UNDERWEIGHT SCHOOLCHILDREN IN A RURAL SCHOOL NEAR THE THAI-CAMBODIAN BORDER

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Abstract. We report on the high prevalence of underweight children in a rural primary school near the Thai-Cambodian border. Ninety-five children were studied: anthropometric data were recorded and studied for their correlation with semester examination scores; 63.2% of the children (60 cases) were underweight; in addition, BMI appeared to be significantly correlated to the semester examination scores. Our findings also revealed problems of nutrition and sanitation among the schoolchildren. In conclusion, schoolchildren in rural areas should be considered a priority in the national health and nutrition promotion programs.

INTRODUCTION

Ineffective healthcare systems are a major problem in most developing countries, including Thailand. At the present time, large numbers of people, especially those who live in rural area, suffer from health problems that are related to the combined pressure of rapid population growth, poor environmental sanitation, undernutrition and the maldistribution of health resources (Viputsiri, 1998).

Promoting the health of children is necessary because they will become their country's workforce. However, in developing countries, the prevalence of health problems among children in remote rural areas is high. Many studies have reported that children with poor health cannot realize their full academic potential (Pollitt, 1994; Pollitt *et al*, 1989).

Due to limited resources, children in far-off rural areas are a vulnerable group when compared with children in urban areas. For a number of reasons, many families are unable to adequately nourish their children, resulting in malnutrition. According to a recent study by Sirikulchayanonta *et al* (2000) a high prevalence of lowweight and malnutrition among children in the rural areas of Vietnam, a developing country, is still evident.

The government of Thailand regards the nationwide development of children's healthcare as a priority: a number of health promotion strategies for schoolchildren in rural areas have been established, for instance the school-based nutrition and feeding programs. Together with this, surveys of the nutritional status and dietary behavior of schoolchildren have been conducted as part of a system of nationwide surveillance (Hammer *et al*, 1991; Lertmaharit *et al*, 1999).

We report on a survey of primary schoolchildren in a rural sub-district near the Thai-Cambodian border.

MATERIALS AND METHODS

Setting

A cross-sectional study was carried out at a primary school in Chalem Phra Kiat District, Buri Ram Province, in the southern part of the northeastern region of Thailand, some 400 km from Bangkok. On average, there are approximately two children per family in the area. The district is near the Thai-Cambodian border and, therefore, local traditions are a mixture of Thai and Cambodian, as in most of the adjacent districts. In view of this, it was felt that the selected primary school could represent the other primary schools in the region.

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The school was composed of three single-story buildings and had twenty rooms in all. For a number of years the school had been the subject of health promotion programs that used schools as public bases for enhancing the nutrition and feeding of children. Shcool hygienic and environmental control were managed according to the standards of the Ministry of Education and the Ministry of Public Health.

Participants in the study

The survey was conducted during May 2001. All schoolchildren aged between six and ten years were included in the study. In cooperation with local health workers and teachers, we dealt directly with community leaders who were willing to assist us in maximizing community participation. The people in this area were willing to participate in the study and informed consent was obtained from each child and his/her parents prior to the study.

Determination of body mass index

The height and weight of all the subjects were measured; the body mass index (BMI) was then calculated. The cut-off levels for underweight and overweight were based on the BMI reference values for children (Hammer *et al*, 1991). We performed this study, with the help of local teachers, as part of the schoolchildren's annual basic health check program.

Semester examination scores

With the assistance of local teachers, we studied the scholastic performance of all the subjects. The children were examined using standard examination papers developed by the Thai Ministry of Education that covered three main educational domains (cognitive, psychomotor and affective) and that were appropriate to the children's level of ability. The examination score of each subject was converted into a school performance grade: A (score > 80%), B (score 70-80%), C (score 60-70%), D (score 50-60%) and F (score < 50%) based on criteria set by the Ministry of Education. The grade of each subject was recorded and used for further analysis.

Statistical analysis

All data were collected and analyzed using descriptive statistics. Independence was tested by the chi-squared test. Statistical significance was regarded as a p-value of 0.05.

RESULTS

Demographic data

Fifty-five boys and fourty girls were studied. The average age of the children was 7.24 (±0.42) years. The relevant demographic data is shown in Table 1.

Body mass indices and semester examination scores

The prevalence of lowweight was 63.2% (60 cases) (Table 1). Most of the students obtained grade A (43.2%; 41 cases), followed by grade B (22.1%; 21 cases), grade C (17.9%; 17 cases), grade D (16.8%; 16 cases) and grade F (0%, 0 cases), (Table 1). The BMI was significantly correlated to educational grade (Table 2) ($p < 0.05$; chi-squared test).

Table 1
Demographic data and some of the parameters of the children studied.

	Number	%
Sex		
Male	55	57.9
Female	40	42.1
School level		
Grade 1	17	17.9
Grade 2	27	28.4
Grade 3	33	34.7
Grade 4	18	19.0
Examination score		
Grade A	41	43.2
Grade B	21	22.1
Grade C	17	17.9
Grade D	16	16.8
Grade F	0	0
BMI status[a]		
Underweight	60	63.2
Proper weight	35	36.8

[a]BMI status as classified by Hammer *et al* (1991).

Table 2
Correlation between BMI and other parameters.

	BMI status[a]		Chi-squared test
	Underweight (n = 60)	Proper weight (n = 35)	
Sex			
Male (n = 55)	33	22	$\chi^2_{calculate} < \chi^2_{0.05}$
Female (n = 40)	27	13	
School level			
Grade 1 (n = 17)	10	7	$\chi^2_{calculate} < \chi^2_{0.05}$
Grade 2 (n = 27)	16	11	
Grade 3 (n = 33)	23	10	
Grade 4 (n = 18)	11	7	
Examination score			
Grade A (n = 41)	8	33	$\chi^2_{calculate} > \chi^2_{0.05}$
Grade B (n = 21)	19	2	
Grade C (n = 17)	17	0	
Grade D (n = 16)	16	0	
Grade F (n = 0)	0	0	

[a]BMI status as classified by Hammer *et al* (1991)

DISCUSSION

According to the 1999 Annual Report of the Thai Ministry of Public Health (1999), the rate of malnutrition among Thai children was as high as 10%. This rate among schoolchildren in rural areas was probable caused by limited resources. It follows that surveillance and health promotion in communities in rural areas are necessary (Viputsiri, 1998).

According to a recent study, using anthropological parameters such as weight, height and BMI can be a simple and effective method of monitoring children at risk of malnutrition in rural areas (Wang *et al*, 2000). It is accepted that BMI is a useful tool for assessment during field surveys. However, there has been considerable argument about the roles and values of different BMI cut-off points. We used child specific BMI cut-off levels (Hammer *et al*, 1991). Our cut-off points were in agreement with those cited in other reports from other developing countries and were also consistent with WHO/NCHS and IOTF cut-offs (Elizabeth, 2001; Wiwanitkit and Sodsri, 2001). According to our study, which was conducted in a community of low socioeconomic status, the prevalence of lowweight (63.2%) was six times higher than the national rate. Our finding is similar to that of a previous study in a nearby rural area of Thailand (Wiwanitkit and Sodsri, 2001).

We demonstrated a significant statistical correlation between BMI and school performance. This finding agreed with that of Lertmaharit *et al* (1999), which showed an association between nutritional condition and intelligence and academic performance. However, we found no significant correlation ($p>0.05$) between BMI and any of the other demographic data (sex and school level). Indeed, an association between the body size of the child and school performance in developing countries has already been reported (Simeon *et al*, 1997). Apparently, the association between the health status of the child, especially nutritional status, and the school performance, has been confirmed (Lertmaharit *et al*, 1999).

In conclusion, this study in a remote area in Thailand describes an association between the BMI of schoolchildren and scores from their examinations. Although our study was part of the school-based nutrition and feeding programs, poor nutritional among the children could still be demonstrated.

ACKNOWLEDGEMENTS

The authors are thankful to all the villagers and teachers who participated and assisted in the study.

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