

Relationship between Feeding Practices and Weanling Diarrhoea in Northeast Thailand

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ABSTRACT

Diarrhoea is a major public health problem in Thailand. During November 1998-January 1999, a cross-sectional survey and a nested qualitative study were conducted to understand the relationship between feeding practices and weanling diarrhoea, and to describe the related local beliefs and practices in a subdistrict of northeast Thailand. A cluster-sampling method was used for selecting 156 weanlings aged 3-24 months. A structured interview was conducted with the main caregivers of these weanlings. The questionnaire used for the interview included items about feeding practices and diarrhoea-history of the weanlings in 2 months prior to the interview. Seven focus-group discussions with an opportunistic sample of the caregivers were held in the villages. A series of vignettes and unstructured questions were used for eliciting the local beliefs about weanling diarrhoea and its causes. Thirty-six (23%) of the 156 weanlings had diarrhoea in 2 months prior to the interview. The factors that were significantly related to reported weanling diarrhoea included consumption of unboiled water by weanlings (OR=10, $p=0.03$), not covering perishable foods (OR=3, $p=0.02$), and washing feeding utensils of weanlings without dishwashing detergent (OR=3.1, $p=0.02$). 'Su' and 'tongsia'-two common local terms-were used for describing different types of weanling diarrhoea. Many caregivers considered 'su' a natural occurrence in a child's development. The results suggest that some poor feeding practices may contribute to the higher risk of weanling diarrhoea in northeast Thailand. Some local beliefs about weanling diarrhoea may mask the true causes, and mislead messages about its prevention.

Key words: Diarrhoea, Infantile; Weaning; Infant-feeding practices; Food contamination; Water pollution; Caregivers

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INTRODUCTION

Diarrhoea is a major cause of illness and death among children in developing countries. It is estimated that, globally, 1.3 billion episodes of diarrhoea and 4 million diarrhoea-attributable deaths occur each year in children aged less than 5 years, and these children experience an average of 3.3 episodes of diarrhoea annually (1). In some parts of the world, this average figure can exceed

9 episodes per child per year (1), which can have a significant effect on the nutritional status of children.

In Thailand, despite the nationwide introduction of the Control of Diarrhoeal Disease (CDD) Programme in 1981, diarrhoea is still the sixth major cause of death among all age groups (2). Although mortality due to diarrhoea has decreased over recent years, its morbidity has increased from 750 cases per 100,000 population in 1984 to 1,500 cases per 100,000 population in 1994 (2). About 40% of all diarrhoea cases are children aged less than 5 years, and these children suffer from an average of 2 episodes of diarrhoea per child per year (2). It is an underestimated figure, since it is based only on reported cases of diarrhoea (3). Childhood diarrhoea is often unrecognized in Thailand; it is considered a natural occurrence in a child's development, and is, therefore, not reported to health authorities (3).

Diarrhoea is commonly caused by consumption of contaminated food and water. Food and water-borne pathogens are responsible for about 70% of diarrhoea episodes (4). Over the last 10 years, the importance of food safety in health and development has been highlighted. In 1992, the FAO/WHO International Conference on Nutrition (ICN) pointed out that hundreds of millions of people suffer from communicable diseases caused by contaminated food and drinking water and that access to safe, nutritionally adequate food is a fundamental human right (4).

Weaning foods and fluids can transmit diarrhoea-causing pathogens. The weaning period is generally the time when infants are first exposed to these organisms. The incidence of diarrhoea increases after the onset of weaning (5). Weanlings are, thus, at high risk of diarrhoea.

Since most diarrhoea cases are attributable to contamination of food and water, the study investigated the association between feeding practices and weanling diarrhoea. The aim of the qualitative component of the study was to elicit the local beliefs in relation to causes and treatment of diarrhoea. The study highlighted appropriate areas for targeting public health interventions aimed at decreasing the risk of weanling diarrhoea in the northeast region of Thailand to promote child health.

METHODS AND MATERIALS

The study was conducted during November 1998-January 1999 in Pra Yun subdistrict of Khon Kaen

Province, located in the northeast region of Thailand. This region is the poorest, least-developed area of the country. Pra Yun district has a population of approximately 30,000, one-third of whom live in Pra Yun subdistrict. There are about 550 children aged less than 2 years in this subdistrict (6).

In 1997, about 1,500 per 100,000 people in Khon Kaen Province suffered from diarrhoea (6). During January-October 1997, Pra Yun subdistrict had the highest reported prevalence of diarrhoea in Khon Kaen Province. Children living in this subdistrict had an average of 0.2 episodes of diarrhoea per child per year (6).

Quantitative and qualitative techniques were combined to investigate the problem of diarrhoea in weanlings in Pra Yun subdistrict with a focus on food-handling practices. A cross-sectional survey was administered to caregivers. Following the survey, the caregivers were invited to participate in a focus-group discussion with other caregivers in the same village.

Pra Yun subdistrict has 15 villages. Eleven villages were randomly selected using a cluster-sampling approach. The village health workers supplied a list of all children aged 3-24 months in each village. All weanlings (have begun to be weaned but not yet fully weaned by the date of investigation) from the list were selected. The caregivers of each weanling were interviewed in their homes with the help of trained interpreters. A total of 156 caregivers were available for structured interviews. They were interviewed to know about the feeding practices and diarrhoea-history of weanlings 2 months prior to the date of the interview. To minimize interviewer bias, the diarrhoea-history of weanlings was asked at the end of each interview. A diarrhoea episode was defined according to local taxonomy ('Tongsia' or 'Su') and by referring to the WHO definition (3 or more loose stools per day). If a caregiver reported that the child had an episode of diarrhoea by local terms, and had passed less than 3 loose stools per day for that episode, such an episode was excluded as a diarrhoea episode. During the interview, general household hygiene, such as presence of wastewater, presence of animals, and dirty hands of the caregivers, was also observed and recorded.

Following the structured interviews, 7 focus-group discussions with the caregivers of weanlings were conducted to elicit the local beliefs about the definition of weanling diarrhoea and its causes. The participants

for the focus groups were sampled opportunistically from among the caregivers who took part in the structured interview. A total of 51 caregivers (39 mothers, 11 grandmothers, and one aunt) participated in the focus-group discussions. To stimulate discussions and avoid some sensitive personal questions, 4 vignettes concerning weanling diarrhoea and feeding practices were read to the participants during the focus-group discussions. Different vignettes dealt with different situations associated with weanling diarrhoea. The topics of the vignettes included: spicy food, unboiled water, food storage, and household animals. The vignettes formed the basis of discussions. Three researchers participated in the focus-group discussions. One acted as the moderator, and the other 2 took notes on the responses and reactions of the participants during each session. An interpreter accompanying each researcher translated the questions of the interviewers and the responses of the caregivers during each session.

The Epi Info (Version 6.04) software was used for analyzing the quantitative data collected through the structured interviews. The weanlings with diarrhoea and the weanlings without diarrhoea were compared regarding their feeding practices, demographic characteristics, and general hygiene. The qualitative data, collected from the focus-group discussions, were analyzed using content and thematic analyses.

RESULTS

Demographic characteristics

The mean ages of the male and female weanlings were 14.9 months (SD=6.1, n=76) and 13.0 months (SD=5.9, n=80) respectively. The majority (68.6%) of the weanlings were cared for by their mothers, 26.3% by their grandmothers, and 5.1% by other caregivers. The mean age of the caregivers was 34 years (SD=12.9, age range: 16-76 years). The mean year of education of the caregivers was 5.7 years (SD=2.7).

Beliefs of caregivers about weanling diarrhoea and its causes

'Su' and 'tongsia' were the two most common local terms used by the caregivers for describing weanling diarrhoea. 'Su' is believed to be a physiological process that each child must experience during his/her early development. The caregivers reported that a child with 'su' simply has an increased amount and frequency (3-4 stools per day) of stool. The stools of 'su' do not smell,

and a child with 'su' is still active. 'Tongsia' is believed to be a pathological condition. Unlike a child with 'su', a child with 'tongsia' looks as if they are in pain and cries. The caregivers reported that the stools of 'tongsia' have a strong smell, and a child with 'tongsia' usually requires medical attention.

Most caregivers acknowledged that poor hygiene, such as flies on food-preparation surfaces, dirty feeding bottles, and dirty hands, could cause diarrhoea, especially 'tongsia.' Many caregivers also believed that 'hot' breastmilk could sometimes cause weanling diarrhoea. They defined 'hot milk' as the breastmilk of a lactating mother who returns from working in the field and breastfeeds her baby immediately without taking time to allow her breastmilk to 'cool.' If a child is fed such breastmilk, the child is believed to be more likely to suffer from diarrhoea. Another belief is that if a lactating mother has eaten too much 'hot and spicy' food, such as papaya salad (usually prepared with chilli) before she feeds her baby, these 'hot and spicy' properties can be transmitted to the child through her breastmilk, causing diarrhoea in the child.

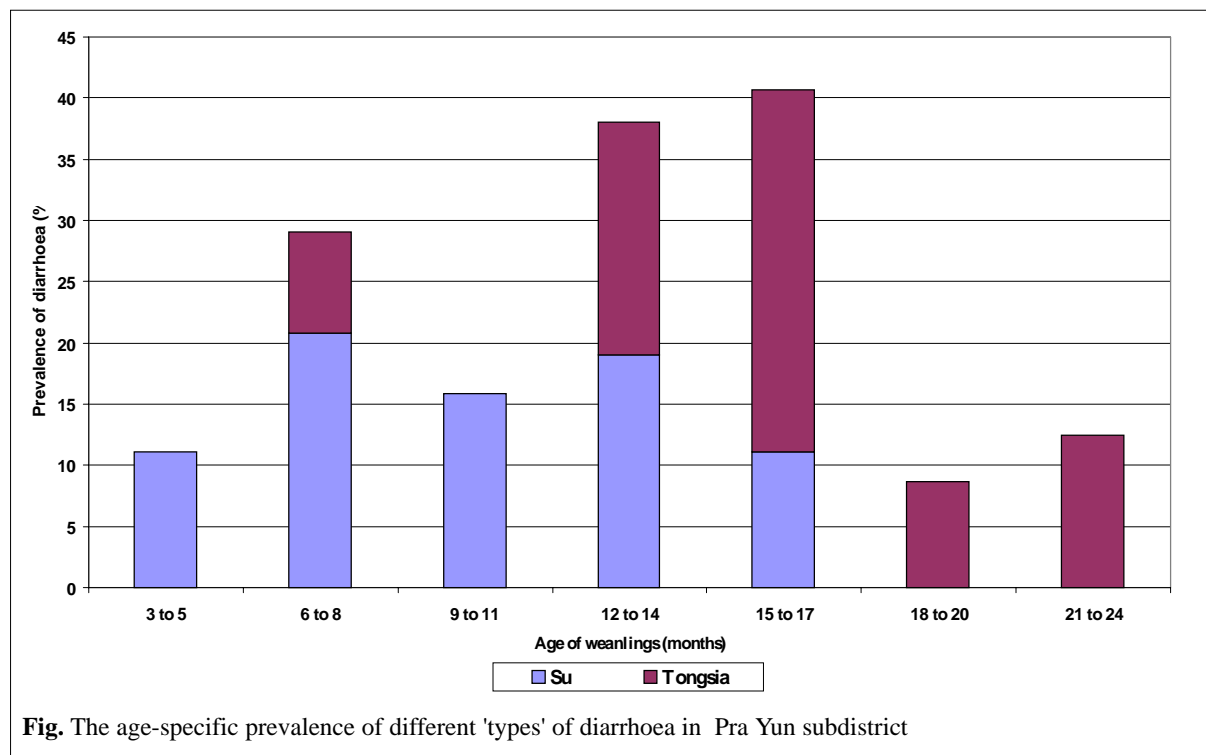
Weanling diarrhoea

Thirty-six of the 156 weanlings investigated had suffered from diarrhoea in 2 months prior to the investigation. Four of them experienced 2 episodes of diarrhoea. The total number of episodes of diarrhoea among them was 40, of which 20 were defined as 'su' and 20 as 'tongsia' by their caregivers. The incidence of weanling diarrhoea in this study was 1.5 episodes per child per year. For this study, if a child experienced 2 episodes of diarrhoea during the 2-month recall period and at least one episode was 'tongsia,' the child was classified as a 'tongsia' case. Of the 36 diarrhoea cases, 17 were classified as 'su' cases and 19 as 'tongsia' cases.

The figure illustrates the prevalence of different 'types' of weanling diarrhoea by age of the weanlings. 'Su' cases were mainly reported in the younger groups (<12 months) and 'tongsia' mainly in the older groups (12 months). The prevalence of total diarrhoea episodes was highest in the 15-17-month age group of children (41%) in this sample.

Feeding practices and their relationship with weanling diarrhoea

This paper includes only those factors that were directly related to feeding practices of the weanlings. The feeding



factors, investigated in structured interviews, included weaning age, source, storage and covering of weaning food, feeding 'Kaw Yam,' washing of feeding utensils, and consumption of unboiled water. Some of these feeding practices were also discussed in the focus-group sessions or observed during the investigation. The following results combine the focus group, observation and structured interview information:

Consumption of unboiled water: All the households investigated in this study used rainwater as their main source of drinking water. During the rainy season, the rainwater falling on to the roof of a house was collected using a gutter to a big cement tank as recommended by the government. The local people usually took the water for drinking directly from the tank without boiling. In the focus-group discussions, most caregivers believed that unboiled water could be a potential cause of weanling diarrhoea. Many of them also believed that it was safe to give a child unboiled water after one year of age. The results of the structured interviews showed that the proportion of weanlings who drank unboiled water increased with the age of weanlings (Table 1). Therefore, the relationship between drinking unboiled water and

weanling diarrhoea was analyzed by stratifying for age. After stratification, the consumption of unboiled water increased the risk of weanling diarrhoea among the children aged 12-14 months (OR=10.0, 95% CI=0.94-135.69, Fisher exact 2-tailed $p=0.03$). In most other age groups, the odds ratios tended to be greater than one but without statistical significance (Table 1).

Covering of weanling food: Covering of perishable weanling food during its storage can reduce the possibility of contamination from flies and other vermins and cross-contamination with other foods. In the households, some caregivers (13%) reported that perishable food was not covered during its storage. The weanlings, who lived in such households, were more likely to have had an episode of diarrhoea than those who lived in households where perishable food was usually covered (Table 2, OR=3.34, 95% CI=1.09-9.85, Fisher exact 2-tailed $p=0.02$).

Cleaning of feeding utensils: In most households, the feeding utensils were washed with dishwashing detergent or to be sterilized. Some caregivers (13.6%) reported that the feeding utensils were just rinsed, and no

Table 1. Relationship between drinking unboiled water and age of weanling and its association with diarrhoea in Pra Yun subdistrict

Age group (months)*	Drinking water						Odds ratio for diarrhoea (95% confidence interval)
	Boiled			Unboiled			
	Total no. of weanlings	Diarrhoea cases No.	%	Total no. of weanlings	Diarrhoea cases No.	%	
3–5	0	0	0	18	2	11.1	
6–8	3	1	33.3	21	6	28.6	1.25 (0.00-25.00)
9–11	6	1	16.7	13	2	15.4	1.10 (0.00-24.00)
12–14	9	6	66.7	12	2	16.7	10.00 (0.94-135.69)**
15–17	19	8	42.1	8	3	37.5	1.21 (0.17-9.24)
18–20	13	1	7.7	10	1	10.0	0.75 (0.02-33.13)
21–24	16	2	12.5	8	1	12.5	1.00 (0.05-34.16)
Total	66	19	28.8	90	17	18.9	1.74 (0.76-3.96)
* Age groupings were defined in 3-month ranges, because, during 3-24 months, the feeding patterns change dramatically, and the digestive and immune systems mature rapidly and also change quickly							
** The Fisher exact 2-tailed p value=0.03							

dishwashing detergent was used. Table 2 shows that washing feeding utensils without dishwashing detergent increased the risk of weanling diarrhoea (OR=2.94, 95% CI=0.98–8.48, Fisher exact 2-tailed p=0.047).

Feeding ‘Kaw Yam’: ‘Kaw Yam’, meaning rice and chew respectively, is a traditional weaning practice in northeast Thailand. Its literal translation is chewed rice. During the structured interviews, 30.3% of the caregivers reported that they fed ‘Kaw Yam’ to the weanlings. During the focus-group sessions, it appeared that the caregivers had different conceptions of ‘Kaw Yam’ (traditional meaning and modern meaning). In this region, the traditional ‘Kaw Yam’ means sticky rice, which is pre-chewed by an adult, wrapped with banana

leaves, and re-cooked before being fed to a weanling. Many caregivers interpreted ‘Kaw Yam’ (modern meaning) to be any food that is pre-chewed by an adult and is then given to a weanling directly or after being re-cooked. Observation of the feeding practices showed that most weanlings were being fed food that had been pre-chewed by an adult, although only about one-third had actually reported feeding ‘Kaw Yam’. Common foods for the latter (modern) kind of ‘Kaw Yam’ include meat and fish that are considered to be too ‘hard’ for a weanling to chew by himself. Thirty-two percent of the weanlings had diarrhoea who were fed ‘Kaw Yam’, whereas 19.4% had diarrhoea who were not fed ‘Kaw Yam’ (Table 2, OR=1.94, 95% CI=0.83–4.56, chi-square test p=0.09).

Table 2. Relationship between some feeding practices and weanling diarrhoea in Pra Yun subdistrict

	Covering perishable food				Cleaning weanling's feeding utensils				Feeding ‘Kaw Yam’			
	No		Yes		Without detergent		With detergent		Yes		No	
	No. (n=20)	%	No. (n=132)	%	No. (n=21)	%	No. (n=133)	%	No. (n=47)	%	No. (n=108)	%
Diarrhoea	9	45.0	26	19.7	9	42.9	27	20.3	15	31.9	21	19.4
Non-diarrhoea	11	55.0	106	80.3	12	57.1	106	79.7	32	68.1	87	80.6
Odds ratio (95% CI)	3.34 (1.09-9.85)				2.94 (0.98–8.48)				1.94 (0.83–4.56)			
p value	0.02*				0.047*				0.09**			

*Fisher exact 2-tailed p value; ** χ^2 test, uncorrected p value; CI=Confidence interval

Other feeding practices: Most (92.3%) households purchased weaning food either from the village shops or from the food hawkers. Only 7.7% prepared weaning food from home-grown produce. No statistical relationship was found between the source of foods and weanling diarrhoea in this study (chi-square test $p=0.89$). Most caregivers (73%) reported that their perishable food was kept in a refrigerator. The prevalence of weanling diarrhoea among these households was 25.5%, whereas it was 17.1% among those households where perishable food was stored at room temperature, but the difference was not statistically significant (chi-square test $p=0.28$).

DISCUSSION

In this study, the weanlings of Pra Yun subdistrict experienced, on an average, 0.128 episodes of diarrhoea per child per month or 1.54 episodes per child per year. This figure is 7 times higher than the official report (0.2 episodes per child per year). This difference may be due to the fact that the official report included only those diarrhoea cases who received medical attention. Even in our study, the true incidence of diarrhoea may still be under-estimated, since our figure was based on the caregivers' recall of the past 2 months that might ignore some mild or short-duration episodes. According to local taxonomy, many diarrhoea cases (such as 'su') are considered a natural process of a child's normal development. These cases are less likely to seek medical attention, and are, therefore, less likely to be recorded in health statistics. In Thailand, Pradhipasen *et al.* also demonstrated the same under-reporting of childhood diarrhoea in health statistics (3). The results of our study showed that the 'su' cases were mainly reported among children aged less than 18 months. The lack of recognition of diarrhoea in so young children is specially important because of the potential development of malnutrition and dehydration (7).

In our study, most caregivers believed that, if a mother breastfeeds her baby after she eats too much 'spicy' and 'hot' food or returns from working in the field without 'cooling' her breastmilk ('hot milk'), her baby is more likely to suffer from diarrhoea. These beliefs may mask the true causes of weanling diarrhoea. Health-education and health-promotion planners need to be aware of the prevalent local beliefs and to incorporate them in strategies designed to decrease the risk of weanling diarrhoea.

Studies have revealed that children, who drink untreated water from an unprotected source, have an increased risk of diarrhoea (8,9). Results of laboratory tests of tank water, carried out in rural areas of northeast Thailand in 1983, showed that about 80% of this water contained unacceptable levels of *Escherichia coli* (10). A large proportion (42.3%) of the weanlings investigated in this study consumed unboiled water. The consumption of unboiled water was related to the higher prevalence of diarrhoea among children aged 12-14 months, but the risk expressed as OR reduced after this age. A possible explanation for this pattern is that a weanling's risk of diarrhoea, following consumption of unboiled water, is greatest at its first exposure to water-borne pathogens. Following continued exposure, the weanling may develop immunity to the pathogens. This has been shown in a study carried out by Bukenya in Papua New Guinea (11).

Results of the study of Echeverria *et al.*, carried out in rural northeast Thailand, showed that the increased incidence of diarrhoea was associated with the increased number of flies in household kitchens (12). Pathogens, such as *E. coli* and *Shigella*, were isolated from diarrhoeal patients in these villages, and were the same as those isolated from the body of flies. The covering of perishable food can prevent the access of flies and other vermin. Our study indicated that covering perishable food could significantly reduce the risk of weanling diarrhoea. Many caregivers in the focus-group sessions also acknowledged that there were plenty of flies around their households, and these flies could be the cause of weanling diarrhoea. However, in practice, some of them still left weaning food uncovered. Therefore, health-promotion campaigns need to emphasize the importance of covering perishable food during storage.

Feeding utensils are the final step in the process of potential food contamination from the source of food and/or water to the mouth of a weanling. Thus, the hygiene of feeding utensils may be very important. Washing feeding utensils with dishwashing detergent can effectively remove diarrhoea-causing pathogens. Ghosh *et al.* compared the use and non-use of dishwashing detergent to clean feeding utensils, and found that dishwashing detergent significantly reduced the risk of diarrhoea in children (13). This relationship was also observed in our study. To reduce the incidence of weanling diarrhoea, caregivers should be encouraged to wash feeding utensils with dishwashing detergent.

'Kaw Yam' is a traditional, but unhealthy, weaning practice in northeast Thailand. Imong *et al.* found that pre-mastication of weaning food significantly increased bacteria content in food (14). However, our study did not find a significant relationship between 'Kaw Yam' feeding practices and weanling diarrhoea. The focus-group sessions of our study demonstrated that the caregivers had different conceptions of 'Kaw Yam.' In our structured interview, we simply asked them if they fed 'Kaw Yam' to their weanlings or not. This would lead to misclassification of this feeding factor. The actual number of weanlings, who were fed pre-masticated food, is likely to have been higher than was reported. It is suggested that any future study should clarify the definition of 'Kaw Yam' in any questionnaire or interview.

The first limitation of this study is that the study period was the harvest season in northeast Thailand. Some caregivers were not available for interview, and the characteristics of these caregivers might be different from those available. The second limitation is that the sample size of our study was not big enough to control for some important confounding factors, including socioeconomic status, in our data analysis. Another reason for not controlling for socioeconomic status was that the proxies used, e.g. years of education, income, and workplace, were not sufficiently precise to differentiate and stratify.

In conclusion, our study found that many episodes of weanling diarrhoea were seen by the caregivers as a natural occurrence in a child's development. The incidence of weanling diarrhoea was significantly higher than what was reported by the local health authorities. Some unhygienic factors, such as consuming unboiled water, not covering perishable food, and washing feeding utensils without dishwashing detergent, were responsible for increasing the risk of weanling diarrhoea. Some local beliefs about the causes of weanling diarrhoea may mask the true causes, and mislead messages about its prevention.

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REFERENCES

1. World Health Organization. Medical education teaching medical students about diarrhoea. Unit 1. The epidemiology and aetiology of diarrhoea. Geneva: World Health Organization, 1998. (<http://www.who.int/chd/publications/cdd/meded/1med.html>).
2. Thailand. Ministry of Public Health. Annual epidemiology surveillance report. Bangkok: Ministry of Public Health, 1994.
3. Pradhipasen M, Chareonkul C, Nitnara S, Taweedej J, Pamonprawat A. The underreporting of childhood diarrhoea in Thailand. *Southeast Asian J Trop Med Public Health* 1997;28:391-4.
4. World Health Organization. Food safety—a worldwide public health issue. Geneva: World Health Organization, 1990. (<http://www.who.ch/fsf/ftcshtfs.htm>).
5. Mata LJ. The children of Santa Maria Cauqué: a prospective field study of health and growth. Cambridge, MA: MIT Press, 1978.
6. Khon Kaen Provincial Health Office. General data and statistics. Khon Kaen: Khon Kaen Provincial Health Office, 1998.
7. Jelliffe EFP, Jelliffe DB, Feldon K, Ngokwey N. Traditional practices concerning feeding during and after diarrhoea. *World Rev Nutr Diet* 1987;53:218-95.
8. Molbak K, Jensen H, Ingholt L, Aaby P. Risk factors for diarrhoeal disease incidence in early childhood: a community cohort study from Guinea-Bissau. *Am J Epidemiol* 1997;146:273-82.
9. Vogt RL, Sours HE, Barrett T, Feldman RA, Dickinson RJ, Witherell L. *Campylobacter* enteritis associated with contaminated water. *Ann Intern Med* 1982;96:292-6.

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10. National Centre of the SEAMEO-Tropmed in Thailand. Coping with health problems in relation to water resource development schemes. Bangkok: National Centre of the SEAMEO-Tropmed in Thailand, 1985. (Unpublished).
 11. Bukenya GB. The epidemiology of under-five childhood diarrhoea in a peri-urban population of Papua New Guinea. Brisbane: University of Queensland, 1991. (PhD dissertation).
 12. Echeverria P, Harrison BA, Tirapat C, McFarland A. Flies as a source of enteric pathogens in a rural village in Thailand. *Appl Environ Microbiol* 1983;46:32-6.
 13. Ghosh S, Sengupta PG, Mondal SK, Banu MK, Gupta DN, Sircar BK. Risk behavioural practices of rural mothers as determinants of childhood diarrhoea. *J Commun Dis* 1997;29:7-14.
 14. Imong SM, Jackson DA, Rungruengthanakit K, Wongsawasdii L, Amatayakul K, Drewett RF *et al.* Maternal behaviour and socio-economic influences on the bacterial content of infant weaning foods in rural northern Thailand. *J Trop Paediatr* 1995;41:234-40.