

The Relationship between Nutritional Status and Educational Achievements in the Rural School Children of Morocco

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Abstract

Malnutrition affects physical growth, cognitive development, and physical work capacity, and it consequently influences human performance and Health.

Objective: Examine the association between results of educational tests and the nutritional status of School children.

Methodology: In 295 school children in a rural costal region of Morocco, educational achievements were assessed by their score in mathematics and general annual score. Nutritional status was evaluated by Z-scores of height-for-age and weight-for-age.

Results: After controlling for age, sex, district and school the results of test scores in both mathematics and general annual score were significantly positive correlated with Z-scores of height-for-age ($P < 0.005$) but not with weight-for age ($P > 0.05$).

Conclusion: This study has found that there is a positive relationship between nutritional status and educational achievement in general annual and Mathematical performance in rural schoolchildren of Morocco.

Keywords: Stunting; Wasting; School achievements; Morocco

Introduction

Malnutrition is a serious global issue and each year, some 24 million babies are born too small to lead healthy lives because their mothers were either ill or malnourished [1,2]. Recent reports show that among children under five years of age in developing countries, 206 million are stunted (low height for age) 50 million are wasted (low weight for height) and 167 million are underweight (low weight for age) due to lack of food and the presence of disease, mostly malaria [3]. The deficiency in nutritional status of a child is the result of macronutrient and micronutrient deficiencies from inadequate food consumption or from illnesses such as diarrhea [4]. It is quantified using the anthropometric indices of height for age, weight for age, and weight for height; all are expressed as a Z-score, which compare a child's measurements with the measurements of a similar child in a reference, healthy population [5]. A low height for age Z-score (stunting) indicates slow physical growth since the birth, usually due to repeated episodes of poor nutrition and/or episodes of diarrhea and other illnesses. A low weight for height Z-score (wasting) indicates current malnutrition and/or recent episodes of diarrhea and other illnesses, often thought of as a flow measure of malnutrition. A low weight for age Z-score (underweight) reflects both stunting and wasting [6]. In Morocco the last decade has been characterized by a marked improvement in all indicators of the nutritional status of children under 5 years. Among preschoolers, the rate increased from 28.3% in 1990 to 23% in 1998 [7]. The return to school is a multifactorial process conditioned by multiple factors which depend on the child (his health, nutrition and its neurocognitive development and the demographic and socioeconomic characteristics. In addition, recent studies show that among the risk factors associated with early cognitive deficits in children, malnutrition in young age, low birth weight and exposure to neurotoxins [8-10].

The objective of this work is to study the relation between the nutritional status, school performance of the children, their cognitive potential and certain socioeconomic and demographic factors of their households in a rural region of Kenitra.

Materials and Methods

Study Population

Two hundred and ninety five children (122 boys and 173 girls) aged 6 to 15 years were included in this study. The majority of children live in Ouled Berjal village. All school children present day of the survey were included in the study, except those for which we received a refusal of consent expressed by children or their parents.

The village is not supplied with drinking water and electricity and has septic tanks for sanitation. It is a rural school which is located in the economic region North-western Morocco.

Methods

Our study is a descriptive cross-sectional survey was conducted using a structured questionnaire.

-Demographic and anthropometric indicators: age, sex, weight, height.

The indicators of malnutrition (height for age and weight for age were determined by Z-scores and calculated with the software Epi info 2000). Stunting and wasting were defined as height-for-age and weight-for-age $Z < -2$ respectively [11,12].

-Socio-economic data: the family’s income, the parents’ educational status, the number of family members.

Educational achievements

In total 295 students underwent cognitive tests, the test chosen in our study review and describe writing. The “strong” level for medium (for class exams) and the note or above Mathematics at 6/10, the “average” level for scores below 6/10 but greater than or equal to 4.5 / 10 and “low” for those less than 4.5 / 10.

Statistical analysis

Chi-2 test and the logistic regression analysis were used to investigate the relationship between the prevalence of malnutrition and the socio-demographic factors and school achievement. Differences were considered statistically significant at a $p < 0.05$.

Results

Table 1 presents the descriptive results of the anthropometric characteristics such as the height for age (HAZ) and weight for age (WAZ) and body mass index (BMI) in all classes (grades 4-8), from since the age of 6 to 16 years. The average size for Age -0.56 ± 1.4 , weight for age 0.25 ± 1.04 .

Parameters	Mean \pm standard deviation
Weight Kg	29,08 \pm 9,06
Height in cm	134,6 \pm 113,9
Height for age (mean Z score)	-0,56 \pm 1,4
Weight for age (mean Z score)	-0,25 \pm 1,04

Table 1: Overall results of anthropometric parameters

Table 2 shows the anthropometric status of children by sex and age. These results show that the level of stunting and wasting among boys is 12.2%, 12.3%, respectively.

	Stunting			Wasting		
	< -2 Z	$\geq -2 Z$	P	< -2 Z	$\geq -2 Z$	P
Sex						
Girls	10 (8,2%)	112 (91,8%)	P > 0,05	16 (13,1%)	106 (86,9%)	P > 0,05
Boys	16 (12,2%)	115 (87,8%)		21 (12,3%)	150 (87,7%)	
Age (years)						
≤ 10	7 (4,4%)	152 (94,6%)	0,0034	13 (8,2%)	146 (91,8%)	0,012
> 10	19 (14,2%)	115 (85,8%)		24 (17,9%)	110 (82,1%)	

Table 2: Anthropometric status of children by sex and age

Table 3 shows the distribution of children according to their academic performance (average math scores or the average) by sex. We note respectively 30.1% of girls and 38.7% of small boys in mathematics and 17.1% of girls and 37.3% of small boys to the general average.

	Girls				Boys			
	Math		Annual average		Math		Annual average	
	N	%	N	%	N	%	N	%
Low	37	30.1	20	17.1	65	38,7	60	37,3
Average	57	46,3	61	52.1	60	35,7	60	37,3
Forté	29	23,6	36	30.8	43	25,6	41	25,4

Table 3: Frequency of school performance (reliability, medium, high) for Mathematics and the annual average student

Table 4 shows that the height for age was positively correlated ($p = 0.009$) with the annual ranking of the student and the average math ($p = 0.007$). No significant difference was found between weight for age and academic performance.

	IC (95%)	P
Math		
- HAZ (Height for age)	-0.24-0.19	0,007
- WAZ (weight for age)	-0.057-0.25	0.43
Annual average		
- WAZ	0.08-0.12	0,009
- WAZ	-0.043-0.25	0.6

Table 4: Linear regression between the average and the Math Average and physical indicators

Discussion

This study is conducted in a rural area of Kenitra. The study of population is consisted of 122 (41.6%) girls and 173 (58.4%) boys. The average age of our study population is 10.02 ± 2.5 years with a range of 6 to 16 years.

The problem of stunting young child starts early at the age of 3 years and reflects early malnutrition. Food diversification and environmental health are the determining factors during this period. But the general constraints of rural areas are debilitating as physical to food that is not regular. In addition, access to clean water is recently in Morocco. Besides the education of women and their social status are key factors for health of child especially when economic conditions are difficult. Malnutrition was more prevalent in children with illiterate fathers compared to other children. The prevalence of wasting and stunting was lower in children from economically better off families. The results of the regression analysis show that the prevalence of stunting was 12.2% and the prevalence of wasting 12.3% among boys. Also, the malnutrition was significantly more frequent among boys than girls. This increase has also been reported by Baba, *et al.* in a study in Lebanon [13]. This confirms the results of the literature reporting that stunting tends to increase with age for children. Possible explanations are the lack of adequate complementary infant feeding both quantitatively and qualitatively. It also appears that the transition to family meals is not always beneficial to the child and that food diversification is associated with the growth of children [14]. We note respectively 30.1% of girls and 38.7% of boys rated as poor for math and 17.1% of girls and 37.3% of boys rated as poor to average, so boys appear less successful than girls. So the boys appear less efficient than the girls, contrary to the study of Doyle, *et al.* reveals that girls have more learning difficulties in mathematics than boys [15].

The effect of nutritional status on the academic performance of the student was not confirmed in our study, as a causal effect by multiple regression analysis. This is consistent with what is observed in the literature since, also noted that there is no significant relationship between academic achievement of children and their nutritional status [14]. Grantham-McGregor, *et al.* by cons reviewed the literature and found that early stunting (HAZ < -2 SD from median) and poverty in the first five years of life were associated with lower subsequent cognitive abilities, school achievement, and productivity in adult life [16]. This can be explained in this case by the fact that the majority of children surveyed are not suffering from advanced malnutrition. Indeed, recent decades have seen a remarkable improvement in nutritional indicators among young Moroccan children.

The 1990 survey on the living standards of Moroccan households reported a rate of 23.9% of height deficit (Z-score of height for age < -2.0) in children under 11 years (Directorate statistics, 1992). Among preschoolers, the rate increased from 28.3% in 1990 to 23% in 1998 [7]. In our case, stunting and wasting among boys is 12.2%, 12.3% respectively of schoolchildren. Moreover Galal and Hulett found in their literature review that nutritional status is rarely considered as a causal factor and priority of academic performance but generally as an underlying factor [17]. They found that by cons are the demographic and socioeconomic characteristics that are most frequently cited as important determinants of attendance and academic performance of children. In particular, they stressed like other authors that parents discourage the return of their children if they have a high level of education [18]. A different study has similarly reported that in urban or rural areas where external influences a children's mental performance are available; there may be no significant difference in cognitive performance between well-nourished children and those showing signs of wasting [19].

Conclusion

The results of the present study show that school performance is a multifactorial process determined by multiple factors, including those dependent on child and his family.

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