Assessment of Nutritional Status of Some Primary School Children & Their Awareness in Slum Areas

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Abstract:

Worldwide, malnutrition is one of the leading causes of morbidity and mortality in childhood. It is still a major health problem in Egyptian community especially in primary school children. Slum populations living in adverse conditions represent nutritionally vulnerable groups that need immediate attention. This is a cross sectional survey study including 1000, (501urban, 499 rural) primary school children, all were subjected to anthropometric measurements, clinical examination, hemoglobin % and stool analysis as well as assessment of feeding practice and nutritional awareness. Also, a questionnaire was conducted on a sample group of persons surrounding the children to evaluate their nutritional awareness. The results showed that 76.9% of urban and 69.3% of rural children are underweight; 9.8% urban and 12.8% rural are stunted; more urban children are anemic than rural group (33% vs 20%, P=<0.05). About 50% of examined stools were positive. The majority of children have bad feeding practices. Only 33.9 % of urban children and 29.3% of rural ones have complete balanced diet. Almost all children have a weak level as regard their nutritional awareness; also more than half of parents (56%) have weak level of nutritional awareness.

Conclusion: *Children living in slum areas, both urban and rural, suffer from malnutrition diseases which are attributed, not only to the lack of nutritional awareness of the children and their contacts, but also to the adverse socioeconomic conditions. Attention to education, poverty alleviation, appropriate feeding practices, prevention and treatment of infections are required to assist in combating malnutrition in this district.*

Introduction:

Worldwide, malnutrition is one of the leading causes of morbidity and mortality in childhood.[1] The national researches done in late years by The Egyptian Nutritional Institute and other research centers showed that malnutrition is still a major health problem in Egyptian community among different age groups and socio-economic classes.[2]

School children are very important population group in Egypt as they represent more than 20% of total population.[3] They need special nutritional care to avert the occurrence of malnutrition which influence not only school performance but also attendance.[4,5]

A large percentage of school children live in slum areas.[3] Slum populations living in adverse conditions represent nutritionally vulnerable groups that need immediate attention.[6]

Stunting is one of the nutritional problems that are common in primary school children. Iron deficiency anemia, vitamin A and B_2 deficiencies, dental caries (65%of school children in Arab countries) and obesity (10%-45% among school children in Arab countries) represent also important nutritional problems.[7] Goiter also is one of endemic diseases all over Egypt.[8]

Low socio-economic conditions are the most important factor that helps in increasing the percentage of malnutrition among school children in slum areas. Also, the bad feeding habits, the high percentage of parasitic infestation and infectious diseases among them are additional factors.[1,2]

So implantation of a good feeding habits and how to get a safe food in primary school children and all surrounding persons through nutritional education is very crucial.[9]

The aim of this work is to assess the nutritional status and awareness of some primary school children in slum areas, to improve their nutritional status, and to raise their health and nutritional awareness.

Subjects and Methods:

This is a cross sectional survey study on a sample of primary school children conducted over one year,

from May 2003 to May 2004. The schools were randomly selected from slum urban and rural areas in Giza governorate: 3 schools from urban areas and 2 from rural. The total student number was1000, (501urban, 499 rural) from the 5th class to be able to answer the questions in the study questionnaires.

The study material included 3 questionnaires, 1st for assessment of nutritional state, including demographic data, clinical history and clinical examination of face, thyroid, skin, nails, mouth, teeth and systemic examination. It also included the anthropometric measurements (weight and height) and the laboratory results for hemoglobin % (by spectrophotometery) and stools analysis. The 2nd questionnaire was for assessment of feeding practice and nutritional awareness (like having breakfast meal, types of food, eating outside home, importance of energy food or having vitamins, malnutrition....etc.). The 3rd questionnaire was conducted on sample group of persons surrounding the children to evaluate their nutritional awareness.

The collected data were analyzed on the following basis:

1-Grades of thyroid enlargement: G0=thyroid not seen or felt, G1=enlargement felt but not seen, and G2=enlargement felt and seen.

2-Height for age: Short =<-2SD of reference values, Very short=<-3SD of reference values. (according to WHO criteria for middle east population,2004).

3-Body mass index(BMI): (calculated by the formula= weight in Kg/ Height in m^2): BMI = <20=underweight, BMI=20-<25=normal, BMI=25-<30=overweight, BMI=30-40= obesity, BMI=>40 =severe obesity (according to WHO criteria for middle east population,1995).

4-Food can be divided into 3 categories according to its functions: Energy food: cereals, sugar, fat, etc; anabolic food: proteins, Ca, Fe, etc; and protective food: vegetables, fruits as source of vitamins and minerals.[10]

5-Evaluation of nutritional awareness and practice: Good: 2-3 correct answers, Medium: one correct answer; and Weak: wrong or no answer

6-Scoring system for evaluation of total nutritional awareness and practice:

The answers were evaluated as follow: correct answer = total score, No or wrong answer = 0.

The total added score was transformed to percentage and on this basis the sample was divided on 3 levels: Good=>75%, Medium=50-75%, and Weak=<50%.

7-Hemoglobin %: Normal:≥12 gm, Mild anemia:9-<12gm, Severe anemia:< 9gm (according to WHO criteria for middle east population,2004).

8-Complete (balanced) diet: Is the diet containing all the nutritious elements (energy, anabolic, protective, fibers) according to the recommended daily requirement for the person according to WHO recommendations.[2]

Statistical Methods:

SPSS software was used for data analysis. Chi square test was used to find any significant statistical difference between the study groups. Also stepwise regression was used to know factors affecting the nutritional awareness levels. P-value is considered significant if less than 0.05.

Results:

The study included 501 students (50.1%) from 3 schools: Mahmoud Azmy (183), Sayed Alshohadaa (180) and Tawfik Alhakeem (138), representing the urban group and 499 students (49.9%) from 2 schools: AlNile (237) and Mostafa Kamel (262) representing the rural group. Males represented 49.9% of our study population while 50.1% were females. The mean age was 11.3 ± 0.63 years in urban and11.± 0.34 years in rural children (table I).

Table I: Sex and age distribution of studied children

Item	Total, 1000 (100%)	Males,499 (49.9%)	Females,501 (50.1%)	Age Mean±SD
Urban	501(50.1%)	251	250	11.3±0.63
Rural	499(49.1%)	248	251	11.1±0.34

Values are expressed in numbers and %, age in years

The clinical history of studied groups showed that children from rural areas had a higher percentage of parasitic infestation (33.3%) than urban children (26.5%) and the result was correlated to anal itching and recurrent abdominal pain. Also, the rural children had more cases of repeated tonsillitis and chronic cough. Both groups had low percent of tuberculosis, diabetes mellitus and rheumatic fever. There was a significant statistical difference between both groups in all diseases (table II).

Eye examination showed that a small percentage in both groups had xerosis or Bitot spots as a sign of vitamin A deficiency. Although 15.6% of urban children and 21.2% of rural children have decrease in visual acuity, yet about 95% of them do not use eye glasses (table III).

A very high percentage showed lip pallor as a sign of anemia (80.6% in urban children and 93.6% in rural children). Also, cheilitis and angular stomatitis due to vitamin B_2 deficiency were statistically higher in rural children (7.4% vs 18.6% and 18.4% vs 21% respectively). Also, rural children had a significantly higher percentage of glossitis and fissured tongue as a sign of vitamin B deficiency. Also they had a higher

Table II: Clinical history of studied children

Item	Parasitic infestation	Bilhar-siasis	Recurrent abd. pain	Anal itching	Recurrent tonsillitis	Chronic cough	Diabetes Mellitus	Tuber-culosis	Rheumatic .fever
Urban	26.5%	0.4%	50.5%	22.2%	30.3%	21.9%	1.8%	1.4%	1.4%
Rural*	33.3%	1%	58.5%	37.5%	37.7%	33.7%	0.8%	1.2%	4.6%

** there is significant statistical difference between urban & rural, P=<0.05.*

Table III: Eye examination

Item	Xerosis	Bitot spots	Visual acuity Right eye			Visual acuity Left eye			Use eye glasses
			6/6	6/9	Less	6/6	6/9	less	
Urban	0%	0.4%	55.9%	32.8%	11.3%	51.3%	33.1%	15.6%	3.9%
Rural	0.4%	0%	35.3%	43.5%	21.2%	35.1%	43.7%	21.2%	4.2%

Table IV: Head and Neck examination

Item	Lips*			Tongue*		Thyroid		
	pallor	Angular stomatitis	Cheilitis	Fissured	Glossitis	G0	G1	G2
Urban	80.6%	18.4%	7.4%	16.8%	4.2%	91.4%	8.6%	0%
Rural	93.6%	21%	18.6%	25.9%	13.2%	87.9%	11.2%	0.8%

**there is significant statistical difference between urban & rural, P=<0.05.*

Table V: Skin, nails and teeth examination

Item	Skin			Nails			Teeth			
	Xerosis	Follicular Hyperkeratosis	Abnormal pigmentation	Flat	Spoon	Clubbing	Caries	Mottled Enamel	Gum* inflammation	Bleeding Gum
Urban	16.2%	2.4%	6.4%	44.5%	0.2%	0.4%	64.9%	11.2%	31.3%	0.6%
Rural	20%	3.4%	4%	49.7%	0.2%	0.2%	62.5%	13%	42.7%	0%

** there is significant statistical difference between urban & rural, P=<0.05.*

Table VI: Anthropometric measurements

Item	Height for age				BMI				
	Normal	Short	Very short	Tall	Normal	*Under weight	Over weight	Obese	Severe obesity
Urban	89.6%	7.6%	2.2%	1%	17.7%	76.9%	3.2%	1.6%	0.4%
Rural	86.6%	10%	2.8%	0.6%	23.6%	69.3%	5%	1.6%	0.4%

**there is significant statistical difference between urban & rural, P=<0.05.*

Table VII: Laboratory Results

Item	*Hemoglobin % (n=1000)			Stools analysis (n >>U=203, R=227)			
	Normal	Mild anemia	Severe anemia	*Normal	*Entameba Histolytica	Entrobious	Giardia
Urban	67.3%	14.4%	18.2%	48.3%	29.6%	14.8%	7.4%
Rural	79.9%	9.6%	10.2%	53.8%	25.6%	13.2%	7.5%

** there is significant statistical difference between urban & rural, P=<0.05, n=number of studied samples, U-urban, R=rural.*

Table VIII: Some feeding practices, teeth care and diet quality

Item	No Breakfast	No Dinner	No Bran Bread	No Vegetables	No Fruits	No Milk	No teeth hygiene	Diet type	
								Complete	Incomplete
Urban	55.3%	55.1%	41.1%	83.6%	82.4%	23.9%	59.7%	33.9%	66.1%
Rural	52.5%	55.1%	33.9%	86.6%	90.6%	25.7%	70.9%	29.3%	70.7%

Table IX: Relation between BMI and Diet quality

Item	Normal	Underweight	Overweight	Obese	Severe obesity
Children had complete diet (n=316)	241(76.3%)	61(19.3%)	12(3.8%)	1(0.3%)	1(0.3%)
Children had incomplete diet (n=684)	146(21.5%)	491(71.7%)	29(4.2%)	15(2.2%)	3(0.4%)

Values expressed in numbers and percent , P value=0.001, X^2=6.04

Table X: Relation between anemia and Diet quality

Item	Normal	Mild anemia	Severe anemia
Children had complete diet (n=316)	225(71.2%)	48(15.2%)	43(13.6%)
Children had incomplete diet (n=684)	94(13.7%)	513(75%)	77(11.3%)

Values expressed in numbers and percent, P value=0.0000 , X^2=334.986

percent in thyroid enlargement than urban children (table IV).

Skin examination showed xerosis in 16.2% of urban children compared to 20% of rural children. Also, hyperkeratosis and abnormal pigmentation were also detected in low percentage in both groups reflecting vitamin A as well as other micronutrients deficiencies. About half of the studied group (44.5% in urban and 49.7% in rural children) had flat nails which is mostly a sign of iron deficiency anemia and this result was correlated with the hemoglobin %.

About 2/3 of children had dental caries (64.9%in urban and 62.5%in rural). Also, gum inflammation was detected in 42.7% of rural children and 31.3% of urban group. These signs reflect calcium, fluorine and vitamin C deficiencies as well as lack of oral hygiene (table V).

The anthropometric measurements showed that the majority of children have normal height (89.6% in urban and 86.6%in rural), while a small percentage are short and a smaller percent are very short. The BMI showed that 76.9% of urban children and 69.3% of rural children are underweight, (=<0.05), while a small percent of them have obesity (table VI).

The laboratory results showed that more urban children have anemia than rural group (33%vs20%, P=<0.05). This result does not correlate with the much higher percent of pallor detected in clinical examination. Entameba Histolytica was detected in the stools of 29.6% of urban children, which was significantly higher than rural group (25.6%). Also, enterobious was higher in urban children while giardia was higher in rural ones (table VII).

The majority of children have bad feeding practices. Most of them (83.6%in urban and 86.6%in rural) do not eat fresh vegetables or fruits which are the main source of vitamins, minerals and fibers. Half of children do not have breakfast or dinner meals and about 1/4 of children do not regularly drink milk.

The teeth hygiene was neglected in 59.7% in urban compared to 70.9% in rural children. Only 33.9% of urban children and 29.3% of rural group had complete balanced diet while the rest had incomplete diet (table VIII).

There is a statistically significant correlation between diet quality and BMI, 71.7% of those had incomplete diet were underweight 6.8% were obese, while 76.3% of those who had complete diet were normal (P value=0.001)(table IX). Diet quality correlates also with hemoglobin %, 86.3% of those who had incomplete diet had anemia (P value=0.0000)(table X).

Evaluation of the level of nutritional practice showed that high percent of urban children (74.8%)and rural children (71.1%) have medium level of nutritional practice while the majority of them (97.4% in urban and 99.2% in rural) have a weak level as regard their nutritional awareness (e.g. the importance of vitamins and minerals, and its food sources, the 3 types of food and their functions in the body...etc.) and there was no statistical difference between the 2 groups (table XI).

Table XI: Evaluation of the overall nutritional practices and awareness of children

Item	Nutritional practice			Nutritional awareness		
	Good	Medium	Weak	Good	Medium	Weak
Urban	8..6%	74.8%	16.6%	0.2%	2.4%	97.4%
Rural	4.2%	71.1%	24.7%	0%	0.8%	99.2%

Our study also included 356 person surrounding the children, 176 (49.6%) parents, 121(33.9%) teachers, and 59 (16.5%) from health team in schools. Males represented 39.3% of this sample while 60.7% were females. About half of them (43.1%) had high educational level while only 9.5% were illiterate (table XII).

Table XII: Education level of surrounding persons

Item	High	Medium	Primary	Illiterate
Percent	43.1%	35.6%	11.8%	9.5%

Table XIII: Evaluation of the nutritional awareness of surroundings

Item	Good	Medium	Weak
Parents	4.9%	39.1%	56%
Teachers	25.2%	51.1%	23.7%
Health team	37.3%	44.1%	18.6%

There is a high statistically significant difference between the 3 groups P-value <0.05

Table XIV: Factors affecting nutritional awareness of surroundings

Item	Education level	Residence (urban)
R.factor	0.5955	0.2941
P-value	<0.001	<0.05

More than half of parents (56%) had weak level of nutritional awareness, while 51.1% of teachers had a medium level On the other hand, only 37.3% of health team had a good level. The education level and residence in urban area proved to affect the awareness level of surroundings (those with higher education and living in urban area have better awareness than others less educated and live in rural area (tables XIII and XIV).

Discussion:

Nutritional status, which reflects the state of health influenced by environmental and dietary factors, is important to be assessed for planning and implementing appropriate nutrition interventions to avert long term disabilities and economic losses.[5]

Our cross sectional study included 1000 children, from urban and rural slum areas. The results of this study showed that, by BMI analysis, the prevalence of

underweight children in urban children is significantly higher than that of rural children. However, it is still high in both groups (76.9% urban and 69.3%rural). This can be explained by the fact that urban slum areas are characterized by adverse living conditions, higher population densities and poor hygienic and sanitary conditions mostly worse than rural areas and therefore need special attention.[6]

Stunting was much less in both groups (9.8% urban and 12.8% rural). Still, it reflects that the nutrition is an important factor affecting the height. This is confirmatory to the study done by Mattr et al.,[4] which was conducted on 3000 students from Cairo, Alsharqueh and Qena. It showed that 13.1% of urban children are stunted compared to 17.2% in rural and that boys were more affected than girls

Although Brink et al.[11] showed that the prevalence of stunting is 27 % in rural villages which declined to 10.6% with urbanization, which agrees with our study, and a high percent of underweight which declined with urbanization, which disagrees with our results; yet, it should be stated that survey was conducted on a different age group (preschool children). Also the difference from our study can be explained by the great increase in population size over the last 20 years which was not associated with a corresponding increase in income which in turn affects the socioeconomic conditions of the family.

The study done by Raja'a et al.[12] on urban and rural school children showed that about 50% of them are either underweight or stunted, which agrees with our study. Monarrez-Espino et al.[13] detected stunting in 22.3% of their children which is almost double of our findings.

There are many other studies all over the world which agree with ours in detecting similar prevalence of underweight and stunting in children living in adverse conditions.[14-16]

A small percentage of our children had obesity (5.2%urban and 7%rural). This result is higher than those detected by the study done by Mattr et al.,[4] which showed that highest percent in Cairo was 3.4% while in rural areas, it was 2.9%, which can be explained by the increase of bad feeding habits over last years. This result is almost similar to the study done by Tee et al.,[17] where 8.4% of their children were overweight. This is in contrast to the study of Bayoumi and Moussa,[18] which showed that 61.1% of children fell above the 50th centile of the reference population. This can be partially explained on the basis of the different socioeconomic conditions and higher per capita income.

The BMI was correlated to diet type, where 71.7% and 6.8% of those who had unbalanced diet were underweight and obese respectively. Anemia was detected in 33% of urban group, a figure which is significantly higher than the 20% reported in rural one. These values however do not correlate with the very high percent of pallor in mucous membrane found by clinical examination, which reflect that pallor in mucous membrane can give a high false positive result and confirm the WHO recommendation to use the palm as a better physical sign of anemia.[19] This result is less than that of the study done by Ibrahim et al.,[20] *w*hich showed that 47% of Egyptian children are anemic.

Our study agrees with Moseker,[7] who showed that from 20% to 60% of school children have anemia. Our study agrees also with that done by Tsuyuoka et al.,[21] who found anemia in 26.7% of their studied children. On the other hand, the prevalence of anemia was 13% in study done by Monarrez-Espino et al.,[13] 45% in the study done by Ulukanligil and Seyrek[22] and 49.8% in study done by Hashizume et al.[23] The differences between the studies depend mainly on prevalence of the parasitic infestation and bad feeding habits.

There was a significant correlation between anemia and type of diet, where 86.3% of those who had unbalanced diet were anemic.

Parasitic infestation was detected in more than 50% in both urban and rural groups and this was correlated to the occurrence of recurrent abdominal pain. Entameba Histolytica had the highest prevalence. The type of parasite detected in our study reflects also the bad hygienic condition in slum communities. Many other studies confirmed the association between malnutrition and parasitosis.[21, 24-28]

The correlations between malnutrition, parasitosis (especially helminthes infections), and child development are complex, and studies of these interrelationships will allow health agencies to maximize screening and intervention strategies for developing countries.[28]

Goiter was detected in 8.6% in urban children and 12% in rural ones. Rural areas do not use iodinated salts in their food and also do not have much sea foods in their diet which is rich in iodine. This agrees with the study done by Jooste et al.,[29] who found the goiter prevalence in rural children to be 17.5%. On the other hand, Monarrez-Espino et al.,[13] found it to be only in 5.4 %, as their children had more access to iodine-rich food.

Although rare, yet, symptoms of vitamin A deficiency (VAD) were detected in 0.4% of our groups, which reflects the severity of the problem. In the study of Brink et al.,[11] in 1983, the prevalence was only 0.04%, which reflect worsening of the condition. The prevalence was higher (2.2%) in study done by Asrat et al.[30] Amaya-Castellanos et al.[31] found, by serum

retinol level, that the prevalence of VAD was higher in urban children than in rural children (22.5% vs 20.5%). However, no clinical signs of VAD were detected in the children.

Signs of vitamin B deficiency were detected in about 1/5 of our children being significantly higher in rural than urban which can be explained by the notion that 11.6% of urban children had medications as a source of multivitamin and minerals compared to 6.4% in rural children and their diet had a higher percent of vitamin-rich food, still this was not enough to supply the daily needs.

Teeth examination showed that 2/3 of children have dental caries, which is attributed to the lack of teeth hygiene (in ~70% of children) and bad feeding habits. Also, more than 1/3 have gum inflammation which was higher in rural group and can also be attributed to same causes and also to vitamin C deficiency as a result of decreased consumption of fresh fruits. Mottled enamel was detected in a smaller percentage, which may be due to lack of milk and its products in the diet. In spite that 75% of children mostly found to consume milk in their diet, yet the absorption of calcium may be impaired by unbalanced diet and bad feeding habits. It may be also due to certain medications taken during pregnancy or due to well water consumption. Our study is confirmatory to the study of Mattr et al.,[4] which detected caries in 2/3 of children and the study done by Moseker,[7] which showed that 65% of school children have dental caries due to same causes.

The inappropriate feeding practices detected in 90% of children reflect their lack of nutritional awareness (99%), which in turn is affected by the lack of the nutritional awareness in their close surrounding persons. In spite that about 1/2 of them got high educational level, yet, the nutritional awareness of most of them (56%of parents, 23.7%of teachers and 18.6%of health team) was weak. This proves that special attention should be given to nutritional education programs to the whole community Still, education level and urbanization were found to have positive correlation with nutritional awareness level (P=<0.001 and <0.05respectively).

Conclusion:

Our study concludes that children living in slum areas both urban and rural suffer from malnutrition diseases, urban children being more severely affected than rural ones, which are attributed not only to the lack of nutritional awareness of the children and their contacts but also to the adverse socioeconomic conditions, as the socio-economic conditions of the families play an important role in determining the quality of life, reflected by health and nutritional indicators of the country. So, nutritional knowledge alone is inadequate in ensuring children's nutrition security and, hence, for nutrition education programs to have a positive impact, facilitational strategies must be incorporated. The chronic parasitosis which is associated with the bad personal hygiene and bad environmental sanitation prevalent in slum areas also have important contributing factor in malnutrition. So, Attention to education, poverty alleviation, appropriate feeding practices, prevention and treatment of infections are required to assist in combating malnutrition in this district.

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Aknowledgement:

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Intestinal Helminth Infections and Nutritional Status of Children Attending Primary Schools in Wakiso District, Central Uganda. by Francis Lwanga 1,*, Barbara Eva Kirunda 2 and Christopher Garimoi Orach 1. 1.Â Children attending rural schools had a higher risk of being infected with helminth infections compared to those in the urban slums. These findings are not different from those of Stoltzus et al., where hookworms were more prevalent among the rural Pemba island school children than those in the urban areas [33]. It is important to note that none of the children investigated had a moderate to heavy form of infection. All (16%) the infected children had a very light intensity of infection. Recent papers in Nutritional Assessment in School Going Children. Papers. People. Assessment of Maternal and Child Health Care in Selected Slum Areas of Raiganj Municipality, West Bengal, India. The nutritional insufficiency among under 5 years children is a serious challenge for India. Despite several efforts have been made to improve the maternal health and child health care, disparities across various socio-economic groups more. The nutritional status was assessed by using anthropometric measurements (height and weight), academic achievement interms of previous year grades. The results revealed that there were highly significant differences found in mean height and weight of children with respect to their NCHS norm values in both groups by age and gender. About 40 per cent of children had normal nutritional status while 60 per cent of children indicated short, long or chronic type of malnutrition.Â Anthrometrically determined nutritional status of urban primary school children in Makurdi, Nigeria. BMC Public Health, 11: 769. Medhi, G.K., Barua, A. and Mahanta, J., 2006, Growth and nutritional status of school age children (6-14 years) of tea garden workers of Assam. J. Hum. Ecol., 19(2): 83-85.