Original Article

Influences on maternal and child nutrition in the highlands of the northern Lao PDR

Wendy Holmes MB BS MSc (CH) *Lond*[1], Damian Hoy BAppSc (Physio) [1], MPH, Anne Lockley BA, Grad. Dip (Asian Studies), MA (Development Studies)[2], Khampho Thammavongxay MB BS, MPH[3], Somphao Bounnaphol MD[3], Anonh Xeuatvongsa MB BS, MPH, PhD[3] and Michael Toole, MB BS *Monash* BMedSc DTM&H *Lond*[1]

[1]*Macfarlane Burnet Institute for Medical Research and Public Health, Melbourne, Australia*
[2]*156 George St, Fitzroy, Victoria, Australia*
[3]*Developing Health Communities Project, Lao PDR*

In two remote northern provinces of the Lao People's Democratic Republic, provincial and district teams were trained and subsequently conducted a qualitative study using a participatory approach to investigate people's knowledge, attitudes, beliefs and practices in relation to women's and children's nutrition. Using focus group discussions, key informant interviews, and structured observation, the teams found that certain nutrition behaviours, including food taboos, may contribute to the high prevalence of child malnutrition and micronutrient deficiencies in these northern provinces. Ethnic groups gave details of nutrition-related beliefs and practices; the teams found that many of these are likely to be amenable to change through relatively low-cost nutrition promotion informed by these findings. In particular, barriers to exclusive breastfeeding, food taboos and hygiene behaviour could be addressed. The study also demonstrated that with appropriate training, supervision and support, local teams are able to plan and conduct a large-scale qualitative study.

Key Words: nutrition, Lao PDR, Laos, mother, child, qualitative study

INTRODUCTION

The Lao PDR is classified as a least developed country. About 78% of its 5.7 million people are rural subsistence farmers. A substantial minority lives in remote mountainous areas where the provision of basic services is constrained by difficult access, especially in the wet season. The provinces of Phongsali and Huaphan are in the remote northern highlands where the land is poor and people struggle to survive. They practice swidden agriculture, often clearing a fresh field each year to grow a single crop of upland rice, several hours walk from their villages. There are many different ethnic minorities living in these border regions, with histories of conflict and persecution.

Health indicators are among the poorest in Asia. Infant mortality is estimated to be 65 per 1,000 live births, maternal mortality 650 per 100,000 live births, and 40% of children under five are underweight.[1] Pneumonia, diarrhoea, malaria, meningitis, and tuberculosis are the most common causes of death. Health care systems are generally weak, and use of dispensaries in rural areas is low. Maternal and child malnutrition and micronutrient deficiencies are common in the northern highlands of Lao PDR.[2,3]; an estimated 39% of children suffer wasting and 54% are stunted.[4]

In 2002, during the planning phase of a primary health care project*, we assisted local government provincial and district teams to undertake a qualitative study. We report here the findings and implications that relate to maternal, infant and child nutrition.

MATERIALS AND METHODS

Preparation

The study team in each province comprised provincial and district staff from the Government of Lao health and agriculture departments, the Lao Women's Union, and national project staff. Each team of twenty included members with local knowledge, different ethnic groups, and a good balance of men and women. The teams were trained in qualitative research skills, and assisted in planning the study, including development of question guides.

They discussed ethical issues and strategies to avoid the possibility of causing offence, anxiety or distress, raising expectations, misleading people, or exploiting the hospitality or time of villagers. Using National Statistics Centre data, we selected the four largest ethnic groups in each province.

Corresponding Author: Dr. Wendy Holmes, Macfarlane Burnet Institute for Medical Research and Public Health, GPO Box 2284, Melbourne 3001, Australia
Tel: 61 3 9282 2145; Fax: 61 3 9282 2144
Email: holmes@burnet.edu.au
Manuscript received 7 September 2006. Initial review completed 20 November 2006. Revision accepted 12 December 2006.

In Huaphan, these were the Hmong, Khmu, Phuthai and Yao, and in Phongsali, the Akha, Khmu, Lue, and Phunoi. The teams selected two villages for each ethnic group – one remote and one by the road.

Data collection

Teams of six or seven researchers made three-day visits to each village during August and September. After explaining the purpose of the visit to the village leader and people, and obtaining informed consent, the team interviewed village leaders, health volunteers, traditional birth attendants and healers, and leaders of the Women's Union, and held focus group discussions with men, older and younger women, and a mixed group. All interviews and discussions were taped, with the permission of the participants. Members of the team also walked through the village with local people making observations and asking questions. In the evenings, conversation and singing built trust. Tapes were transcribed during the visit, and before leaving the team gave feedback to the village and presented health messages.

Analysis

The teams reviewed and discussed the transcripts. They cut and pasted sections from the transcripts under one or more themes, with additional themes suggested by the data. This was an important exercise to promote discussion and analysis of the findings among the study teams, leading to a deeper understanding of the situation at the village level. Due to the volume of data and the need for the study teams to resume their usual work duties, two international consultants sorted the remaining sections of the transcript under the identified themes. Further workshops were held with the study teams to reach consensus on the main points for each theme, discuss implications and develop recommendations. A draft report of the findings, illustrated with verbatim quotes, was prepared in both English and Lao and circulated to the teams. Study findings were presented at national and provincial workshops and the final report was circulated to relevant government departments and international organisations.

RESULTS

Food availability

Some villages are able to grow their staple rice in terraces; some need to supplement this with swidden agriculture; many are completely dependent on swidden agriculture. The Lue villagers said that they usually have sufficient rice all year. The team were told that a few families run out, because they have sold their rice or, with a suggestion of blame, because they have been 'lazy'. If there is insufficient rice, families eat maize, wild roots, taro or sweet potato. There is often a tradition of cooperation within villages: *"They borrow rice from their relatives in the village, not from other villages." [Lue]* In villages that have been recently established by the government, this cooperation may be lacking: *"The villager's living condition is difficult and complicated because people have come from many districts."[Khmu]* Families may work for cash to buy rice. Akha villages are especially poor. They described how they have adopted family planning suggestions from visiting Chinese relatives, *"…we agree because we have many children and we cannot feed them - we don't have land for growing rice. We should have only two or three children because there is nothing to feed them." [Akha]*

Many villages plant pineapples and grow fruit trees including mango, plum, bananas, tamarind, papaya and lemons. They grow vegetables, such as beans, potatoes, cabbage, and pumpkins, but often *"wild animals such as pigs and mice eat them all."* Women go to look for yams, roots and nuts, and pick bamboo shoots in the forest. Availability of many fruits and vegetables is seasonal. Some are preserved through fermentation, but drying of fruits is not common. Over 90% of salt is now iodised in Lao PDR following a decree in 1995, but in these border areas salt may be imported from China or Vietnam, and local producers may not comply with iodisation. Most women said that they buy whatever salt is available at the market and did not know whether it is iodised. Only a few literate women knew that the salt they bought was iodised.

Protein sources include fish, eels and 'crabs' from ponds or rivers; chickens and ducks raised around the house (and their eggs); pigs, raised in pigsties; and forest buffaloes. Fish may be preserved through drying or fermentation. Many poorer families eat meat only once or twice a month. Many villages keep no livestock and obtain meat from hunting wild animals such as squirrels and birds.

Most respondents said that they have more foods available in the dry season (from October to February) when vegetables and fruit are more plentiful and livestock fatten. In the cooler months of November to February, people are less busy in the fields and a pig may be killed and shared among the villagers. In the rainy season (from April to August) fruit and vegetables tend to rot more quickly. Ducks and chickens start to be raised in the rainy season so eggs are not eaten until the dry season. Rice, corn, taros, pumpkins, bananas, papayas and bamboo shoots are available in the rainy season, but by July food supplies are often insufficient.

Beliefs and practices about eating during pregnancy

Generally it is recognised that pregnant women need to eat well during pregnancy, *"they eat everything they want to look after themselves during pregnancy," [Lue]*, and *"they should avoid only dirty foods." [Phunoi]* Food taboos during pregnancy were less common and less widely adhered to than taboos after delivery. The Akha mentioned that wild animals, fermented food, and pumpkin leaves are prohibited during pregnancy, although crab, fish and domestic animals are allowed, *"I don't eat wild animals, wild animals with babies, or domestic animals with its babies - because if we eat these animals we will have difficulties during delivery and our child will not be healthy and may become disabled."[Akha]* Eating cultivated vegetables is encouraged, but from the fifth month forest vegetables and mushrooms are not allowed. Both the Hmong and the Yao said that meat from animals killed by a tiger was prohibited.

There was some evidence of the phenomenon of 'eating down' during pregnancy to avoid a large baby and obstructed delivery.[6] A Phunoi woman said *"We cannot*

Table 1. Post-natal food taboos found within ethnic groups

Foods avoided, and duration	Foods encouraged/ allowed	Beliefs
Lue		
No meat or salt in first 5 days White buffalo; white chicken; beef; duck; female pig; pickled foods; sour foods; Pa-daek (fermented fish); bananas; eggplants; lettuce; vegetables for first three days Some food taboos last 5 months - 3 years.	Grilled sticky rice + water after delivery Baked dry fish; black buffalo meat; pork; boiled chicken (except white chicken); rice; leafy vegetables (Pak now); morning glory; bamboo shoots; cabbage; potatoes.	Taboo foods cause leprosy or other illnesses; female pig causes headaches, dizziness and fever; women often feel tired and need help post-partum, but feel better if well fed; "If the mother does not have good food the baby does not grow up well."
Khmu		
Fresh meat, incl. beef, white buffalo, deer, female pig, wild pig, dog, and white and red chicken; certain fish: Kouan, Khae, Kheung, red, Nai; fermented foods; pumpkin tops (only men said this) *Taboo foods are avoided for 1-5 months.*	Rice; all vegetables; 'roasted' salt; dry black buffalo meat; pork; black chicken; duck; Mom fish; turkey.	Good food is important to keep the new mother healthy and able to breastfeed welI; taboo foods may cause bleeding, illness or death; some men said 'pumpkin leaves have rough skin - baby has soft skin'.
Phunoi		
Beef; chicken; pork; wild animals, incl. squirrel and deer (meats avoided for 1-4 months for healthy women, up to a year if unhealthy). Fish without scales - snake fish; MSG; young pumpkin until umbilicus dries; yellow flowering vegetables; cabbage; cauliflower; leuang flower; bouan and kadom fruits; mak nam tao; 'itchy' fruit types; papaya.	Rice; scaly fish; lettuce and vegetables with white flowers Some men said no taboos - pork, chicken, wild animals are all allowed.	Eating fish without scales results in insufficient milk; if women eat deer meat or beef then the baby will lose consciousness.
Akha		
Wild animals; buffalo meat; chicken; pig fat; crab; some kinds of vegetable; fruit; melon and pumpkin tops (for 4-8 months); banana flower (for 1 year after delivery); 'raw' salt; chilli; fermented food; coffee and tea; oily food; fried food; vegetables and fruits (for 3-4 days).	Rice; boiled pork and chicken (but sometimes only after 3- 4 days); all kinds of fish, but only the lower part because upper part is 'bitter'; eggs; some vegetables.	Fried foods and fermented foods cause both mother and child to get a stomachache and other diseases; these foods will affect breast milk supply, and umbilical cord of baby may not dry.
Hmong		
Red meat; chilli; ginger; fruit; and most vegetables (for 20-30 days) If the baby is ill, breastfeeding mother avoids: beef; chicken; fruit; onion; oil; and chilli.	Warm water; white rice; chicken (except white chicken or chicken with yellow legs); pork; fish; lettuce; beans.	Belief by elders that taboo foods will cause sickness, damage to uterus, and later, cough.
Yao		
Animals that were killed by a tiger; blood; buffalo meat and intestine; roasted meat; duck; fermented fish; fruit and pumpkin Taboo foods are avoided for one month.	Rice; chicken and rice wine; ginger and warm water.	Fruit will make the mother thin and pale; eating pumpkin makes mother's abdomen pumpkin-shaped; ginger mixed with water helps to prevent illness.
Phuthai		
Sour or spicy foods; striped watermelon; dog meat; white buffalo; red cow; deer; pork; big chillies; fermented fish; turtle; ray; eel; frog; tiger; meat from male animals. Taboo foods are avoided for 2 days-2 months.	Rice; meat from female animals; chicken; some fish; some fruit; tea and boiled water.	Taboo foods cause diarrhoea or bleeding from the uterus.

eat banana and sugarcane because we are afraid that it will nourish the baby and the baby will get fat and cause a difficult delivery." Phuthai and Khmu villagers reported avoiding certain foods for the same reason. All ethnic groups reported that husbands take on extra domestic work to spare their wives during pregnancy.

Most women had never received micronutrient supplements; in one Khmu village women reported that they had received iron supplements when they attended for antenatal care.

Beliefs and practices about eating post-partum

Most women deliver at home with a family member, and rest afterwards on a 'hot bed' or chair over a fire for between two days and four weeks. They drink boiled water, often with herbs or roots. Some fast for a few days or eat only rice. Food taboos after childbirth are common in all ethnic groups, but are not always consistent between villages or even within villages of the same ethnic group. Often, food taboos described by men seemed broader and more complex than those described by women. The belief was also expressed by some that taboos "*are more from the past*", and not followed by all. In preparing communication materials it is useful to know the specific practices of each ethnic group, so we have presented details of foods that are encouraged post-partum, and beliefs about taboo foods by ethnic group, in Table 1.

Table 2. Infant feeding beliefs and practices found within ethnic groups

Colostrum and pre-lacteal feeds	Exclusive breastfeeding (EBF)	Complementary foods	Actions if worried about milk supply	Duration of breast-feeding
Lue				
Some put baby to breast after birth; many delay until 'good, white milk' appears. Believe colostrum causes diarrhoea, and 'makes baby thin'.	Usually EBF 2–3 months, some up to 6 months; often concern that mother does not have enough milk for newborn – give sugar water or rice and sugar; work is a barrier to EBF.	Pre-chewed rice with sugar; after 3 months pre-chewed meat and sticky rice (if baby well); avoid fermented foods for babies – believe causes diarrhoea.	'Take care of mothers' health'; drink warm water or soup; give mother chicken, pork, egg and buffalo meat; give baby pre-chewed rice or ground rice with water and sugar by bottle; lactagogue: drink boiled wild chilli tree.	9 months to 2 years.
Akha				
Feed babies straight after birth – do not discard colostrum.	EBF for 6 months unless mother is not healthy or is worried about milk supply.	At 5-6 months, meat, eggs and rice - fruits and vegetables introduced later; foods pre-chewed for baby	Give mother hot water, boiled pork, dog's meat or chicken; give baby pre-chewed rice, ground rice with water and sugar by bottle, or condensed milk.	Until next pregnancy - may be 3 or 4 years.
Khmu				
Most discard colostrum for 1-6 days – believe causes diarrhoea. Baby fed by cotton bud dipped in honey or glucose until 'nice' milk appears.	EBF uncommon; many breast-feed and give chewed rice or rice soup from day 1; rice given if newborn cries a lot; mothers return to work soon after birth – 15 days – barrier to EBF.	Pre-chewed rice, wrapped in leaves and baked or roasted - often from a few days of age; after 6 months, eggs, seasonal fruits and banana; later - fish, dry meat and meat soup.	Wet nurse feeds baby; sweetened condensed milk / pre-chewed rice / well ground rice boiled with sugar given to baby; lactagogue: banana flower, vegetable.	Until next pregnancy – often only 1 year – up to 2 years.
Phunoi				
Most discard colostrum 1-3 days - believe causes diarrhoea. Give pre-chewed rice or sugar water via cotton bud. Some now give colostrum in response to health education.	EBF uncommon; usually start to give rice 2–3 months, some up to 6 months. Elders advise mothers to give pre-chewed rice early – from a few days of age - belief that food and milk given together will make baby healthy.	Pre-chewed rice, sometimes with sugar, wrapped in leaves and steamed; after 3-6 months - eggs, seasonal fruits, banana, pre-chewed meat; after breast-feeding ceases, fish, dry meat, soup, rice, fruits, 'same food as parents, or 'whatever is available'.	Pre-chewed steamed rice, wrapped in leaves, given to the baby; mother drinks boiled water and has massage.	Great variation - 'until next pregnancy', 'no limit', 9 months - 2 years Belief that long breastfeeding limits babies' growth.
Hmong				
Most mothers discard colostrum – believe it will cause diarrhoea; some now feed colostrum in response to health education. Don't give pre-lacteal feeds.	Most EBF for 5-6 months.	At 5-6 months, most introduce pre-chewed rice, meat, and non-sweet fruit; sweet foods are avoided.	If mother is worried about breastmilk one day after delivery, chews rice for baby; some give formula milk, rice soup, or condensed milk and rice; may use a wet nurse; may organise 'sacrificing ceremony' to ask for milk from the "sky ghost".	Usually until next pregnancy – some stop when child is between 1 and 2 years.
Phuthai				
Most do not feed colostrum to the newborn - believe will make baby ill.	Most mothers EBF for 3-6 months; some mothers feed rice grilled in banana leaves from soon after delivery; mothers' work is a barrier to EBF.	Most mothers wait until 3-6 months, then feed the baby cooked chewed rice in banana leaves with meat, fish, vegetables, and unsour fruit.	May use wet nurse; feed water and ground rice to the baby.	9 months-2 years; Until next pregnancy.
Yao				
Most feed colostrum to the newborn - believe that if they don't, the breast-milk will 'dry up'.	Most EBF for 3-6 months, but if the mother feels she does not have enough milk, chewed rice or rice soup may be given from day one; returning to work is a barrier to EBF.	At 3-6 months of age, most introduce ground rice, meat, rice soup with sugar, banana, and fish; some give 'Kao Mam' - chewed rice with meat, put in a banana leaf and roasted.	Baby is given formula milk, or chewed meat and rice; alternatively, the baby may be fed by a wet nurse	6 months - 2 years.

NB. lactagogues are substances believed to increase milk production. They play a useful role in encouraging mothers' confidence in their ability to satisfy their child

Infant feeding practices

Almost all babies are breastfed on demand in all the ethnic groups, and breastfeeding was sometimes spoken of as a source of pleasure and happiness. However, breastfeeding practices are not optimal, and there are varied practices within each group (Table 2). The most common problems are:

- Widespread belief that colostrum is harmful resulting in babies receiving fluids and food other than breastmilk in the first days of life
- Lack of understanding that it is normal for mature, white milk not to appear until two to three days after delivery *"If the mother doesn't have breastmilk one day after delivery, she has to chew rice for the newborn baby" [Hmong traditional midwife]*
- Early complementary feeding with rice and sugar before six months, most commonly due to the mother having to work, *"The mother has to stop breastfeeding her baby because there is no-one else to do the work" [Phuthai woman],* concerns about adequate milk supply, belief that the mother is not healthy, and breast problems
- Common belief in the myths that women who are ill should not breastfeed, and that after working and walking home the breastmilk is 'hot' and 'dirty', and needs to be expressed before feeding the baby.

Late introduction of rice (later than six months) seems uncommon. However, one Khmu mother mentioned that she did not give rice until nine months of age, and an Akha woman said that if the mother is healthy they do not give rice until eight to nine months. Providing complementary foods other than rice may be delayed until nine to 12 months, and fruits, believed to cause diarrhoea, may not be given until children are older.

Premastication, or chewing of food by the mother, father, grandmother or sibling, is practiced in all the ethnic groups. Often the food is chewed and then placed, frequently with dirty hands, directly in the baby's mouth (Akha); sometimes it is baked in the fire after prechewing, often wrapped in a leaf (Phunoi and Khmu); sometimes it is chewed, heated and then mixed with water (Lue). *"We feed the child with 'Kao Mam', which is chewed rice with meat, put in a banana leaf and then roasted." [Yao]*

Older women in the family seemed to be the most common source of information about infant feeding for new mothers. There was some evidence of changing practices, for example, a Lue mother said that in the past she had discarded colostrum but she had fed her last baby from birth because a doctor had told her that colostrum is beneficial. There were several indications that husbands and other family members make an effort to provide care and good food to a new mother to help her to establish breastfeeding. When asked what they do if worried about poor milk supply no one mentioned that increased sucking stimulates increased milk supply. Several ethnic groups mentioned traditional lactagogues, that is, substances that are believed to stimulate milk production.

Feeding young children

In general, children are valued and given whatever food is available, or whatever the rest of the family eats, *"We give the best food to children first and the adults will take it later." [Akha mother]* Children receive rice, taro or cassava, vegetables such as pumpkin and green beans, fruits, soya beans, and animal protein such as fish, chicken and other meats. But sometimes *"If there is no food, the child eats only rice. There is nowhere to buy food." [Akha woman]*

Village people were aware that malnutrition is common, and some understand the reasons: *"There are many stunted children in this village because they are always ill, they lose their appetite, and their bodies are small and weak." [Akha woman]* But many admit they lack knowledge: *"There are children who are not growing well. We do not know why this is" [Akha man]*, and *"I don't know what foods are good for the baby. I just feed the baby what I can find." [Lue mother]* There is some sense of fatalism associated with this: *"I don't know how to recognise a malnourished child, and I also don't know how to solve this problem." [Akha traditional healer]*

Some foods are forbidden, for example, the Lue believe that eggs delay teething or cause tooth problems. Some Akha believe that *"duck will make the child dumb"*, while the Lue believe that duck is one of *"the best foods for the baby"*. Sometimes taboos are handed down and the reasons for them are not known: *"We do not give wild animal or cow to the children. We are not sure why. It is a culture that people have practiced for many years." [Akha]* Fermented foods are widely familiar, but many believe that fermented or sour foods harm babies and young children, and cause diarrhoea. Parents said that when they are working they leave food for grandparents or siblings to feed young children. In general people reported that boys and girls are treated the same, but the Akha reported that boys tend to eat more than girls, *"because the boys have more energy than the girls. Boys will also eat more meat than vegetables so that they will grow quickly and be able to work. For girls, we give less food than the boys … because they don't do hard work. This is our tradition of bringing up children." [Akha man]* On the other hand, the Phunoi suggested that older boys are given less food than girls because *"they can find food for themselves"*.

It is common to avoid certain foods when children are sick. Children with diarrhoea may be given only rice and boiled water; sour and spicy foods are avoided. The Lue give sick children pork and fish, and avoid meat from white buffalo, white chickens, deer, ducks and beef, for five to six days after recovery. The Akha give crabs, fish, black chicken, eggs, beans, and vegetables, but avoid dog, beef, fish, cucumber, melon, fruits, chicken's eggs, fermented foods, and pumpkin leaves. Once the child recovers, they are given extra food. The Phunoi also avoid giving fruits considered 'sour', including mango, pineapple and tamarind, but encourage porridge with peanuts, sugar, milk and biscuits. Interestingly, while fruit is often avoided for sick children, children with measles may be given fruits rich in vitamin A, *"If they have measles, they cannot eat chicken. They should eat mango and papaya, unless they have a fever." [Phunoi woman]* Mothers in all groups continue to breastfeed during episodes of diarrhoea, but may avoid some foods themselves, especially sour and pickled foods. Akha women mentioned avoid-

ing fish, oily food, bamboo shoots, pumpkin leaves, crabs and wild meat, and Lue mothers may eat only rice until the child is well.

DISCUSSION

Ours was the first study to explore in detail influences on nutrition in these poor and remote Lao provinces. Like others, we found that a genuine commitment to research partnership with local workers, and feedback of findings to the community, are especially important when working with different ethno-cultural groups.[7,8] The local teams made an essential contribution to the planning and conduct of the study. Although they lacked experience in probing, their participation facilitated interpretation of the data. They discussed the implications of their findings for their own work, and made recommendations for interventions at provincial, district and local level. Their capacity to undertake their own future studies has been increased.

Poor nutrition in these highland northern provinces is primarily the result of political and geographical factors, especially lack of land and poverty, which are difficult to influence. Land pressure also means that many women have to travel far on hilly terrain to their fields, expending many calories. This leaves little time to gather and prepare food and feed children. Remoteness limits access to shopping for food and iodised salt. Nevertheless, local knowledge, beliefs and practices also have some adverse effects on maternal, infant and child nutrition and these can be addressed.

Food security is precarious in many villages, although there are traditional cooperative coping mechanisms. 'New' villages, established by government, require particular attention, such as establishment of rice banks, because cooperation between families from different backgrounds and access to fertile land may be limited. Food availability is influenced by the seasons. There are few traditions of preserving food and there is scope for trialling drying techniques for fruits such as mangoes and for peas and beans.

Food taboos are common in Phongsali and Huaphan, and vary between and within different ethnic groups. We found, like others, that qualitative methods are particularly useful for exploring nutritional practices and the beliefs that underlie food taboos.[9] For example, the knowledge that in some villages eggs are not given to young children because they are thought to harm teeth means that we can specifically address this belief when designing messages and in health worker training. Maternal dietary restrictions when a baby is ill may reduce micronutrients available to the baby through breastmilk, especially vitamin A.[10] Soukalan *et al* found that babies with beri-beri were more likely to have mothers with little variety in their diet.[11] Taboos in relation to wild animals and plants are significant because foods obtained from the forest make an important contribution to nutrition in these areas. Food taboos for young children are common, especially during illness, and are likely to contribute to malnutrition and micronutrient deficiencies where dietary variety is already limited. On the other hand, some beliefs were beneficial and should be reinforced. For example, the Phunoi's belief that children with measles should eat mango and papaya, good sources of vitamin A, and the prohibition in Lue villages on women eating fermented fish for five to six months after delivery. This fish contains thiaminase, which contributes to the development of maternal thiamin deficiency and infantile beri-beri.

Food plays such a central role in our lives that it is not surprising that most cultures have food rituals and taboos.[12] There are many explanations for the existence of food taboos. They may be related to religious beliefs, health beliefs or simply be based on tradition and custom, with no clearly identifiable reason. Shifflett has suggested that often the folklore surrounding food habits developed from uncertainty and fear in the quest for food, and can be interpreted as an attempt to gain control of fate.[13] It has been suggested that they may serve to mark off one sect or denomination from another, to mark the passage into or out of a ritual state,[14] or have been generated by both genders to gain control through food.[15] Food taboos often affect women more than men and, as we found, are especially common in relation to pregnancy and breastfeeding.[16,17,18,19,20]

Our findings contradicted the notion that food taboos are likely to be deeply held and difficult to counter. The finding that often people did not know the reason for a taboo is relevant because it may be easier to modify a belief that has simply been handed down, rather than being associated with a religious prohibition. Some recognised that there may be trivial reasons for taboos, such as that chicken livers are not given to children because they are considered a delicacy and so reserved for important men in the village. It would also be useful to assess the significance of food taboos by quantifying adherence to them, and their impact on nutritional status.[21]

Concerns about "eating down" in pregnancy to avoid obstructed labour are real and emphasise the importance of improving access to emergency obstetric care.[22] It is important to understand and address the common postpartum food restrictions, because breastfeeding will further deplete maternal micronutrient levels, and babies can be affected too.

Although all babies are still breastfed, breastfeeding practices are not optimal, and our findings help in understanding beliefs and influences on these practices. Some can be reinforced, such as feeding on demand, and belief in lactagogues, which give mothers confidence that they can satisfy their child. But some beliefs are harmful and need to be addressed, such as that colostrum should be discarded, and that breastmilk becomes 'hot' and 'dirty' after working. As in most societies, exclusive breastfeeding is rare. Substances other than breastmilk are often given in the first week of life; and babies are often fed rice in the early weeks because of mothers' concerns about the adequacy of their milk supply. Exclusive breastfeeding reduces the risk of diarrhoea and ARI so it is essential to address these problems.[23, 24] Health workers seem to be influential, so training them in breastfeeding is important, in particular to advise mothers worried about their milk supply to suckle their baby more frequently for a few days to ensure an increase in supply. Family members, peers and older women influence infant feeding practices. They need to be included in communication efforts related to breastfeeding. Studies in several settings show that peer support and counselling interven-

tions can be effective in improving rates of exclusive breastfeeding, and the use of peer counsellors should be considered.[25,26] However we should note that some mothers have barriers to exclusive breastfeeding that cannot be overcome through education and counselling. They may be obliged to return to work for long hours in distant fields soon after delivery, while slippery slopes make it dangerous to carry babies. This is difficult to address, but government and community support needs to be mobilised to ensure that these women are able to work closer to home for at least the first four months, where possible. Antenatal and postnatal visits could provide an important opportunity to improve breastfeeding practices, as well as other benefits. Such interventions are likely to have a significant impact on infant mortality and morbidity in these provinces and should be prioritised.

Pre-mastication of food for infants is an interesting traditional practice that has been little investigated. One study from north-east Thailand suggests that there may be an increased risk of diarrhoea episodes in babies who are fed in this way, compared to other non-exclusively breastfed babies.[27] Although the mouth contains many bacteria they are not usually enteropathogenic, and infants rapidly become colonised after birth with their mother's bacterial flora. However the mother's fingers that take the premasticated food from her mouth to the baby's may well be contaminated with harmful faecal organisms. The practice highlights the importance of hygiene behaviour promotion in these communities.[28] Before trying to modify or prevent pre-mastication there is a need for further research, including investigating the bacterial content of the various preparations associated with pre-mastication, and the impact on babies' health.

We found that early introduction of weaning foods is very common. In 2001, the World Health Assembly approved a change to the recommendations for duration of exclusive breastfeeding to six months in order to reduce deaths from diarrhoea.[29] Between four and six months there is a danger of iron and other micronutrient deficiencies when mothers have these deficiencies, as is likely in Phongsali and Huaphan. It is therefore important to improve the variety of women's diets before, during and after pregnancy, and to provide folate and iron supplements during pregnancy.

Late introduction and inadequate amounts or variety of complementary foods are problems in the poorest villages, because of lack of food. It is important that efforts are made to identify and prioritise assistance to poor families with young children. Reports from parents of night-blindness suggest that rates of sub-clinical vitamin A deficiency are likely to be high. Studies from Nepal show that both nutrition education and supplements of vitamin A are effective at reducing mortality in children.[30]

In villages where a variety of foods are available, they are often not given to children because of food taboos or lack of knowledge. Foods that would be feasible and acceptable to add to rice porridge to improve calorie density and micro-nutrient value include pounded ground nuts; pork fat; ground, roast, germinated pulses and grains; chicken and duck eggs; pounded sunflower, poppy or sesame seeds; and sugar. Although fermented foods are not thought suitable for children, fermentation of rice porridge could be promoted because it inhibits the growth of pathogenic bacteria and increases the absorption of micronutrients including iron, calcium and zinc.[12, 13]

Few women knew the importance of iodised salt. Iodine deficiency, previously a major public health problem, has been addressed in most of Lao PDR, but there is a need for education and better monitoring of salt quality in these provinces. A number of women complained of numbness or tingling in their hands and feet after delivery, which are symptoms of thiamin deficiency. Infantile beriberi has been described among patients in a Vientiane children's hospital and in nearby northern Thailand; however, its distribution within the Lao PDR has not been studied.[31,32] Thiamin deficiency results from a diet lacking thiamin, such as sticky rice that has been soaked[31], and from eating foods that contain thiaminase, the enzyme that breaks down thiamin, such as tea, coffee, betel nut, and fermented fish. In these villages we heard that people commonly drink tea, eat fermented fish, and soak sticky rice for at least eight hours. Further investigation of beri-beri in these areas is needed.

Parents' willingness to recognise lack of knowledge about feeding children suggests that advice about improved practices will be effective, although sensitivity will be needed in relation to fatalistic attitudes. Since our study Gillespie *et al* have shown that Huaphan mothers were willing to try new feeding practices, were impressed with the amount and types of food their children could eat if coaxed, and that their children were happier and easier to care for.[8]

CONCLUSIONS

This study demonstrated that with appropriate training, supervision, and support, local teams are able to plan and conduct a large-scale qualitative study. Poverty, lack of land, and remoteness are the chief causes of poor maternal and child nutrition in Huaphan and Phongsali; addressing these problems requires advocacy and support for long term government development strategies. However there are also harmful and beneficial community and parental beliefs and practices that are likely to be amenable to change or encouragement. In particular barriers to exclusive breastfeeding, food taboos, and hygiene behaviour could be addressed. The study provided a wealth of detailed findings to inform the design of interventions, counselling guidelines and information material.[8] The Lao PDR is adopting the Integrated Management of Childhood Illness (IMCI) program of the World Health Organisation. Our findings provide a useful basis for adaptation of these guidelines in the ethnically diverse northern provinces of Laos. The need for further research was highlighted including investigating the bacterial content of premasticated food and impact on babies' health, quantifying adherence to food taboos and impact on micronutrient deficiencies, and assessing the prevalence and risk factors associated with thiamin deficiency. Encouraging behaviour change through feasible interventions could have a large and positive impact on the nutritional status of this population.

ACKNOWLEDGEMENTS

We thank the Huaphan and Phongsali study teams who helped in study planning, data collection and analysis; Australian Agency for International Development and the Government of Lao PDR who funded the study; the staff and government counterparts of the Developing Healthy Communities Project; and Cecily Dignan, who assisted with development of the question guide. AusAID and the Government of the Lao PDR had no role in study design, data collection, data analysis, data interpretation, or writing of the report.

REFERENCES

1. UNICEF. The State of the World's Children 2006. New York: UNICEF; 2006.
2. Ministry of Health, Lao PDR. Multiple Indicator Cluster Survey, 2000. Vientiane: Ministry of Health; 2001.
3. Kachondham Y, Dhanamitta S. A new horizon: addressing food and nutrition problems in the Lao People's Democratic Republic. Food Nutr Bull. 1992;14(2):79-87.
4. Phimmasone K, Douangpoutha I, Fauveau V, Pholsena P. Nutritional status of children in the Lao PDR. J Trop Pediatr. 1996;42(1):5-11.
5. Brems S, Berg A. (1998). Eating down during pregnancy: nutrition, obstetrics and culture considerations in the third world. Discussion paper prepared for the UN Advisory Group on Nutrition, Subcommittee on Nutrition, Population and Human Resource Division; 1998; Washington, D.C.
6. Willms D, Singer SM, Adrien A, Godin G, Maticka-Tyndale E, Cappon P. Participatory aspects in the qualitative research design of phase II of the ethnocultural communities facing AIDS study. Can J Public Health. 1996;87 Suppl 1:S16-27.
7. Gillespie A, Creed-Kanashiro H, Sirivongsa D, Sayakoummane D, Galloway R. Consulting with caregivers: using formative research to improve maternal and newborn care and infant and young child feeding in the Lao People's Democratic Republic. World Bank HNP Discussion paper. Washington DC: World Bank; 2004.
8. Kruger R, Gericke GJ. A qualitative exploration of rural feeding and weaning practices, knowledge and attitudes on nutrition. Public Health Nutr. 2003;6(2):217-23.
9. Brown KH, Akhter NA, Roberston AD, Ahmed MG. Lactational capacity in marginally nourished mothers: relationship between maternal nutritional status and quantity and proximate composition of milk. Pediatrics. 1986;78:909-19.
10. Soukaloun D, Kounnavong S, Pengdy B, Boupha B, Durondej S, Olness K, Newton PN, White NJ. Dietary and socio-economic factors associated with beriberi in breast-fed Lao infants. Ann Trop Paediatr. 2003;23(3):181-6.
11. Kruger R, Gericke GJ. A qualitative exploration of rural feeding and weaning practices, knowledge and attitudes on nutrition. Public Health Nutr. 2003;6(2):217-23.
12. Shifflett PA. Folklore and food habits. J Am Diet Assoc. 1976;68(4):347-50.
13. Fox R. Food and eating: An anthropological perspective [monograph on the internet]. Oxford: Social Issues Research Centre [cited 2006 October 3]. Available from: http://www.sirc.org/publik/food_and_eating_11.html
14. Nilsson U. Pregnancy food cravings and gender determination in women's expressive traditions [monograph on the internet]. Madison: University of Wisconsin [cited 2006 October 3]. Available from: http://www.aasianst.org /absts /1996abst/southasi/sa13.htm
15. Spielmann K. A review: dietary restrictions on hunter-gatherer women and implications for fertility and infant mortality. Human Ecology. 1989;17:321-45.
16. Mahmood S, Atif MF, Mujeeb SSA, Bano N, Mubasher H. Assessment of nutritional beliefs and practices in pregnant and lactating mothers in an urban and rural area of Pakistan. J Pakistan Med Assoc. 1997;47:60-2.
17. Fernandez EL, Guthrie GM. Belief systems and breast feeding among Filipino urban poor. Soc Sci Med. 1984;19: 991-5.
18. Manderson L, Mathews M. Vietnamese behavioral and dietary precautions during pregnancy. Ecology of Food and Nutrition. 1981;11:1-8.
19. Santos-Torres MI, Vásquez-Garibay E. Food taboos among nursing mothers of Mexico. J Health Popul Nutr. 2003;21(2):142-9.
20. Odebiyi AI. Food taboos in maternal and child health: the views of traditional healers in Ile-Ife, Nigeria. Soc Sci Med. 1989;28(9):985-96.
21. Garner P, Kramer MS, Chalmers I. Might efforts to increase birth weight in undernourished women do more harm than good? Lancet. 1992;340(8826):1021-3.
22. Victora CG, Smith PG, Vaughan JP, Nobre LC, Lombardi C, Teixeira AM, Fuchs SM, Moreira LB, Gigante LP, Barros FC. Evidence for protection by breast feeding against infant deaths from infectious diseases in Brazil. Lancet. 1987;ii:319-21.
23. Bahl R, Frost C, Kirkwood BR, Edmond K, Martines J, Bhandari N, Arthur P. Infant feeding patterns and risks of death and hospitalization in the first half of infancy: multicentre cohort study. Bull World Health Organ. 2005;83(6):418-26.
24. Morrow AL, Guerrero ML, Shults J, Calva JJ, Lutter C, Bravo J, Ruiz-Palacios G, Morrow RC, Butterfoss FD. Efficacy of home-based peer counselling to promote exclusive breastfeeding: a randomised controlled trial. Lancet. 1999;353(9160):1226-31.
25. Bhandari N, Bahl R, Mazumdar S, Martines J, Black RE, Bhan MK, Infant Feeding Study Group. Effect of community-based promotion of exclusive breastfeeding on diarrhoeal illness and growth: a cluster randomised controlled trial. Lancet. 2003;361(9367):1418-23.
26. Cao X, Rawalai K, Thompson AJ, Hartel G, Thompson S, Paterson JH, Chusilp K. Relationship between feeding practices and weanling diarrhoea in northeast Thailand. J Health Popul Nutr. 2000;18(2):85-92.
27. Luby SP, Agboatwalla M, Feikin DR, Painter J, Billhimer W, Altaf A, Hoekstra RM. Effect of hand washing on child health: a randomised controlled trial. Lancet. 2005;366: 225-33.
28. World Health Organisation. Duration of exclusive breastfeeding: conclusions and recommendations. Geneva: World Health Organisation; March 2001.
29. Pant CR, Pokharel GP, Curtale F, Pokhrel RP, Grosse RN, Lepkowski J, Muhilal, Bannister M, Gorstein J, Pak-Gorstein S, Atmarita, Tilden RL. Impact of nutrition education and mega-dose vitamin A supplementation on the health of children in Nepal. Bull World Health Organ. 1996; 74(5):533-45.
30. Soukaloun D, Kounnavong S, Pengdy B, Boupha B, Durondej S, Olness K, Newton PN, White NJ. Dietary and socio-economic factors associated with beriberi in breast-fed Lao infants. Ann Trop Paediatr. 2003;23(3):181-6.
31. Luxemburger C, White NJ, ter Kuile F, Singh HM, Allier-Frachon I, Ohn M, Chongsuphajaisiddhi T, Nosten F. Beri-beri: the major cause of infant mortality in Karen refugees. Trans R Soc Trop Med Hyg. 2003;97(2):251-5.

Original Article

Influences on maternal and child nutrition in the highlands of the northern Lao PDR

Wendy Holmes MB BS MSc (CH) *Lond*[1], Damian Hoy BAppSc (Physio) [1], MPH, Anne Lockley BA, Grad. Dip (Asian Studies), MA (Development Studies)[2], Khampho Thammavongxay MB BS, MPH[3], Somphao Bounnaphol MD[3], Anonh Xeuatvongsa MB BS, MPH, PhD[3] and Michael Toole, MB BS *Monash* BMedSc DTM&H *Lond*[1]

[1]*Macfarlane Burnet Institute for Medical Research and Public Health, Melbourne, Australia*
[2]*156 George St, Fitzroy, Victoria, Australia*
[3]*Developing Health Communities Project, Lao PDR*

寮國人民民主共和國北部高原地區影響母親與小孩營養狀況的因素

在寮國人民民主共和國兩個偏遠北部省份，省級及區級團隊接受訓練後，接著進行一個質性研究，使用參與法，在探討他們的認知、態度、信念及實踐與母親及小孩營養的相關性。使用焦點團體討論，重點資訊訪談及結構性觀察，團隊發現某些營養的行為，包括食物禁忌，可能與那些北部省份小孩營養不良及微量營養素缺乏的高盛行率有關。氏族團體給予詳細的營養相關信念及實踐；團隊發現很多這些行為可能可以透過相對低的成本的營養素促進資訊而改變。尤其是完全母乳哺餵的阻礙、食物禁忌及衛生行為應該被提出。本研究也示範了，經過適當的訓練、管理及支持，區域的團隊有能力計畫及從事大規模的質性研究。

關鍵字：營養、寮國人民民主共和國、母親、小孩、質性研究。