Factors associated with food consumption patterns of inpatient children aged 3 - 5 years with diarrhea in hospitals in Khammuane province 2019

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Abstract

Introduction: Diarrhea is the most common childhood illness and causes hospitalization especially in low and middle income countries. It accounts for about 8% of all child deaths worldwide. However, these problems can be stopped by continuing to give nutrient rich foods during and after diarrhea. The objective of this study was to determine factors associated with food consumption patterns of inpatient children aged 3 - 5 years with diarrhea in hospitals in Khammuane province during 2019.

Methodology: A cross-sectional study was conducted with mothers or caregivers of 130 inpatient children aged 3 - 5 years presenting with diarrhea in hospitals in Khammuane province using a structured questionnaire.

Result: Our findings showed that 29.2% of children had inappropriate food consumption patterns. The factors associated significantly with inpatient children's food consumption patterns were the caregiver's age (AOR=0.3, 95% CI=0.1-0.9), the caregiver's knowledge (AOR=5.1,

95% CI=1.1-22.2) and the caregiver's perception (AOR=0.2, 95% CI=0.1-0.7). Language was the main barrier for the provision of good practices and meaningful consultations.

Conclusion: In order to improve inpatient children's food consumption it is recommended that guidelines for the well-being of sick children for medical staff, nutrition education programs for caregivers in hospitals and the community should be developed, and awareness of families and communities about the health benefits of a proper diet, especially during diarrhea also need to be raised.

Keywords: Factors/ Food Consumption Pattern/ Inpatient Children/ Diarrhea/ Hospital/ Khammuane Province

Background

Food consumption pattern (FCP) diversity has been associated with an improved nutritional status for children [1]. Nutrition impacts the mental and physical development of children. An appropriate dietary intake benefits the national economy directly by reducing public expenses in health care and indirectly through the improvement of the community's health [2]. Healthy foods help to prevent malnutrition in all forms [3].

Malnutrition affects cognitive function and contributes to poverty by hindering the ability of the child to pursue a productive life [4]. Furthermore, it is estimated globally that more than one-third of deaths under five years are due to malnutrition [5]. Malnutrition accounts for 54% of mortality cases in children aged under five years in developing countries [6]. Consequent annual economic losses related to malnutrition in the Lao PDR in 2013 were nearly US$ 200 million constituting 2.4 % of Gross Domestic Product (GDP) [7]. Undernourished children are more likely to die from common childhood ailments such as pneumonia and diarrhea, and for those who survive have recurring sicknesses and faltering growth.

Acute diarrhea is the most common childhood illness and causes hospitalization in low and middle-income countries; diarrhea as a disease continues to be a major cause of avoidable death, and accounts for about 8% of all child deaths worldwide [5, 8]. Meanwhile, it accounts for approximately 11% of all child deaths associated with diarrhea in the Lao PDR [9]. During the period of getting diarrhea, children suffer from a reduced food intake, decreased nutrient absorption, and increased nutrient requirements that cause weight loss and a failure to grow normally. However, these conditions can be stopped by continuing to give nutrient rich foods during and after diarrhea. When these steps are followed, malnutrition can be prevented and the risk of death from a future episode of diarrhea is much reduced [10, 11].

In Khammuane province, child feeding practices while suffering diarrhea showed a low percentage of children were given more to drink and eat, nearly 40% and only 34% respectively. Four percent of all children under five got diarrhea in 2017 [12]. In addition, there are some influential factors affecting food consumption among children with diarrhea in Khammuane province such as maternal knowledge and family finances [13].

Dietary diversity has been correlated with an improved nutritional status of children [14] Food intakes that do not provide enough calories, protein for growth and maintenance, and essential nutrients will result in undernourished individuals. The ability of children to fully process food consumed is also a component of undernourishment as individuals with reoccurring infectious diseases may be unable to absorb and use nutrients from consumed food [15]. This becomes a worsening factor for severe conditions and malnutrition because children are at a critical point of growth where they require adequate nutrients to get healthy and meet their growth demands. Therefore this study seeks to describe factors associated with the FCPs of inpatient children aged 3 - 5 years with diarrheal disease in three hospitals.

Methods

Study design and site

This was a quantitative cross-sectional descriptive study. The subjects included all caregivers' children aged 3 - 5 years who admitted in one of three hospitals (Provincial Hospital, Gnommalath District Hospital, and Mahaxay District Hospital) with diarrheal disease during the two months study periods (17/01/2019 to 17/03/2019) in Khammuane province.

Sample size

This study chose a sample of 130 children aged 3 - 5 years old who were admitted with diarrheal diseases.

Sampling method

All children aged 3 - 5 years old admitted in the three hospitals who were diagnosed with diarrheal episodes, and recorded as inpatients for at least one day (24 hours) during the study period met the criteria for selection in the study sample.

Measurement of the FCPs

Children's feeding routines was combined into the assessment of the children who received appropriate feeding, using the "minimum diet diversity" indicators to determine whether they had a minimum acceptable diet during the previous day.

The questionnaires asked about the food groups that inpatient children ate in the last 24 hours. There were 13 questions in this section asking about foods that came under the seven food groups to assess whether the inpatient children got appropriate food consumption levels or not. The informants answered using three choices namely: "Yes = ate, "No" = did not eat, DK= don't know/not sure. A child who consumed at least five or more of the seven groups was classified as having good nourishment [13, 16].

Measurement of caregivers' knowledge

Questionnaires were used to find the knowledge of caregivers about food consumption patterns and the nutrition of children aged 3 - 5 years with diarrhea. The questionnaire consisted of 12 items in total with two choices for each answer. They were scored by using "True" = 1 Point, and "False" = 0 Points for positive questions in items 1, 2, 3, 4, 5, 6, 7, 8 and 9. For negative questions points were in items 10, 11, and 12 with answers scored as: "True" = 0 point, "False" = 1 point. The criterion for the knowledge level was made, depending on the percentage gained from the knowledge score. This was based on the percentage of the knowledge score and classified into three groups following Bloom's criteria: Good knowledge ≥ 80 % or ≥ 10 of the total score; Fair knowledge 60-79 % or 7-9 of the total score; Poor knowledge < 60% or < 7 of the total score [17].

The knowledge level of caregivers was a combination of low and fair knowledge due to the values being small and it was difficult to assess the relationship based on statistics association. Thus there were two levels when determining the caregiver's knowledge: low and good.

Data analysis methods

Data was coded and entered into the Epidata 3.1 software. Before transferring the data for further analysis it was rechecked. This involved scanning for errors and missing values. Then coding, scoring and recoding were carried out. The next step involved analyzing it using the Stata/MP application version 14.2 for Windows 10. Descriptive statistics were used to describe the demographic characteristics of the study participants. In addition, simple binary logistic regression analysis was used to describe the association between independent variables. Binary logistic regression was performed to calculate the crude odds ratio (OR) with a corresponding 95% confidence interval; The variables in the bivariate analysis that were found with a significant

association by a p-value < 0.05 were entered into a multivariate logistic regression analysis which was taken of significant predictors. Crude and adjusted odds ratios with their 95% confidence intervals were calculated and presented in texts and tables.

Ethical approval

Ethical approval was given by the Ethical Committee for Health Research of the UHS (Reference Number 106/19 dated 07/02/2019) and the Hanoi University of Public Health (Reference Number 472/2018/YTCC-HD3). Consent of the children's caregivers was obtained after explaining the design, objectives and benefits of the study. The participants responded clearly that their involvement in the study was well informed and voluntary. According to the guidelines for the protection of the confidentiality of participants, the names of respondents were not included in the answers, and all information collected from the respondents was kept strictly confidential. The participants were assured anonymity and privacy, and they had the right to end their involvement in the research at any time if they felt uncomfortable.

Results

Socio-demographic characteristics of caregivers

There were 130 subjects in total, with the majority of relationships being mother- child in orientation. However, a few of the caregivers were not the biological parents. The majority of caregivers were aged under 30 years. There was more than double the amount of females when compared with males. Another point is that the vast majority of caregivers were from Lao-Tai speaking ethnic groups. In addition, there was an overwhelming majority of caregivers who were Buddhist. There was a diverse proportion of education levels among caregivers with a sizeable group remaining illiterate. The breakdown of occupations among caregivers was relatively even between government clerks, primary producers and those engaged in commerce. Traditional occupations, namely farming and housekeeping, were the mean. There was an even distribution

for family income, as half of the respondents had less than or equal to 1,550,000 kip/month and vice versa.

Table 1: Socio-demographic characteristic of caregivers (n=130)

Characteristics of caregivers	Number	Percentage (%)
Relationship with child		
Father	36	27.7
Mother	72	55.4
Other	22	16.9
Age		
17-28 years	76	58.4
29-62 years	54	41.5
Mean=29, Median=28, SD=9.3, Min=17, Max=62		
Sex		
Female	91	70.0
Male	39	30.0
Ethnicity		
Lao	108	83.0
Hmong or Yao	22	16.9
Religion		
Buddhist	93	71.5
Christian	19	14.6
Animist	18	13.8
Education		
No Schooling	21	16.1
Primary - High School	40	30.8
Vocational Certificate- Bachelor of Arts	69	53.1
Occupation		
Government Official	43	33.0
Housewife or Farmer	56	43.0
Self-Employed and Private Sector	31	23.8
Family Income (kip/month)		
≤ 1,550,000	65	50.0
≥ 1,551,000	65	50.0
Mean=1,757,308, Median=1,550,000, SD=1,221,578, Min=300,000, Max=10,000,000		

Socio-demographic characteristics of children

More than half of the children were aged 3 years. In the sample there were one and a half times more females than males. For the birthplace, the vast majority of these children were born at a hospital or a health centre. At the same time, most children were delivered by a medical

professional. Less than 10% were born at home without qualified medical assistance. Of these children a large majority achieved a healthy birth weight of more than 2.5 kilograms. Under a quarter of the children surveyed were born prematurely. A clear majority of mothers had natural birthing. Finally, the study noted that most caregivers insured that their children received a full series of vaccinations.

Table 2: Number and percentage for general characteristics of children (n=130)

Characteristics of children	Number	Percentage (%)
Age		
3 years	78	60
4 years	34	26.1
5 years	18	13.9
Sex		
Female	80	61.5
Male	50	38.4
Birthplace		
Health facility	116	89.2
Other places	14	10.7
Birth Weight		
≤ 2490 g	25	19.2
≥ 2500 g	105	82.8
Mean=2731, Median=2725, SD=344, Min=2000, Max=3800		
Birth Attendant		
Doctor	73	56.1
Midwife	34	26.1
Nurse	11	8.4
Specify other	12	9.2
Infant Term		
Full term	99	76.1
Pre-term	31	23.8
Birth Condition		
Natural birth	109	83.8
Caesarean	21	16.1
Immunization Status		
Complete	103	79.2
Some	27	20.7

Caregivers' knowledge of the FCPs of inpatient children with diarrhea

The level of caregivers' knowledge of the FCPs of children with diarrhea was calculated by way of detailing 130 caregivers shown in Table 3. The mean knowledge score was 10.7± 1.7

and the knowledge level was categorized into two groups. Nearly all caregivers had a good level of knowledge about the FCPs of children with diarrhea.

Table 3: The level of knowledge for caregivers' knowledge of the FCPs of children with diarrhea (n=130)

Caregivers' knowledge level	Number	Percentage (%)
Poor & moderate knowledge	10	7.7
Good knowledge	120	92.3
Mean ± SD=10.7± 1.7, Median=11, Min=4, Max=12		

FCPs of inpatient children aged 3 – 5 years with diarrhea

In response to the questions measuring inpatient children's FCPs while suffering diarrhea in Table 4, it showed that the mean distribution for the use of food groups was 5.09 ± 1.05 groups. A poor level of FCPs was recorded for nearly one third of inpatient children, while most of the others had a good level for FCPs. An important finding was that more than three quarters of female inpatient children had appropriate FCPs levels, while barely two thirds of males had the suitable level.

Table 4: Number and percentage of FCPs for inpatient children with diarrhea

Food consumption patterns	Female (n=80)		Male (n=50)		Total (n=130)	
	Number	Percentage (%)	Number	Percentage (%)	Number	Percentage (%)
Appropriate food consumption						
< 5 group food	18	22.5	20	40.0	38	29.2
≥ 5 group food	62	77.5	30	60.0	92	70.7
Median=5, Mean=5.09, SD=1.05, Min=2, Max=7						

Factors associated with the FCPs of inpatient children with diarrhea

An effort to identify the best model for children's appropriate FCPs was presented in Table 5. The independent variables had to be correlated significantly with the dependent variables, with a p-value of <0.05. A backward stepwise was performed to determine the association between factors and children's appropriate food consumption. Some independent variables which the made models unreliable were excluded and the results were presented by adjusting the odds ratio (AOR) with a corresponding confidence level of 95%. The multivariate logistic regression model showed that the caregivers' age, knowledge, and perceived barriers had a statistically significant association with the children's appropriate food consumption.

Table 5: Bivariate and multivariate logistic regression analysis of the factors associated with the FCPs of inpatient children aged 3 - 5 years with diarrhea in Khammuane province in 2019.

Variables	Appropriate Food Consumption		P-value
	COR (95% CI)	AOR (95% CI)	
Caregiver's age			
≤ 28 years	1	1	
≥ 29 years	0.4(0.1-1.0)	0.4 (0.1-0.9)	0.03**
Sex of children			
Female	1	1	
Male	0.4(0.1-1.0)	0.8 (0.3-2.1)	0.7*
Caregiver's knowledge			
Low	1	1	
Good	4.1(0.8-20.9)	6.2 (1.4-26.8)	0.01**
Perceived barriers			
Low	1	1	
Good	0.3(0.1-0.8)	0.3 (0.1-0.7)	0.01**

Discussion

The caregivers' age was significantly associated with children's appropriate FCPs in the Pearson's chi-square test (p-value<0.05). A child whose caregiver's age was between 29 and 62 years was less likely to give appropriate FCPs for children with diarrhea than younger caregivers. In contrast, there was a previous study in Khammuane province which revealed there was no

significant association between the age of caregivers and children's FCPs [18]. In a previous study by Thonethong in 2016, who did research in Bolikhamxay province, it showed that there was no significant association because it produced a p-value > 0.05 [19]. In addition, Souksavath did research on children's nutritional status in Saravan province in 2012 and found there was no significant association either [20].

According to the situation in the three hospitals, caregivers aged 17-28 years made up more than half of the sample group compared to caregivers aged 29 - 62 years. Nearly three quarters of caregivers were women. A child whose caregiver's age was 29 - 62 years was moderately concerned with FCPs because this group was occupied with more obligations. Hence they frequently paid less attention to their children and their responsibility for their children's health. Another impeding factor for caregivers was geography since location restricted their choices for healthcare practices.

In this study it was found that there was a significantly strong association between the caregivers' knowledge and the children's FCPs with a p-value of 0.02. The proportion of caregivers who had a good knowledge of nutrition was more than 9:1 when compared to those with a poor knowledge. The caregivers who had a good knowledge knew how to feed their children food with appropriate nutrient content and they were able to select suitable foods for their children. The results of this study were similar to the research of Oduor and colleagues who focused on caregivers' nutritional knowledge and found that there was a significant association between caregivers' nutritional knowledge and children's FCPs [21]. Zeng's team which researched the relationship between caregivers' nutritional knowledge and children's FCPs in China found that the caregivers' knowledge was strongly associated with children's FCPs [22]. Another study in Ghana found that caregivers' nutritional knowledge was significantly associated with the dietary diversity of a child's intake [23].

The present study found that there was a significantly strong association between the caregivers' perceived barriers and the children's appropriate FCPs (p-value=0.007). This study's results were in agreement with Heitzinger and colleagues, who studied caregivers' perceptions of children's nutritional status in Magallanes, Chile. Their study showed that there were a significant association between the caregivers' perception and the children's FCPs (p-value<0.05) [24]. Another study by Briefel and Reidy found that the proportion of children with a very healthy diet was significantly associated with caregivers' perceptions [25]. Furthermore the study by Almoosawi and colleagues showed there was a significant association between caregivers' perceptions and children's FCPs [26]. In addition, Daniel's team in South Sudan revealed that there was a significant association with caregivers' perceptions and the FCPs of children [27]. Therefore, it can be noted the way and amount caregivers perceive barriers is important to their decision making about what is suitable for children's health, even though there are many suggestions given by nutritionists and other medical professionals about health and well-being..

Conclusions

Nearly one-third of inpatient children in Khammuane were poorly nourished while suffering diarrhea in the hospitals surveyed in this study. Some affecting factors were the age of caregivers, and the caregivers' knowledge and perceptions in connection with FCPs of inpatient children with diarrhea.

It is recommended that in order to improve inpatient children's food consumption, guidelines regarding the food consumption of healthy and sick children be developed for medical staff, nutrition education programs for caregivers in hospitals and the community. In addition, the awareness of families and communities about the health benefits of a proper diet, especially during diarrheal outbreaks, needs to be raised.

List of abbreviations

FCPs	Food Consumption Patterns
MOH	Ministry of Health
ORS	Oral Rehydration Salts
UN	United Nations
UNICEF	United Nations Children's Fund
WB	World Bank
WHO	World Health Organization

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