NUTRITIONAL STATUS OF THE PRESCHOOL CHILDREN OF THE KLONG TOEY SLUM, BANGKOK

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Abstract. A cross-sectional study was conducted to examine the nutritional status of children (aged 1-5 years) who lived in the Klong Toey slum, Bangkok; the factors related to nutritional status were also determined. Anthropometric measurements were made for 232 children; socio-economic background information was obtained by interviewing their mothers using a structured questionnaire. The prevalence of malnutrition among the study sample was 25.4% by weight-for-age, 18.1% by height-for-age, and 6.9% by weight-for-height; the prevalence among pre-school children in Thailand and in the Bangkok metropolitan area by weight-for-age was reported to be 8.73% and 5.25% respectively. Potential related factors were examined: family characteristics, (mother's age, marital status, educational background, family size, family income, and mothers' occupation); children's characteristics (age, gender, birth order, immunization status, and history of illness); mothers' knowledge and perception of nutrition and mothers' food practice. Multiple logistic regression analysis was used to identify the association with the nutritional status of children by height-for-age. The results showed that family income (adjusted OR=0.9998; 95% CI : 0.9997-1.0000), matenal housewifery or unemployment (adjusted OR=6.5; 95% CI : 1.74-24.3), food practice (adjusted OR=0.7123; 95% CI : 0.5390-0.9414), and a maternal educational level lower than primary school (adjusted OR=10.1; 95% CI : 1.13-91.9) were associated with the nutritional status of children. This finding implies that although malnutrition is no longer considered to be a major health problem in Thailand, it remains a threat to the health of the urban poor in Bangkok. This finding should not be overlooked and countermeasures are indicated.

INTRODUCTION

In recent decades, most developing countries have experienced an unprecedented growth in their urban populations; Thailand is no exception. Owing to rapid economic growth during the past two decades, Bangkok has become very large city. A quarter of Bangkok's inhabitants now live in slums with poor housing conditions and deteriorating environment. Malnutrition is thought to be one of the main health problems that threaten these slum communities.

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The Thai Ministry of Public Health (MOPH) implemented growth monitoring activities in 1977 as a part of the National Food and Nutrition Policy. Thanks to these activities and some other interventions under the National Economic and Social Development Plans, Thailand dramatically reduced the prevalence of malnutrition: from 50.8% in 1982 to 8.37% in 1999 (MOPH, 1999). Previous studies in Bangkok slum areas have, however, pointed out big differences in the prevalence of malnutrition between metropolitan areas and slums. While the MOPH reported that the proportion of malnourished pre-school children (0-60 months old) in 1991 was 5.5% in the Bangkok metropolitan area (Division of Nutrition, 1998), the study by Devkota (1991) showed that malnutrition was 17% in a congested area of Bangkok. In addition, due to the severe economic crisis that Thailand has faced since 1997,

another 1 million people are living in poverty, of whom 54% are 'ultra-poor' (Tangcharoensathien *et al*, 2000). This might have affected the economic status of the people and furthermore the nutritional status of children, especially among the urban poor.

The latest data show that the prevalence of malnourished pre-school children is 5.25% in the Bangkok metropolitan area (MOPH, 1999). However, very few studies have attempted to investigate the nutritional status of children in Bangkok's slums. This study was conducted to examine the present nutritional status of children aged 1-5 years in the largest slum, Klong Toey. The study also aimed to identify the factors that were assoicated with malnutrition, in order to draw attention to the problem of malnutrition among the urban poor, and to inform potential solution.

MATERIALS AND METHODS

Study area and population

A cross-sectional study was conducted in March 2001 in 12 communities in the Klong Toey slum, Bangkok. A multistage sampling method was applied for data collection. From more than 1,500 slums under the Bangkok Metropolitan Administration (BMA), Klong Toey slum was selected because it is the biggest. Then, 12 of the 45 communities in Klong Toey slum were selected on the basis of their accessibility and safety.

The study population comprised children aged 1-5 years and their mothers. The required sample size based on calculation was 207. Considering the possibility of incomplete data, 232 pairs of children and mothers were studied. In the selection of the children, those who seemed to be of eligible age were selected randomly from each community because lists of the children in each community did not exist. In addition, only the children who were accompanied by their mothers at the time of data collection were selected: this was because some information was thought to be difficult to obtain from other caregivers. The number subjects for each community was deternined proportion to the estimated population of each community.

Data collection

The anthropometric measurements of children were made by the authors using a weighing machine with a minimum capacity of 500g and height scale with a 0.5 cm incremental scale. Weight-for-age, height-for-age, and weight-for-height were used as indicators of nutritional status. The degree of malnutrition was determined by the Gomez classification for weight-for-age (Gomez *et al*, 1958) and the Waterlow classification for height-for-age and weight-for-height (Waterlow, 1972). As the reference weight and height, the reference scale of Thai children (MOPH, 2000) was used. For the analyses of the relationships with potential related factors, only height-for-age was used because it is the indicator that is most widely used to assess long-term malnutrition. The study subjects were classified as 'Normal group' and 'Malnutrition group' according to the Waterlow's cut-off points (Waterlow, 1972) to examine the relationships with potential affecting factors.

Interviews with the mothers were guided by a structured questionnaire that was designed by the study team and were intended to obtain information about potential related factors. Interviews were conducted in Thai by Thais. As potential related factors, family characteristics (mother's age, marital status, educational background, family size, family income, and mother's occupation), children's characteristics (age, gender, birth order, immunization status, and history of illness), mothers' knowledge and perception on nutrition, and mothers' food practice were examined. Immunization status refers to the completeness of BCG, DPT, OPV, and measles vaccination. Only children who had had three doses of DPT and OPV were regarded as being completely vaccinated against these illnesses. History of illness refers to symptoms such as diarrhea, cough, fever, and measles within the month prior to the study. Only the symptoms that persisted for more than 7 days were considered as indicating illness.

Mothers' knowledge, perception and food practice were assessed using rating scales prepared by the authors and transformed into scores. A mother's knowledge of nutrition was determined by asking 15 questions about essential nutrients and malnutrition and its cause and prevention. A mother's perception of nutrition was elicited by asking 11 questions about the benefit of nutrition, the danger of malnutrition, susceptibility to malnutrition, and the cost of providing good nutrition. A mother's food practice was explored by asking 10 questions about kinds of food, methods of food preparation, the number of meals per day, and the time and regularity of meals. Total scores for each of these three variables were obtained by simple summation and then examined for any association with nutritional status.

Prior to the actual data collection, the questionnaire was tested in two other Klong Toey communities and revisions were made as necessary. Also, six interviewers were briefed beforehand by the research team in order to ensure that they clearly understood every item in the questionnaire.

Data processing and analysis

All data were analyzed using SPSS program for Windows (version 10.0.1). All potential related factors were analyzed using the Chi-squared test or Fisher's exact test or the Mann-Whitney U-test in order to identify relationships with the nutritional status of children. Only the variables found to have significant relationship with nutritional status in bivariate analysis were further analyzed by multiple logistic regression analysis (backward stepwise method) to examine the association after controlling for other potential related factors. For all of the statistical tests performed in this study, a significance level of 0.05 was adopted.

RESULTS

The socio-demographic characteristics of the families in this study are shown in Table 1. Mothers' age ranged from 18 to 53 years; the mean age was 29.8 years (SD=6.5). More than half of them (51.3%) belonged to the age group 20-29 years. Most of the respondents (89.7%) in this study were married and lived together with their husbands. While the majority (86.2%) of mothers had finished at least primary school, some of them (9.5%) were illiterate and 4.3% of them had not finished primary school. The average family size was 6 persons (range 2 to 30 persons per family). Family income varied considerably, from no income (n=3) to 50,000 baht/month (1 US$≈40 baht); the average was 8,228 baht/month (SD=6,800). More than one third of the families (39.5%) had an income of less than 5,000 baht/month. Nearly two thirds (63.4%) of the mothers were unemployed or housewives; the rest were employed in the private sector (19.8%) or engaged in trade (15.1%) etc.

The socio-demographic characteristics of the children are presented in Table 2. The target population in this study was children aged 1-5 years; the majority of the children were at the younger end of the target age range. Boys accounted for 48.3% of those studied; 51.7% were female. Most of the children (76.9%) were first or second offspring. Most (74.6%) had received four vaccines; one quarter of the children were incompletely vaccinated. Of the 59 children (25.4% of the total) who were incompletely vaccinated, 25 (10.8% of the total) had never received any immunization. Recent illness was relatively rare (0.9%-2.2%).

From the answers to the questions on mothers' food practice, it was found that 64.7% of the mothers sometimes fed their children instant food as a meal. In addition, 78.9% of them fed their children a snack between meals every day, and 74.1% of them sometimes gave their children high calorie-low protein food. About 70% of the mothers sometimes failed to provide their children one or two meals.

The nutritional status of children by weight-for-age, height-for-age, and weight-for-height are shown in Table 3. In terms of weight-for-age, the prevalence of malnutrition was 25.4%, and most of the cases (23.3%) were first-degree malnutrition. Five cases (2.2%) of second-degree

Table 1
Familial socio-demographic charateristics.

Socio-demographic characteristics		Number (N=232)	%
Mothers' age (years)			
< 20		6	2.6
20-29		119	51.3
30-39		90	38.8
≥ 40		17	7.3
Mean (SD) = 29.8 (6.5)	Min = 18	Max = 53	
Marital status			
Single		1	0.4
Married/Living together		208	89.7
Married/Separated		10	4.3
Widowed/Divorced		13	5.6
Mothers' educational level			
Illiterate		22	9.5
Did not finish primary school		10	4.3
Finished primary school (grade 4 or grade 6)		111	47.8
Secondary school		54	23.3
Higher than secondary school		35	15.1
Family size (persons)			
< 3		3	1.3
3-5		131	56.5
6-7		55	23.7
> 7		43	18.5
Mean (SD) = 6.0 (3.6)	Min = 2	Max = 30	
Family income (baht/month)[a]		(N=218)	
≤ 3,000		22	10.1
3,001-5,000		64	29.4
5,001-10,000		97	44.5
10,001-15,000		17	7.8
> 15,000		18	8.3
Mean (SD) = 8,227.5 (6,799.9)	Min = 0	Max=50,000	
Mothers' occupation			
Unemployed/Housewife		147	63.4
Government official		1	0.4
Clerk		1	0.4
Labor		2	0.9
Employed in private sector		46	19.8
Trade		35	15.1

[a]1 US$ = 40 baht.

malnutrition were found, while no third-degree malnutrition case was observed. With respect to height-for-age, the prevalence of malnutrition was 18.1%. Most of these cases (15.9%) were first-degree malnutrition; four cases (1.7%) were second-degree and one case (0.4%) was third-degree malnutrition. Regarding the weight-for-height, while 93.1% of the children were identified to be normal, one child (0.4%) was classified as having third-degree malnutrition.

Table 2
Children's socio-demographic characteristics.

Socio-demographic Characteristics		Number (N=232)	%
Children's Age (months)			
12-23		56	24.1
24-35		63	27.2
36-47		67	28.9
48-59		38	16.4
60-71		8	3.4
Mean (SD) = 35.5 (13.6)	Min = 12	Max = 67	
Gender			
Male		112	48.3
Female		120	51.7
Birth Order		(N=229)	
1		90	39.3
2		86	37.6
3		39	17.0
4		11	4.8
5		2	0.9
6		1	0.4
Completeness of Immunization*			
0/4		25	10.8
1/4		5	2.2
2/4		12	5.2
3/4		17	7.3
4/4		173	74.6
Illness history (within 4 weeks)			
Diarrhea		2	0.9
Cough		5	2.2
Fever		2	0.9
Measles		15	6.5
Others		7	3.0

[a]Number of vaccines received/Total number of vaccines studied (BCG, DPT, OPV, measles).

From the results of bivariate analysis, family income (Z = -3.140; p-value = 0.002), mothers' educational level (χ^2 = 6.782; p-value=0.034), mothers occupation (χ^2 = 8.811; p-value = 0.003), and mothers food practice (Z = -2.184, p-value = 0.029) were found to have a significant relationship with the nutritional status of children. Multiple logistic regression analysis was applied to these four variables using the backward stepwise method to examine the associations after controlling for other potentially related factors. The result of this analysis is shown in Table 4. From the result of this analysis, it was found that after controlling for other variables, family income (adjusted OR = 0.9998, 95% CI : 0.9997-1.0000; p-value = 0.014), mothers' educational level lower than primary school (adjusted OR=10.1; 95% CI : 1.13-91.9; p-value = 0.038), maternal unemployment or housewifery (adjusted OR = 6.5, 95% CI : 1.74-24.3; p-value = 0.005), and mothers' food practice (adjusted OR = 0.7123; 95% CI : 0.5390-0.9414, p-value = 0.017) remained significantly associated with the nutritional status of the children. The adjusted odds ratio for family income, which was 0.9998 (95% CI : 0.9997-1.0000), indicates that if the family income were to increase by 1,000 baht/month,

Table 3
Children's nutritional status.

Nutritional status of children	Number (N=232)	%
Weight-for-age (Gomez classification)		
Normal	173	74.6
First-degree malnutrition	54	23.3
Second-degree malnutrition	5	2.2
Third-degree malnutrition	0	0.0
Total of Malnutrition	59	25.4
Height-for-age (Waterlow classification)		
Normal	190	81.9
First-degree malnutrition	37	15.9
Second-degree malnutrition	4	1.7
Third-degree malnutrition	1	0.4
Total of Malnutrition	42	18.1
Weight-for-height (Waterlow classification)		
Normal	216	93.1
First-degree malnutrition	15	6.5
Second-degree malnutrition	0	0.0
Third-degree malnutrition	1	0.4
Total of Malnutrition	16	6.9

Table 4
Multiple logistic regression analysis for potential factors associated with malnutrition.

Factor	β	adjusted OR	95% CI	p-value
Family income	-0.0002	0.9998	0.9997-1.0000	0.014[a]
Mothers' educational level				0.097
Lower than primary school	2.3175	10.1499	1.1331-90.9194	0.038[a]
Finished primary school	1.3112	3.7108	0.4506-30.5579	0.223
Secondary school	1.3679	3.9269	0.4365-35.3289	0.222
Higher than secondary school		1.0000		
Mothers' occupation				0.009[a]
Unemployed/Housewife	1.8723	6.5033	1.7414-24.2874	0.005[a]
Trade	0.8404	2.3172	0.3953-13.5833	0.352
Employed		1.0000		
Food practice	-0.3392	0.7123	0.5390-0.9414	0.017[a]
Constant	-1.6725			0.242

-2 Log likelihood = 172.349
χ^2 for Goodness-of-fit test = 195.929; df = 7; p-value < 0.01
[a]Significant at p-value < 0.05

then the risk of malnutrition would be reduced by 18.1% [(1 - $e^{\beta \times 1,000}$) x 100 = 18.1]. As for mothers educational level, it was found that the children whose mothers had an educational level lower than primary school had a 10.1 (95% CI : 1.13-91.9; p-value = 0.038) times higher risk of malnutrition than the children of mothers with an educational level higher than secondary school. With respect to the mothers' occupation, it was found that the children whose

mother were unemployed or housewives had a 6.5 (95% CI : 1.74-24.3; p-value = 0.005) times higher risk of malnutrition than the children of employed mothers. In addition, food practice was found to have a significant association (p-value = 0.017) with the nutritional status of children, and its adjusted odds ratio, which was 0.7123 (95% CI : 0.5390-0.9414), indicates that each increase in the total score might lower the risk of malnutrition by 28.8%.

DISCUSSION

This study revealed that the nutritional status of children among the urban poor in Bangkok was much worse than both the latest national average and the Bangkok average. The prevalence of malnutrition by weight-for-age in the Bangkok metropolitan area and for Thailand in 1999 was reported to be 5.25% and 8.73% respectively (MOPH, 2000), whereas that of the study population was 25.4% (Table 3) – the same as the mid-1980s Thai national average. This implies that several Thai government initiatives, such as growth monitoring since 1977 (Viriyapanich *et al*, 1994) might not have fully covered slum children. This can be supported by the findings on immunization coverage among the study population. Those who had never received any immunization accounted for 10.8%, and only 74.6% had had all four immunizations (Table 2). This figure falls well below the national update: in 1997-1999, 94-98% of 1-year-old children in Thailand were completely immunized (BCG 98%; DPT 97%; OPV 97%; measles 94%) (UNICEF, 2001). Some children did not have a birth certificate: this implies that there are urban poor that cannot gain access to government primary health care services. This is an important matter that ought to be taken into consideration by the Thai government, not only for the prevention of malnutrition, but also to improve the health status of children.

As shown in Table 3, most of the malnutrition was first-degree; these cases appeared, at first glance, to be well. NGOs working in the Klong Toey slum and the BMA health center responsible for the area had therefore come to the view that malnutrition was no longer a serious problem. However, it has been reported that mild-to-moderate malnutrition increase the risk of mortality as well as severe malnutrition (Pelletier *et al*, 1993; 1995; Schroeder and Brown, 1994). It was also reported that 83% of malnutrition-related deaths were attributable to mild-to-moderate malnutrition as opposed to severe malnutrition (Schroeder and Brown, 1994). Therefore, the problem of malnutrition should not be overlooked and certain countermeasures should be taken to address it.

Comparing with the previous studies in Bangkok slums, there were big differences in the prevalence of malnutrition (weight-for-age) in this study. Devkota (1991) reported that the prevalence of malnutrition among under-five children in a congested area of Bangkok in 1991 was 17.0%. A survey conducted by the Duang Prateep Foundation in 2000, in which the study population was the children in a kindergarten in the Klong Toey slum, showed that the prevalence of malnutrition was 16.4% (unpublished data). On the other hand, the prevalence in this study was much lower than that reported by Ueda (1997), who found that the prevalence of malnutrition among 1-3 years old children of urban poor communities in Bangkok was 41.1%. In addition to the difference in the target population, the variety of reference scales used in each study can be a reason for discrepancies in results. In this study, the reference scale for Thai children (MOPH, 2000) was used in order to ensure that the data obtained was comparable with national data. On the other hand, in Devkota's report (1991), the Thai reference was used, while in the survey by the Duang Prateep Foundation, a growth chart distributed by the BMA was used. In the study by Ueda (1997), the international standard set by the US National Center for Health Statistics (NCHS) was used. Were the 1987 Thai reference to have been used in this study, instead of the 2000 reference, the prevalence of malnutrition would have been lower because the children in 1987 were shorter and thinner than in recent years. Also, if the NCHS standard was used as reference, the prevalence might be higher than

the results suggested because the weight and height values in this reference are higher than the reference data used in this study. However, it is equally plausible that the prevalence has become higher during these few years because Thailand has faced a severe economic crisis since 1997, which might have had some negative impacts on the economic and nutritional status of the general population and, especially the urban poor.

Regarding the types of malnutrition, in general low height-for-age is considered to reflect the long-term deceleration or cessation of growth, while weight-for-height indicates a short-term response to inadequate intakes; weight-for-age includes both long-term and short-term malnutrition (WHO, 2000). It can therefore be said that the malnutrition in the study population was mainly due to long-term nutritional deficiency; considering that the study population was urban poor, this conclusion seems reasonable. All the factors that were associated with the nutritional status of the children in this study (family income, mothers' educational level, mothers' occupation, and mothers' food practice), are factors that are related to economic status. Family income varied from zero to 50,000 baht/month; the average was 8,227.5 baht/month. According to the report on the household socio-economic survey by National Statistical Office of Thailand (2000), the average monthly income of a household in Thailand was 12,167 baht in 2000. Compared with this figure,the income of the majority of the families in the study area was much lower. Statistical analysis showed a significant association between family income and the nutritional status of children. Countermeasures to improve economic status, such as a relief program for the unemployed or income generation activities, are expected to be instituted.

It is well known that maternal education is directly related to child health, including children's nutritional status (Barrera, 1990; Reed *et al*, 1996). This study also showed that mothers whose educational level was lower than primary school had a 10.1 times higher risk of having malnourished children. Among the study population, even though Thailand has a compulsory education system, nearly 15% of the mothers had not finished primary school. This may be one of the common characteristics of the urban poor. Thai government needs to strengthen the compulsory education system to improve the child health among such population.

Lamontagne *et al* (1998) reported that the children of employed mothers had significantly better nutritional status than those of unemployed mothers; this research concluded that maternal income might be spent on a higher quality of food. This same study also showed that a child whose mother was not employed had a 6.5 times higher risk of malnutrition. In this study, however, because only the children whose mothers were available at the time of data collection were included in the study population, the majority of the mothers were unemployed or housewifes or trades. In fact, there were a lot of children whose mothers went to work and who were not available, even at the weekends. Some children were orphans; others were reared by their relatives or others. Were such children to have been included in the sample, a different result would have been obtained. To understand the actual situation in the study area, further research is required.

Although several studies have reported significant associations between mothers' knowledge of nutrition and malnutrition (Gans, 1983; Devkota, 1991; Saito *et al*, 1997), mothers' knowledge and perception were not related to the nutritional status of the children in this study; mothers' food practice did, however, have some effect on the nutritional status of the children. There might be some discrepancy between mothers' knowledge and perception and food practice. In other words, even though they had a high level of knowledge and perception of nutrition, they did not necessarily have desirable food practices. In fact, during the data collection, a lot of children were observed eating high calorie–low protein foods such as potato ships and chocholate, etc, between meals or sometimes at lunchtime. Also, it was found that a lot of mothers sometimes omitted one or two

of their children's meals every day. It seems reasonable to suggest that the teaching of proper food practices is urgently required and this may be the most feasible way of improving the nutritional status of children because addressing the other three factors identified in this study required firm government commitment. Health education about proper food practices can be given through community activities; NGOs and the BMA health center could play an important role for in such activities.

There were several limitations in this study. First, there were selection biases in the study sample because the Klong Toey slum and the communities were selected on the basis of feasibility and safety. Also, because of the nature of the area, there was no official list of the member of each community and, therefore, the random sampling of children was not possible. In addition, only the children who were with their mothers at the time of the interview were chosen. The results of this study may not reflect the real situation in the study area.

There were also several information biases. For the measurement of children's weight, the WHO recommends the use of a Salter spring balance with a scale in increments of 100 g; for the measurement of children's height (under 2 years of age), they recommend measuring recumbent length, while for children older than 2 years, a vertical measuring rod in increments of 0.1 cm is recommended (WHO, 1988). However, these instruments were not used because of the children's fear and limited space. Therefore, an ordinary weighing machine with the minimum scale of 500 g and a height scale made of paper with increments of 0.5 cm were used. The anthropometric data may not be accurate. However, when considering the prevalence of malnutrition, the possibility of under- and overestimation is the same. Thus, any inaccuracy in the data should have been offset and therefore would not have affected the results of this study.

Moreover, in this study, children's dates of birth were obtained by interview and, whenever possible, medical records, such as immunization records and maternal and child handbooks, were used to ensure the accuracy of data. However, in the study population, some children did not have birth certificates and had never had any healthcare from state sources. In these cases, maternal testimony was the only source of information. Some mothers could not remember their children's exact birthdates. As weight-for-age and height-for-age were calculated based on the children's age, the uncertainty on dates of birth may have distorted the results of this study.

This study revealed that more than a quarter of the children had signs of malnutrition. The prevalence was much higher than in both Thailand and the Bangkok metropolitan area. Although the majority of the cases were mild (first-degree) malnutrition, mild-to-moderate malnutrition may increase the risk of mortality as well as severe malnutrition. Therefore, malnutrition remains a life-threatening problem among the urban poor in Bangkok. Most of the cases were identified as long-term malnutrition; family income, mothers' occupation, mothers' educational level, and mothers' food practices were found to be associated with the nutritional status of the children. Specific countermeasures are needed.

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