % were from low social class families. The overall prevalence of under-nutrition was 35.5 %. The under-nutrition was more frequent among children less than 2 years of age (65.9 %), (p value < 0.001). Females were more suffering from under-nutrition (57.4 %), (p value 0.0491). More than 70 % of under-nourished children were from rural areas (p value 0.002). Children of first order of birth were more suffering from under-nutrition followed by those of 3rd and fourth order of birth. More than 80 % of under-nourished children were from low social class families (p value < 0.001). in our study we found a statistically significant differences between well and under-nourished children according to some clinical parameters (feeding, history of infections, hospital admissions, vaccinations and error in weaning), (p value < 0.0001), where under-nutrition was frequent among artificially fed children and those with error in weaning. Infections especially diarrheal diseases and frequent hospital admissions were major risk factors for under-nutrition. More than 58 % of under-nourished children were

simple under-weight, 24 % stunted, 10.46 % wasted and 4.9 % wasted and stunted. Incidence of simple under-weight (58.8) was more than % of Marasmus (26.65 %). Kwashiorkor constitutes 11.82 % while incidence of Marasmic kwashiorkor was 2.74 %. A statistically significant differences between children of different age groups as regard incidence of types of under-nutrition, where simple under-weight was more prevalent among children aged 1-2 years old followed by children aged 2-5 years (p 0.021). Stunting (p value 0.452) and wasting (p value 0.025) was more prevalent among children less than one year of age, while combined wasting and stunting were more incidence among children aged 1-2 years old (p value 0.031). The incidence of Marasmus, Kwashiorkor and Marasmus Kwashiorkor were more incidences among children less than one year old, while simple under-weight more prevalent among children aged 2-5 years. A statistically significant difference between both sex as regard types of PEM, where simple under-weight and Marasmus Kwashiorkor were more prevalent among females, while Marasmus and Kwashiorkor were more prevalent among males. The overall incidence of under-nutrition among children from rural areas was 39% compared to those from urban areas (29.5 %). Marasmus, kwashiorkor and Marasmus kwashiorkor were more prevalent among children from rural areas. A statistical non-significant difference was found between children from urban and rural areas as regard incidence of simple under-weight (p value $>$ 0.05).

Keywords :incidence, under-nutrition, PEM, marasmus, kwashiorkor.

INTRODUCTION

The term “Protein-energy malnutrition is used to describe a broad array of clinical conditions ranging from mild malnutrition manifesting itself in poor growth to serious type of Kwashiorkor and Marasmus, which have high fatality rate. School children are at risk of becoming severely malnourished (**Kariuki, et al., 2002**). Incidence rate vary among different continents of the world. More than 70% of children with Protein-energy malnutrition live in Asia, 26% in Africa, and 4% in Latin America and the Caribbean (**Yigit and tezcan, 2004**).

Inadequate food, ignorance, undesirable social practices tend to impede child’s early growth. Lack of spacing and large number of siblings are the order of the day amongst low income groups and in rural areas. The present study, therefore, will be undertaken to assess the incidence of Protein-energy malnutrition in our area. Nearly one in five children under age five in the developing world is underweight (**MDG report, 2012**) and it continues to be a primary cause of ill health and mortality among children. The World Health Organization (WHO) has reported

hunger and related malnutrition as the greatest single threat to the world's public health. Malnutrition has shown to be an important concern in children because of rapid growth and development. Pre-school children are most vulnerable to the effect of protein energy malnutrition (PEM) and their nutritional status is considered to be a sensitive indicator of community health (Prasot et al, 2014).

PATIENTS AND METHODS

Our study is a cross sectional randomized study conducted on 1026 children aged from one month to 5 years old, from those attending MCH centers and out-patient clinic of AL-Azhar University Hospital from the period of February to October 2015. All enrolled children were randomly selected by simple random method (odd numbers of tickets from 1-30) from all children attending the hospital. Working days were 3 days / week.

Inclusion criteria: All children from one month to 5 years old and from both sex.

Exclusion criteria:

- Neonates
- Any children with short stature due to any cause other than nutrition.

- Obese and over- weight children, and children more than 5 years old.

ALL enrolled children were subjected to: Full history taking:

- 1- Personal history (name, age, sex, address and order of birth)
- 2- Maternal obstetric history.
- 3- Nutritional history (breast feeding, bottle feeding, weaning)
- 4- Developmental history (gross motor, fine motor, social and language.
- 5- Medications and diseases of the mother during pregnancy.
- 6- Past history: perinatal, past medical history, (Recurrent illness and hospital admission).
- 7- Family and social history.

Clinical examination: General examination: Mental status: normal, apathetic or irritable and also including : hair, skin, mucous membranes, head and neck, lymph nodes, extremities, deformities and edema of lower limbs) and signs of dehydration, anthropometric measurements according to WHO classification 2006: (WHO, 2010) and systemic examination: including signs of PEM and examinations of different systems (neurological, abdominal, chest and cardiac examination). The data were collected and the results were represented in tables and figures.

RESULTS**Table (2): Socio-demographic data among well and under-nourished children.**

	Total = 1026				P value
	Well nourished children (N = 662) 64.5 %		Under nourished children (N = 364) 35.5 %		
	No.	%	No.	%	
Age/ years					
<1 year	100	15.1	75	20.6	<0.001**
1-2 years	88	13.3	132	36.3	
2-5 years	474	71.6	157	43.1	
Sex					
Male	310	46.8	155	42.6	0.0491*
Female	352	53.2	209	57.4	
Residence					
Rural	401	60.6	255	70.1	0.002**
Urban	261	39.4	109	29.9	
Order in family					
1 st	146	22.1	104	28.6	0.038*
2 nd	94	14.2	52	14.3	
3 rd	177	26.7	73	20.1	
4 th	113	17.1	72	19.8	
5 th	121	18.3	54	14.8	
6 th	11	1.7	9	2.5	
Social classes					
Low	264	39.9	295	81.0	<0.001**
Middle	273	41.2	56	15.4	
High	125	18.9	13	3.6	

*P value: statistically significant. - **P value: statistically highly significant.

This table show highly significant difference between both groups regarding the age, residence and social classes

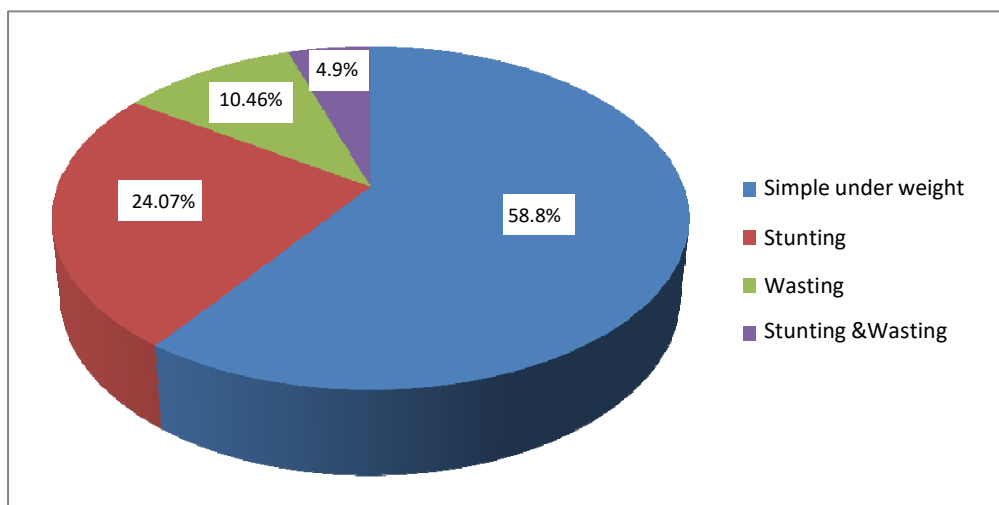


Figure (1): Incidence of different types of under-nutrition among studied children

Table (2): Incidence of different types of PEM among studied children.

Types PEM	N = (364)	%
Simple under weight	214	58.8
Marasmus	97	26.65
Kwashiorkor	43	11.82
Marasmic Kwashiorkor	10	2.74

This table shows that the most common form of PEM is simple under weight and the least was Marasmic KWA.

Table (3): Incidence of different types of under-nutrition among children of different age groups

Nutritional status	Age						P value
	<1 year (N = 75)		1-2 years (No = 132)		2-5 years (N = 157)		
	No	%	No	%	No	%	
Simple under weight	28	37.33	77	58.33	109	69.42	*0.021
Stunting	8	10.67	10	7.58	15	9.55	*0.452
Wasting	37	49.33	40	30.3	30	19.10	*0.025
Stunting & Wasting	2	2.67	5	3.79	3	1.91	*0.031

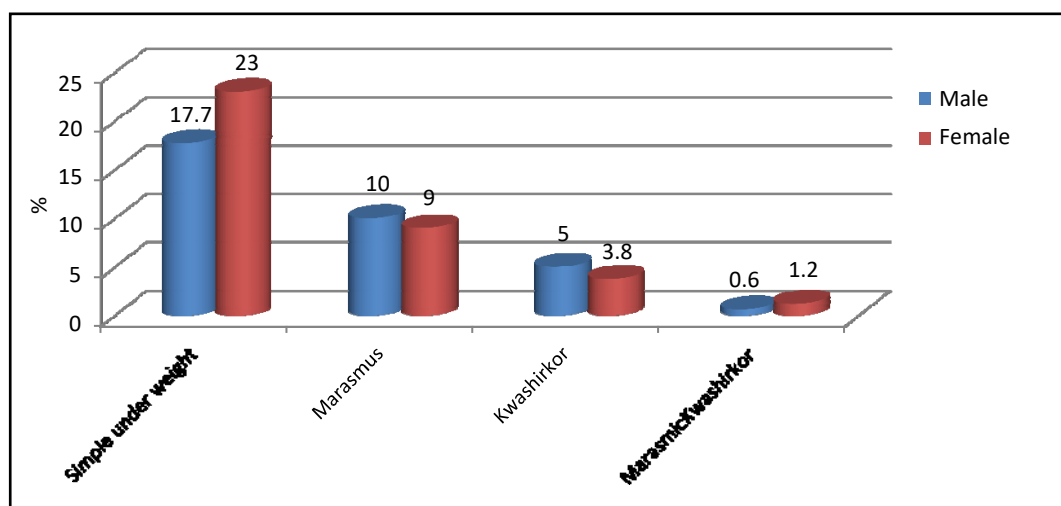
* P value: statistically significant.

This table demonstrates that simple underweight and stunting increase by the age with significant difference regarding underweight and wasting.

Table (4): Correlation between types of PEM and gender in studied cases.

<i>Types of PEM</i>	Sex				P value
	Male (No 465)		Female (No 561)		
	N	%	N	%	
Simple under weight	83	17.7	131	23	*0.032
Marasmus	47	10	50	9	0.058
Kwashiorkor	22	5	21	3.8	*0.041
Marasmic Kwashiorkor	3	0.6	7	1.2	*0.012
Total	155	33.33	209	37	*0.042

*P value: statistically significant.

**Figure (2): Correlation between type of PEM and gender in studied cases.****Table (5): Correlation between PEM among children from Rural and Urban areas**

	Rural (n=656)		Urban (n=370)		Total 1026	P value
	No.	%	No.	%		
Well-nourished children	401	61	261	70.5	662	0.021**
Under-nourished children	255	39	109	29.5	364	0.011**
Simple under weight	145	22	69	19	214	0.055
Marasmus	70	11	27	7	97	0.034*
Kwashiorkor	33	5	10	2.7	43	0.001**
Marasmic KWA	7	1	3	0.8	10	0.032*

**P value: Statistically highly significant.-*P value: statistically significant

This table show Statistically highly significance difference as regard the residence with significant difference between Well-nourished and Marasmus and Marasmic KWA.

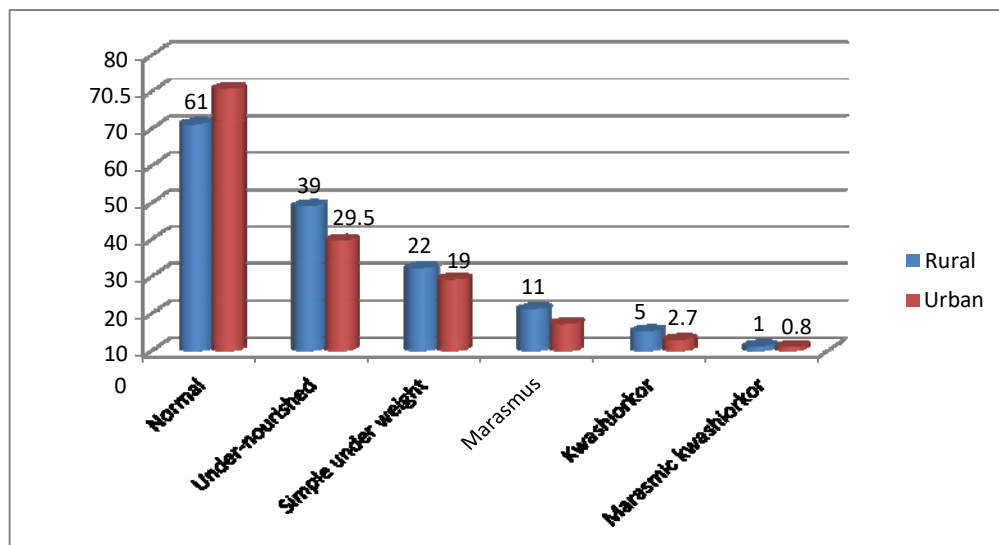


Figure (3): Incidence of under-nutrition among rural and urban children

DISCUSSION

Nearly half of all deaths in children less than 5 years are attributable to under-nutrition. This translates into the unnecessary loss of about 3 million young lives a year. Under-nutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and contributes to delayed recovery. In addition, the interaction between under-nutrition and infection can create a potentially lethal cycle of worsening illness and deteriorating nutritional status (UNICEF, 2015).

In the present study, the age of 17.1 % of studied children was less than one year, 21.4% aged 1 - 2 years and 61.5 % of children

aged 2 – 5 years. 54.7 % were females, 63.9 % were from rural areas and 54.5 % were from low social class families. **Patil and Divyarani in 2015** reported that maximum numbers of studied children were in the age group of 1-3 years which constituted about 56.7% of study subjects. It was observed that 25.6% of study subjects belong to age 3-4 years and 17.8% belong to the age 4-5 years and also they stated that boys constituted 43.3% and girls 56.7%. The proportion of females in our study was higher which is comparable to a study by **Bhatia et al., 2007**. **Prasot, et al, 2014** concluded that the burden of PEM was very high.

The overall incidence of under-nutrition in our study (table 1) was

35.5 %. The under-nutrition was more frequent among children less than 2 years of age due to lack of vitamins supplementation and recurrent episodes of diarrheal infection (65.9 %), (p value < 0.001). We found that 57.4 % of under-nourished children less than 5 years were females (p value 0.0491) this explained by upper Egypt community prefer males than female so they give him more nutritional and health care. More than 70 % of under-nourished children were from rural areas (p value 0.002). Children of first order of birth were more suffering from under-nutrition followed by those of 3rd and 4th order of birth. This can be explained by lack of experience as regard the method and protocol of health nutrition and vitamin supplementation and these findings are in line with the results obtained by **Islam, et al., 2013** and **Hien and Hoa, 2009**. More than 80 % of under-nourished children were from low social class families (p value < 0.001). Low socio-economic children are at increased risk for under-nutrition. **Patil and Divyaraniin 2015** reported that the prevalence of PEM is high among poor rural children (71.1%) compared to urban children (64.4%) and this difference is found to be statistically significant. **UNICEF, 2015** in Egypt

found the prevalence of moderate to severe stunting and wasting among lower social class children less than five years was 24 % and 7.4 % respectively.

In the present study we found a statistically significant differences between well and under-nourished children according to some risk factors for under-nutrition, (type of feeding, history of infections, hospital admissions, vaccinations and error in weaning), where under-nutrition were frequent among artificially fed children and those with history of error in weaning. Infections especially diarrheal diseases and frequent hospital admissions were major risk factors for under-nutrition.

Prasot et al., 2014 stated that more than half children were malnourished who were not utilizing service of complementary food. Also, **Paramita, et al. 2010**, stated that children who exclusively breast fed for less than 6 months was more likely to be wasted when compared to those exclusively breast fed for 6 months or more.

In our study (tables, 2 and figure 1) 35.5 % of studied children were under-nourished; 58.8 % of them were simple under-weight, 24 % stunted, 10.46 % wasted and 4.9 % wasted and stunted. The

incidence of marasmus was (26.65 %). Kwashiorkor constitutes 11.82 % while incidence of Marasmic kwashiorkor was 2.74 %. Incidence of marasmus, Kwashiorkor and Marasmic Kwashiorkor were more prevalent among children less than one year old, while simple under-weight more prevalent among children aged 2-5 years.

Also we found a statistically significant differences between children of different age groups as regard prevalence of types of under-nutrition (table 3), where simple under-weight was more prevalent among children aged 2-5 years old (64.4 %) followed by children aged 1-2 years (58.33 %). Stunting and wasting were more prevalent among children less than one year of age (10.67%) and (49.3%) respectively, while combined wasting and stunting were more prevalent among children aged 1-2 years old (3.79 %), (p value < 0.05).

UNICEF, 2015 in Egypt, stated that the overall prevalence of moderate stunting among children less than 5 years old was 21.4 %. Incidence of moderate stunting among children less than one year was 18 %, for children aged 1-2 years was 23 % and for children aged 2-5 years was 22 %. Prevalence of severe stunting

among children less than 5 years was 9.8 % and 8%, 11%, 9% for children less than one year, children aged 1-2 years and children aged 2-5 years respectively. **UNICEF, 2015** in Egypt, also stated that the overall incidence of moderate to severe wasting among children less than 5 years old was 8.4% and for severe wasting 3.8%. The incidence of moderate to severe wasting among different age groups was 14.4 %, 8%, 9% and 10% for infants less than 6 months, 6-12 months, children aged 12-24 months and 24-59 months respectively.

In the present study we found that a statistically significant difference between both sexes as regard types of PEM (table 4 and figure 2), the overall incidence of under-nutrition among male children less than 5 years was 33.3 %, while among females was 37 %. Simple under-weight and Marasmic Kwashiorkor were more prevalent among females (23% and 1.2 %) respectively, compared to males (17.7% and 0.6 %) respectively, while marasmus and kwashiorkor were more prevalent among males (10% and 5%) respectively compared to females (9 % and 3.8 %) respectively. Our results were higher than results obtained by UNICEF, 2015 in Egypt who stated that prevalence

of moderate to severe wasting among males and females was 8.4% and 8.5 % respectively.

We found a statistically significant differences between rural and urban groups as regard incidence of under-nutrition (p value 0.011), where overall incidence of under-nutrition among children from rural areas was 39% compared to those from urban areas (29.5 %). Marasmus, kwashiorkor and marasmus kwashiorkor were more prevalent among children from rural areas and among children less than 2 years of age. A statistical non-significant difference was found between children from urban and rural areas as regard incidence of simple under-weight (p value > 0.05). Our results were higher than results of **UNICEF, 2015** in Egypt who states that the overall incidence of moderate to severe stunting among urban children less than 5 years old was 23% while among rural children was 20.7%. incidence of moderate to severe stunting in Lower Egypt was 17.9 % and in Upper Egypt was 26.2 % for the same age groups, while in frontier governorates 15.1%.

UNICEF, 2015 in Egypt also found a lower incidence rate of wasting among urban and rural children less than 5 years old (8.4

% and 8.5 % respectively). Nearer results from lower and Upper Egypt (8.4 % and 8.3 %, respectively) and for frontier governorates, 13.9 %.

CONCLUSION

- PEM is the major health problems especially in developing countries and consider as biggest health problem effecting young children in Egypt.
- The under nutrition was more frequent among children less than 2 years of age Females were more suffering from under nutrition than males.
- Also rural areas were more suffering than urban.
- The first orders were highly affected followed by 3rd and 4th.

RECOMMENDATION

- We recommend that the elevation of socio economic stander and level of health educations for enhancement the nutritional status of the infants and children.
- Application of protocol for vitamins supplementation as recommended by WHO.
- Stress on vaccination schedule, to decrease the incidence of infections.

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دراسة وبائية الحالة الغذائية بين الاطفال فى محافظة اسيوط

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هذه الدراسة التفصيلية العشوائية أجريت على 1026 طفل من عمر شهر و حتى خمس سنوات وذلك لدراسة مدى انتشار مرض نقص التغذية و أمراض الخلل فى البروتين و الطاقة لدى هؤلاء الأطفال.

وتم أخذ الاعتبارات الاخلاقية اللازمة و التصريح من الإدارات و الهيئات المعنية للقيام بهذا البحث.

وتم استخدام طريقة أخذ العينات الدراسية بالطريقة العشوائية البسيطة من وسط الأطفال المترددين على عيادات الأطفال بمستشفى جامعة الأزهر بأسيوط فى الفترة من فبراير حتى أكتوبر 2015م. وتم عمل الأتى للأطفال بعد توافر معايير الاشتمال عليهم :

- أخذ تاريخ مرضى مفصل للأطفال يشمل بياناتهم الشخصية و مكان إقامتهم و عمل والديهم و تعليمهم و مستوى المعيشة لهم وكذلك أخذ التاريخ الغذائى و المرضى لهم و عدد مرات حجزهم بالمستشفيات و تاريخ إصابتهم بالأمراض المختلفه و الفحص العام و التفصيلى لأجهزتهم و خاصة علامات سوء التغذية و القياسات الجسدية لهم (طول، وزن و محيط الرأس). و مطابقة ذلك لمنحنيات النمو اللازمه لهم. و تم جمع هذه البيانات و عمل تحليل إحصائى لها و تم عرضها فى جداول و اشكال إحصائية و كانت النتائج كالأتى :

لقد وجدنا نسب الأطفال المشتملين فى هذا البحث كالأتى :

17,1% أعمارهم أقل من سنه ، 21,4% من عمر سنه حتى سنتين و 61,5% من عمر سنتين حتى خمس سنوات.

- و كانت نسبة الإناث 54,7% و نسبة الأطفال الذين يسكنون فى المناطق الريفية 63,9% و الأطفال من الطبقات الاجتماعية المنخفضة 54,5% و توصلنا فى هذه الدراسة الى أن نسبة إنتشار نقص التغذية 35,5% و هذا الانتشار أكثر فى الأطفال دون سن الثانية من العمر 65,9% و أن الإناث يعانون من هذا المرض أكثر من الذكور (57,4%) و أن أكثر من 70% من حالات نقص التغذية كانت فى الريف . و وجدنا أن الأطفال الأولى للابوين معرضين أكثر لسوء التغذية و وجدنا أن أكثر من 80% من الأطفال الذين يعانون من نقص التغذية كانوا من الأطفال ذوى الطبقات الاجتماعية المنخفضة .

وفى هذه الدراسة وجدنا أنه توجد علاقة احصائية ذات دلالة بين علاقة بعض العوامل (نوع التغذية و الرضاعة الصناعية و عدد مرات العدوى لدى الأطفال و عدد مرات حجزهم بالمستشفى و خاصة بأمراض الإسهال و الجفاف و أخطاء الطعام و أن الأطفال الذين يرضعون رضاعة طبيعية هم أقل عرضة لهذا المرض.

و وجدنا أن معدل انتشار نقص الوزن البسيط بين هؤلاء الأطفال هو 58,8% و معدل قصر القامة هو 24% و معدل الوهن هو 10,4% و وجدنا نسبة مرض الهزال 26,65% و مرض سوء التغذية التورمى 11,82% و أن معدل انتشار التقزم الغذائى و الهزال أكثر بين الأطفال الأقل من عام من العمر مقارنة بباقى الأعمار .