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Original Article

Using formative research to design a context-specific behaviour change strategy to improve infant and young child feeding practices and nutrition in Nepal

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Abstract

Global recommendations on strategies to improve infant feeding, care and nutrition are clear; however, there is limited literature that explains methods for tailoring these recommendations to the local context where programmes are implemented. This paper aims to: (1) highlight the individual, cultural and environmental factors revealed by formative research to affect infant and young child feeding and care practices in Baitadi district of Far Western Nepal; and (2) outline how both quantitative and qualitative research methods were used to design a context-specific behaviour change strategy to improve child nutrition. Quantitative data on 750 children aged 12–23 months and their families were collected via surveys administered to mothers. The participants were selected using a multistage cluster sampling technique. The survey asked about knowledge, attitude and behaviours relating to infant and young child feeding. Qualitative data on breastfeeding and complementary feeding beliefs and practices were also collected from a separate sample via focus group discussions with mothers, and key informant interviews with mothers-in-law and husbands. Key findings revealed gaps in knowledge among many informants resulting in suboptimal infant and young child feeding practices – particularly with relation to duration of exclusive breastfeeding and dietary diversity of complementary foods. The findings from this research were then incorporated into a context-specific nutrition behaviour change communication strategy.

Keywords: nutrition, infant and young child feeding, barrier analysis, behaviour change communication, Nepal.

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Introduction

An estimated 8.1 million children under 5 years of age died globally in 2010, with undernutrition contributing to 35% of these deaths (Black *et al*. 2008; UNICEF 2010). For the children who survive, their undernutrition during the critical 1000 day window between conception and 24 months can have lifelong consequences. Children who are stunted in early childhood are more likely to suffer from cognitive deficits (Mendez & Adair 1999; Berkman *et al*. 2002; Liu *et al*. 2003). As adults, they also have an increased risk of chronic disease (Sawaya *et al*. 2003; Uauy *et al*. 2008), as well as a higher likelihood of permanent short stature, lower educational achievement and lower economic status (Victora *et al*. 2008, 2010).

These findings have generated substantial interest in preventive nutrition interventions targeted at pregnant and lactating women and children under 2 years of age in settings of high food insecurity and

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infectious illness, including strategies to promote optimal feeding and care of infants and young children. Research has shown that counselling about optimal breastfeeding can increase child survival rates, while education on complementary feeding combined with food supplements in food-insecure settings can improve child growth (Bhutta *et al.* 2008). Research in Nepal suggests that achieving universal initiation of breastfeeding within the first hour of birth could reduce the national neonatal mortality rate by 19% (Mullany *et al.* 2008). With regard to complementary feeding practices, a review of Demographic and Health Survey data found that maternal education, income and exposure to media were all positively associated with optimal practices (Joshi *et al.* 2012). Although there is a general consensus on global recommendations for improving nutritional status and growth of young children (see *The Lancet* series on Maternal and Child Nutrition, 2008 and Scaling up Nutrition: a Framework for Action 2010), there is limited published literature on the adaptation of these strategies to varied contexts. In their comprehensive meta-analysis of 42 complementary feeding interventions, Dewey & Adu-Afarwuah (2008) concluded that there is no single universal 'best' package of components of a complementary feeding programme. Factors such as initial prevalence of malnutrition, the degree of household food insecurity, the energy density of traditional complementary foods and the availability of micronutrient-rich foods can all influence programme impact, as well as programme quality (Dewey & Adu-Afarwuah 2008).

In Nepal, malnutrition is a pervasive problem. At project start-up, 49% of children under 5 years of age were stunted [height-for-age <–2 standard deviation (SD) based on 2006 World Health Organization (WHO) reference norms], 43% were underweight (weight-for-age <–2 SD) and 13% were wasted (weight-for-height <–2 SD) [Ministry of Health and Population (MOHP) (Nepal), New ERA and Macro International Inc. 2007]. Education programmes have been shown to improve the nutritional practices of caregivers in some contexts (Guldan *et al.* 2000; Penny *et al.* 2005); however, in areas where there is a high prevalence of food insecurity, interventions that improve access and availability of food in addition to addressing food utilisation have been shown to be more effective (Bhandari *et al.* 2001; Roy *et al.* 2005; Dewey & Adu-Afarwuah 2008). There is limited literature describing contemporary complementary feeding practices in Nepal, although one report of a similar effort to promote kitchen gardens with nutrition education suggested very low knowledge of optimal nutrition, even after exposure to the education programme (Jones *et al.* 2005). To address the needs for more effective programmes targeting infant and young child feeding (IYCF) practices, Helen Keller International (HKI) developed a programme with funding from the US Agency for International Development for Nepal's Far Western Region that integrates homestead food production (HFP) with a behaviour change strategy based on the Essential Nutrition Actions (ENA) framework (Guyon *et al.* 2009; Guyon & Quinn 2011). The project is known as 'Action Against Malnutrition through Agriculture', or AAMA, which is 'mother' in the Nepali language. Formative research was undertaken to inform and shape intervention approaches.

Key messages

- A significant proportion of undernutrition could be eliminated by supporting caretakers to adopt improved infant and young child feeding practices.
- Effective interventions to support this behaviour change must be based on detailed research that identifies the key determinants of the predominant practices and develop messages and other strategies that target these influential factors.
- In Nepal's Baitadi district, findings from such research indicated that activities were needed to teach mothers lactation techniques to increase milk production, reassurance that even with an imperfect diet they can produce sufficient milk to meet the nutritional needs of their infants, and support both to produce animal-source foods and to feed these to their infants in the crucial period between 6 and 12 months of age.

Through specific selection criteria (having access to at least 1200 m^2 of irrigable and flood-free property in close proximity to the home; an accessible location; at least one household member literate and active in the community), women were chosen to serve as group leaders and to host demonstration farms, providing resources and training in the cultivation of a diverse selection of micronutrient-rich vegetables and fruits, as well as improved poultry production. These group leaders are each responsible for conducting regular meetings in their community with two mothers' groups, comprised of women who are pregnant or have young children. The mothers' group members receive agriculture and poultry inputs under the condition that they remain active in the group and maintain their own improved home farms (preparing raised beds, using organic compost and pesticides, establishing poultry pens, etc.). When possible, the AAMA project utilised the Ministry of Health's female community health volunteers (FCHVs) to establish the demonstration farms because of their pre-existing community relationships and experience providing health support to a range of maternal, child and reproductive health initiatives.

In addition to agricultural training and inputs, participants and group leaders also received training in the ENA framework, an approach that aims to improve key nutrition practices by integrating behaviour change communications strategies into existing health services to reach near universal scale and achieve public health impact. The framework promotes seven 'actions' in maternal, infant and young child nutrition, which have been proven to reduce undernutrition and mortality (Bhutta *et al.* 2008, Table 1); however, the framework also highlights the importance of using formative research to probe local customs and beliefs to inform communications strategies, focusing on the most important actions for the given context, and determining how to convey the messages in a way that will motivate the adoption of healthier behaviours. The AAMA project also used formative research methods to determine how to link the educational messages to the agricultural component of the programme in order to better promote the consumption of foods made available through HFP.

Table 1. Sociodemographic characteristics of main study population, 12–23 months

Demographic characteristics ($n = 750$)	
Children who were male	414 (55.2)
Age of children (in months)	17.3 ± 3.4
Age of mothers (in years)	26.1 ± 5.3
A disadvantaged caste (Dalit)	414 (55.2)
Mother's with no formal education	156 (20.8)
Primary caretaker of the child	
Mother	412 (54.9)
Grandmother	291 (38.8)
Older sibling	32 (4.3)
Father	5 (0.7)
Other family member	10 (1.3)
Nutritional status ($n = 744$)	
Stunted (height-for-age <–2 SD WHO reference)	434 (58.3)
Underweight (weight-for-age <–2 SD WHO reference)	301 (40.5)
Wasted (weight-for-height <–2 SD WHO reference)	86 (11.6)
Anaemia (Hb < 11 g L^{-1})	373 (50.1)
Mother BMI < 18.5 kg m^2 ($n = 750$)	185 (24.7)

BMI, body mass index; SD, standard deviation; WHO, World Health Organization. Values are n(%) or mean ± SD.

One approach for conducting such formative research is to identify the individual, cultural and environmental barriers that prevent and facilitators that encourage optimal nutrition practices (Academy for Educational Development/Linkages Project 2003; Davis 2004; Hill *et al.* 2007), and use this information to craft targeted strategies to promote positive behaviour change and improve maternal and child nutritional status. In this paper, we detail the process used to conduct then translate the findings of this research into such context-specific behaviour change strategies for a USAID-funded child survival project. Subsequent papers will describe the impact of the strategy on production and nutrition practices as well as on nutritional status of children and mothers.

Materials and methods

Study setting

This study was conducted in Baitadi district, a hill region in the Far Western Region of Nepal. The study, which is part of a larger community-randomised control trial, was approved by Nepal Health Research Council, Nepal's ethical review board. In addition, verbal consent was obtained from

all heads of households and mothers of children before their inclusion in the study.

The Far Western Hill districts suffer from higher rates of malnutrition than national averages with 58% of children under 5 years old stunted, 16% wasted and 44% underweight. The ethnic groups were Brahmin/Chhetri (80%), Dalits and other disadvantaged ethnic groups (20%).

Data collection and analysis

This study was designed as formative research to provide contextual data to inform the project's behaviour change communications strategy. Both quantitative and qualitative data were collected simultaneously in August 2009. One methodology involved a modification of barrier analysis (Davis 2004), a rapid assessment approach that draws on elements of three theories from the scientific literature on behaviour change: the health belief model (Champion & Skinner 2008), the theory of reasoned action (Ajzen & Fishbein 1980) and transtheoretical stages of change (Prochaska *et al*. 1992). The research team developed a series of questionnaires to identify the most salient determinants of key behaviours of interest and then used the BEHAVE framework developed by the Academy for Educational Development (Davis 2004) for translating findings into context-specific social and behaviour change strategies. The methodology has been used in numerous settings to guide formative research to inform the design of nutrition interventions.

Data were collected by the staff of HKI and our partners from Snehi Mahila Jagaron Kendrea (SMJK) a Baitadi-based non-governmental organisation, as well as the Nepali Technical Assistance Group (NTAG). Data collectors were selected who had adequate existing knowledge of IYCF and maternal nutrition. They were then provided with a 5-day training in techniques of both quantitative and qualitative research methods, including topics such as posing questions without biasing responses and facilitating focus group discussions (FGDs).

Quantitative data were collected as part of the baseline for the randomised control trial designed to evaluate the impact of the AAMA project on the nutritional status of children less than 2 years of age, and pregnant and lactating women. For that research, communities were selected through a multistage cluster-randomised design. Baitadi district is administratively divided into 12 sub-districts called 'Ilakas', and each 'Ilaka' is further divided into municipalities called village development committees (VDCs), which consist of several wards (villages). Ilakas were paired according to socio-economic data available from the 2001 census, including household food availability, life expectancy, poverty index and total number of VDCs, villages and households. Four pairs were then randomly selected to participate in the AAMA project. Random selection was also used to assign one of the selected Ilakas in each pair as a project and the other as a control community. As a result, the project and control areas each included 21 VDCs. Fourteen VDCs were then randomly selected from each area to participate in the baseline assessments.

A total of 2106 children aged 12–48 months and their mothers were included in the sample. This age range, rather than 0–23 months, was selected for design reasons relating to impact assessment. For the purpose of developing the social and behaviour change strategy aimed at the critical period of birth to age 2, however, only data on children aged 12–23 months ($n = 750$) and their mothers were analysed together with data from an addition sample of $n = 209$ infants <6 months in the surveyed households who were included in order to assess immediate and exclusive breastfeeding practices. Data were collected from mothers using structured questionnaires to assess knowledge and practices relating to IYCF, including recall of the timing of post-partum initiation of breastfeeding, prelacteal and colostrum feeding. Information on breastfeeding and composition of complementary foods at the time of the survey were obtained through mothers' recall of the 24 h prior to the survey. The survey also collected socio-economic and demographic information on mothers and children.

Qualitative data were collected concurrently with the quantitative survey and consisted of FGDs with mothers and in-depth interviews (IDI) with mothers-in-law and fathers. The latter two

groups were included because of their known influence on mothers' feeding practices and because mothers-in-law are frequently the primary caretakers of young children while mothers leave the home to work in the fields. The discussions and interviews assessed the knowledge, practices and beliefs relating to child feeding and care practices, and probed social norms and normative referents influencing feeding choices. Ten FGDs were conducted with mothers drawn from five VDCs. Each focus group consisted of five to eight mothers, each of whom had at least one child under the age of 2 years. Although their ages ranged from 18 to 44 years, the majority were >24 years. Discussion facilitators made every effort to ensure all participants felt free to express their point of view. Interview guides for FGDs included 62 open-ended questions and the discussions averaged 2 h in length. IDIs were conducted with five mothers-in-law and five husbands drawn from five VDCs in order to provide some triangulation of findings. Semi-structured interview guides were developed for IDIs, which included 48 open-ended questions, and interviews averaged 45 min. The qualitative sample was drawn from a cross section of geographic areas included in the quantitative sample using convenience sampling to select participants. Thus while the communities for the qualitative research were randomly selected from the overall sampling frame, individual participants were recruited through word of mouth with the help of local FCHVs, who were instructed to invite a group representing the various ethnic and economic groups in the community. The intent was to elicit more richly detailed explanations of some commonly held beliefs.

The interviews and focus groups were conducted in Nepali by a two-person team consisting of an interviewer/facilitator and a note keeper; common tea glasses were used to guide discussions of feeding quantity. Focus groups were conducted at a central location in each village that was easily accessible by participants. Participants received small refreshments after the discussions. All sessions were tape-recorded and careful notes were taken by the note keeper during the discussions. The facilitator and note taker debriefed on the same day after the discussion. The tape-recorded interviews were transcribed and reviewed with the notes, translated into English and assigned identification numbers for data analysis. Data collection continued until researchers deemed a saturation point was reached on the information sought around key IYCF questions.

All quantitative data were analysed using Statistical Package for the Social Sciences version 18.0 (SPSS Inc., Chicago, IL, USA). Data on child dietary intake based on a 24-h recall were used to compute additional indicators such as age-specific feeding of minimum dietary diversity, minimal meal frequency and minimum acceptable diet according to the 2008 WHO guidelines (WHO 2008). The qualitative data were analysed by a manual analysis of themes that emerged in the discussions of each of the questions presented by the facilitator. Analysis sought to identify the determinants of IYCF behaviours having most impact on undernutrition.

Based on the analysis, strategies were developed to target these key behavioural determinants, drawing both on research findings and the relevant grey and published literature. A matrix was developed identifying key behaviours, target groups and influencing groups, behavioural determinants, the key changes that need to be achieved to address those determinants, and then specific project activities to be carried out. Strategies targeted aspects of individual self-efficacy, social norms and environmental barriers identified by the research, in recognition that changing behaviours must go beyond messaging to deal with the multiple influences on these behaviours. Communications materials were developed in a way that would not only convey knowledge but also the motivation and conviction needed to translate recommendations to action. These materials were pre-tested with focus groups to test their relevance and comprehension, revised as needed, and then finalised. The behaviour change strategy for promoting these messages was then implemented through a four-phase strategy that included: (1) building interpersonal counselling and negotiationskills among mothers group leaders and FCHVs; (2) producing communications materials to reinforce the key concepts, including flip charts, posters and crop calendars; (3) outreach to caregivers through activities organised by

group leaders and FCHVs, such as trainings, home visits and group meetings; and (4) further reiteration of significant messages through mass media.

Results

Demographic characteristics of study subjects

Table 1 shows the key demographic characteristics of the quantitative sample of children 12–23 months ($n = 750$) and anthropometric data on those children with biologically plausible height and weight measures ($n = 744$). The mean ± SD age of children was 17.3 ± 3.4 months and the mean ± SD age of the mothers was 26.1 ± 5.3 years. One-fifth of mothers had no formal education and almost all were married. The mean number of children per mother was three. Although only biological mothers were interviewed, only 54.9% stated they were the primary caretaker of the study child; among the rest, 38.8% cited the grandmother. An alarming 58% of the children were stunted, 11.6% were wasted and half were anaemic.

Table 2 presents the qualitative sample representing five VDCs. The 66 mothers participating in the 10 FGDs ranged in age from 18 to 44, their youngest child ranging in age from 2 to 23 months. The five mothers-in-law interviewed ranged in age from 40 to 60 years and the five husbands ranged in age from 24 to 33 years.

Table 2. Qualitative sample

Focus group discussions ($n = 10$)			
Location	Participants	Mothers' age (year)	Child age (months)
Dehimandu VDC, ward 8	$n = 7$	18–40	3–18
Dehimandu VDC, ward 4	$n = 6$	22–35	5–24
Durgabhawani VDC, ward 3	$n = 6$	19–27	2–24
Durgabhawani VDC, ward 7	$n = 5$	20–40	3–23
Deulekh VDC, ward 8	$n = 7$	22–35	13–24
Deulekh VDC, ward 2	$n = 8$	18–35	3–24
Bhumeshor VDC, ward 6	$n = 7$	22–28	2–24
Bhumeshor VDC, ward 4	$n = 7$	22–28	3–24
Patan VDC, ward 1	$n = 6$	22–28	6–24
Patan VDC, ward 9	$n = 7$	18–44	3–24
In-depth interviews ($n = 10$)			
Informant	Participants	Age (year)	Location
Mothers-in-law	$n = 5$	40–60	Durgabhawani, Dehimandu, Patan, Deulekh, Bhumeshor
Fathers	$n = 5$	24–33	

VDC, village development committee.

Value of breast milk

Data from the quantitative survey indicated that breastfeeding was almost universal, with 96% of surveyed mothers still breastfeeding at the time of the survey. On average, mothers breastfed eight (±3) times during the 24 h preceding the survey. Qualitative data revealed an overall perception among mothers, mothers-in-law and husbands that breastfeeding is important because breast milk is nutritious, makes the child strong, active and healthy, and also helps the child to grow well. The following are some of these themes from the group discussions and interviews:

- [*Mother*] If mother's milk is fed to the child, the child will grow well and can later take care of the mother, which is beneficial to the family in the future.
- [*Mother*] Mother's milk is good for the child because it contains vitamins.
- [*Husband*] Breastfeeding makes the mother–child relations very healthy.
- [*Mother-in-law*] Breastfeeding increases the child's weight.

Immediate breastfeeding

Key findings from the quantitative survey on beliefs about breastfeeding and complimentary feeding are shown in Table 3. Less than half (45%) of mothers reported putting the infant to breast within the first hour after birth (although 90% breastfed within 2 h of birth), and only 4% gave prelacteal feeds. Furthermore, despite the high proportion of mothers who reported breastfeeding during the first 3 days – the period in which colostrum is produced (93%), when

Table 3. Infant and young child feeding practices and maternal beliefs quantitative survey ($n = 750$)

Mothers' beliefs regarding colostrum	%	*n*
Give it to the baby	70.0	525
Throw some away	28.0	210
Don't know	2.0	115
Mothers' beliefs about optimal length of exclusive breastfed		
Less than 6 months	18.1	136
6 months	65.5	491
More than 6 months	10.3	77
Don't know	6.1	46
Mothers' beliefs about appropriate foods for children 12–23 months		
Porridge that is not fortified	54.5	409
Fortified porridge	32.5	244
Dairy products	82.9	622
Vitamin A-rich fruits and vegetables	64.5	484
Eggs	28.0	210
Flesh foods	42.1	316
Ghee, butter or oil	43.1	323
Proportion of children 12–23 months fed in the last 24 h		
Grains, roots, tubers	98.4	738
Dairy products	81.2	609
Vitamin A-rich fruits and vegetables	64.5	484
Other fruits and vegetables	24.1	181
Legumes and nuts	54.8	411
Eggs	2.1	16
Flesh foods (meat, poultry, fish, etc.)	4.4	33
Four or more food groups*	42.0	315
Minimum acceptable diet (diversity/frequency)*	38.4	315

*World Health Organization Guidelines recommend that a child aged 12–23 years of age be fed foods from four or more of the above-listed categories three or more times per day.

asked about their beliefs about IYCF over a quarter (28%) stated that they believed the very first drops of breast milk should be discarded.

Qualitative data also revealed a general consensus that breast milk is the best first food for newborn babies, but suggested some confusion among key influencing groups over the value of colostrum. The mothers in the group discussions spoke highly of the benefits of colostrum, with one group citing a cultural practice of feeding colostrum to infants and another mentioning a local name: '*kina*'. Advantages of feeding colostrum stated by mothers included providing 'vitamins' to 'make the child strong' and for the prevention of disease. However, some informants felt differently. One father believed the first two drops of milk should be thrown away and a mother-in-law and a father both suggested colostrum can harm the child, as reflected in the comments below:

- [*Mother-in-law*] Colostrum should be thrown away because it makes the infant sick.
- [*Husband*] Giving colostrum is not practised in this village. It is believed that colostrum should be thrown away because it contains toxins which can harm the child.

Exclusive breastfeeding

In their survey responses, approximately one-third of mothers were unaware of the recommended duration of exclusive breastfeeding: 18% thought that it should be for less than 6 months, while 10% suggested longer and 6% admitted that they did not know. The 24-h recall among mothers of the sample with infants <6 months indicated that 65% fed their infant only breast milk during that period. Among the mothers of children 12–23 months, 48% reported retrospectively having exclusively breastfeed for 6 months, while 66% identified 6 months as the optimal duration. The qualitative data from FGD helped to expand upon these findings. It became clear that despite widespread knowledge of the importance and optimal length of exclusive breastfeeding, in practice, many mothers commonly provide other liquids, and sometimes food as well. Concern about their ability to produce sufficient milk was fairly common. A number of mothers suggested that when they are unable to produce enough breast milk, buffalo milk should be given. Some mothers also thought that water should be given in addition to breast milk when the child was perceived to be thirsty.

During FGD, mothers were asked to explain in their own words why they did not always exclusively breastfeed for the first 6 months. They cited: mothers' inadequate dietary intake, sickness and other factors that make the mother too weak to breastfeed, another pregnancy occurring during the period of exclusive breastfeeding, excessive household chores and early return to work after delivery. When asked what could encourage exclusive breastfeeding, almost all the mothers, husbands and mothers-in-law suggested support from other family members on household

and agricultural chores to increase the amount of time mothers can spend with their young children. Another perception shared across groups was that lactating mothers require nutritious foods like dark green leafy vegetables, fruits, meat, fish, curd and milk to enhance their ability to produce milk:

- [*Mother*] If mother could stay home and eat nutritious foods such as vegetables, eggs, meat, fish and milk then she can breastfeed well. If mother is hungry, she cannot produce enough milk for the child.
- [*Mother*] If mother can eat green vegetables, yellow fruits and is given good care, then she can breastfeed exclusively.
- [*Husband*] To support exclusive breastfeeding, other family members should help the mother in her work, so that she can spend more time with the child. Mother's food should also be nutritious and balanced.
- [*Mother-in-law*] If mother eats regularly and can be supported in her work, then she can spend more time with her child and keep breastfeeding the child.

Effect of breastfeeding on the mother

When asked about whether breastfeeding has any advantage for the mother, opinions in FGD were divided, with some of the positive comments reflecting the beliefs that breastfeeding makes the mother healthy, strong and improves her ability to fight diseases such as cancer. A majority of respondents could think of no obvious benefits for the mother, however, while a few suggested a negative impact, e.g. that the woman loses beauty, particularly in the shape of the breast, when she breastfeeds. Most informants believed breastfeeding should continue just until the child is 'old enough to eat the family diet'. There was also a widely shared perception that breastfeeding should be stopped immediately when a mother becomes pregnant with another child, and that breast milk from a pregnant woman is no longer nutritious and can even cause sickness.

Complementary feeding

The quantitative and qualitative results indicate that complementary feeding practices in Baitadi district are also not optimal. Compared to the WHO guidelines, 90% of children aged 12–23 months were fed at the appropriate frequency for their age (≥3 times for breastfed and ≥4 times for non-breastfed children per day); however, only 42% of the children were fed the age-appropriate minimum dietary diversity (≥4 food groups per day), and only 38.5% were fed the minimum acceptable diet for their age (appropriate frequency and diversity).

The bottom of Table 3 shows the proportion of children ages 12–23 months fed each of the seven food groups specified by WHO over the 24 h prior to the survey. Almost all children consumed staple foods like grains, roots and tubers (99%); 81% consumed dairy products other than breast milk; and 65% consumed vitamin A-rich fruits and vegetables. However, very few children consumed animal-source foods such as eggs (2%) or meat, fish, poultry, etc. (4%). In Baitadi, Brahmin and Chhetri do not customarily rear or consume poultry, believing they are unclean. Maternal beliefs about feeding nutritious complementary foods is also presented in Table 3. Only 28%, 33% and 42% of mothers, respectively, felt children between 6 and 12 months of age should be given eggs, fortified porridge and flesh foods (meat, poultry etc.) in addition to breast milk.

From the qualitative data, we found that most mothers, mothers-in-law and husbands were aware that the introduction of semi-solid foods should occur at 6 months. Many spoke of a cultural ceremony called '*rice feeding ceremony*' that is performed when a child is 6 months and marks the first time that the child is fed complementary foods, particularly rice porridge. In one community, study subjects mentioned a radio programme that had reinforced this message; others cited community health workers as a source of such information. In addition to rice, mothers commonly reported offering buffalo milk, *Jaulo* (a rice and pulse dish), *Lito* (an infant food made of rice, ghee and sugar), a porridge made of ground rice, soybean and wheat fried in ghee and cooked in milk, or, where available, a lentil/pulse soup and soft *roti* (bread). Some mothers mentioned adding vegetables (e.g. 'green leafy vegetables') and fruits (e.g. mango, banana) to the porridge, and a small number also reported feeding animal-source

foods including meat, eggs, fish and yogurt. Most respondents felt that appropriate complementary foods for children should be soft or 'soupy' and well-cooked to prevent diarrhoea and stomach aches; many thought animal-source foods should be avoided especially before the age of 1 year.

• [*Mother*] If solid food is given, child suffers from stomach ache, diarrhoea, so food should be made soft.

With regard to the frequency of feeding, most mothers indicated they did not have any schedule or fixed number of times of feeding per day, but provided food to the child frequently, in most cases at least four times. There was a general perception that a child cries when hungry and stops eating or vomits when he is full. Some mothers said they waited until the child asked to be fed, particularly by crying. Nevertheless, mothers cited a range of techniques used to entice a reluctant child to eat, most commonly by coaxing and playing with the child during feeding.

Cultural beliefs, food availability, time and financial constraints, seasonality and water availability were all cited as factors that affected the quantity and variety of foods provided to children. Most mothers felt that food for children under 1 year should be prepared separately from the family meal, particularly because in their view infants cannot digest 'spicy' or 'oily' foods; however, some regretfully said they did not have time to do so. In addition, most mothers felt that animal-source foods (meat, eggs, fish and yogurt) should be given to children only after 1 year of age or after the child has teeth. Respondents also suggested that these foods are often inaccessible because of their cost and that liver is not usually eaten by those of the Brahmin caste. A few mothers mentioned cold foods should be avoided along with certain vegetables and fruits during the cold season (October to June).

• [*Mother*] I haven't given meat or egg because they remain uncooked in stomach and child vomits . . . After child becomes a year and develops teeth, then egg, meat and fish are fed. After child becomes a year old, then curd is also fed.

• [*Mother*] Liver is given to child and mother, but it is not easily available; the market is not near. Only after animals are killed in village, liver is found.

Feeding of sick children

The quantitative survey found that 18% of the children ($n = 135$) had experienced an illness in the 2 weeks preceding the interview. Among this sample, only 22% of mothers reported feeding the sick child more than usual, while 58% fed less and 17% fed the same amount. In the focus groups, mothers explained that they provided food to a sick child only when the child wanted to eat. Some mothers indicated that they did increase the amount of liquids (particularly breast milk) and soft foods, such as *jaulo* and *lito*, given to the child.

• *[Mother]* Sick child must be fed soupy foods like lentil soup, porridge, milk or mother's milk. If ill child refuses to eat food then child should be coaxed. What child wants to eat must be fed.
• *[Mother-in-law]* If the child is sick, only mother's milk is given.

Utilising findings in behaviour change communication strategy

Table 4 presents how research findings were translated into communications strategies and messages. The findings from this research were organised according to current practices and beliefs, factors expected to facilitate behaviour change, and those posing barriers to change. For example, a current non-ideal practice was mothers providing water or buffalo milk to infants <6 months, with barriers to change being beliefs that a nursing child may be thirsty or that the mother could not produce sufficient breast milk. A factor to facilitate change would be providing messages that emphasise the high water content of breast milk sufficient to quench thirst, and teaching mothers methods to enhance breast milk production, such as correct positioning, frequent feeding and emptying each breast fully at each feeding. FCHVs were trained in lactation management to improve their knowledge and skills for supporting optimal

Table 4. Translation of formative research findings into communications strategy

Optimal breastfeeding: initiation within 1 h of birth; feed colostrum and no prelacteals; exclusive for 6 months; continue 24 months and beyond		
Current practices & beliefs	Facilitating conditions for behaviour change	Barriers to behaviour change
• Exclusive breastfeeding is not continued to 6 months due to beliefs of poor milk production, that a 'weak' child requires additional feeding, or the mother's work obligations outside the home • Buffalo milk is provided if mother's milk considered insufficient • Some mothers are uncertain about when and if water needs to be fed to the child	• All mothers breastfeed • Exclusive breastfeeding is practised by some mothers • Large majority initiate breastfeeding within first hour after birth • Colostrum was fed by the majority of mothers and prelacteal feeding was rare • Extended breastfeeding common	• Mother's time constraints and field labour obligations • Expressing breast milk is not common practice • Lack of knowledge of lactation management practices to increase milk production • Lack of understanding by all caretakers of the child of what exclusive breastfeeding is, and why it is important. • Belief that breastfeeding during new pregnancy will harm fetus
Communications messages and strategies:		
• Ensure mothers learn proper positioning and latching; emptying each breast completely at each feed; nursing at least 10 times during the day and night • All mothers can produce sufficient milk if they nurse frequently enough and empty each breast • Breast milk contains all the nutrients as well as all the water the infant needs for the first 6 months of life • Nursing mothers should be given extra foods and liquids to remain strong during breastfeeding • For the first 6 months post-partum women should be allowed to stay close to home to continue breastfeeding; encourage fathers and other members of household to support with field responsibilities • With proper nutrition a pregnant woman can continue breastfeeding previous child without harm to either child or mother		
Complementary feeding: appropriate quantity and frequency for age of child (6–8 months; 9–23 months)		
Current practices & beliefs	Facilitating conditions for behaviour change	Barriers to behaviour change
• The most frequently reported first foods included rice as *jaulo* or *lito*, although often without quality protein source • Food restrictions included certain food types, preparation, temperature and season; although cultural beliefs are changing and previously unacceptable foods are now being fed • Caretakers used weight gain and growth as measures of good nourishment	• Majority believe complementary feeding starts at 6 months with rice ceremony • Majority feed appropriate frequency.	• Lack of understanding of the recommendations for gradually adjusting frequency and quantity • The lack of understanding small children need frequent, small feedings • Lack of knowledge of how to make *jaulo* and *lito* nutrient-dense • Lack of knowledge of what foods can be provided to the child and why they should be given • Cultural taboos relating to eggs and flesh foods; 'cold/hot' foods • Multiple caretakers share responsibility for child feeding
Communications messages and strategies:		
• Wait until the infant is 6 months to introduce foods; until then the infant can only digest breast milk. • Porridge should be soft but not watery so that the infant receives enough nutrients. Porridge should drop rather than pour from spoon. • Infants' stomachs are tiny so feed small, frequent meals • Feed at least one full teacup three times each day from 6–8 months then two full teacups three times each day plus snacks to 23 months • Continue to breastfeed frequently throughout the day • Target fathers and elder women caretakers with messages as well to ensure all who help with young child feeding learn, understand and adopt best practices		

Table 4. Continued

Complementary feeding: optimal diversity and quality, including animal-source foods		
Current practices & beliefs	Facilitating conditions for behaviour change	Barriers to behaviour change
• Animal flesh foods usually introduced after 12 months, sometimes later • Eggs rarely fed • Availability, work, money, time to prepare and cultural beliefs all affected the food variety provided	• There is general knowledge that a variety of foods are important for the child • Some caretakers in the community are feeding regularly and a variety of foods	• Lack of knowledge of nutrient dense choices, particularly sources of zinc and iron • Lack of access to certain foods such as meat/liver • Confusion over when meat can be provided to the child
Communication messages and strategies:		
• Homestead food production training and inputs provided to increase household access to nutrient-dense plant and animal-source foods • To get all the nutrients they need infants must be fed many different foods. Choose foods of many colours to ensure a variety of nutrients • Animal-source foods are especially important for young infants who grow very fast • From 6 months infants can digest animal-source foods as long as they are made soft enough to swallow without chewing. Eggs are especially nutritious and easy to digest. • Feed at least four different food groups each day (grains and tubers; pulses and legumes; dairy products; flesh foods; eggs; vitamin A-rich fruits and vegetables; other fruits and vegetables)		
Complementary feeding: practice responsive feeding; feed with patience and actively encourage child to eat		
Current practices & beliefs	Facilitating conditions for behaviour change	Barriers to behaviour change
• When a child refuses to eat, caretakers may play, coax, reward and give favourite foods but also threat, scold and beat	• Some caretakers use positive strategies to encourage child	• Generally it was believed that children ask for food when hungry and will eat as much as they need; child perceived to control • Many caregivers do not know how to encourage a child who seems unwilling to eat
Communication strategies:		
• As children grow they may prefer to play rather than eat as much as they should; make feeding into a game to encourage them gently to finish their meals • Children will respond better and will be healthier with encouragement and love than with force		
Feeding during and after illness: increase breastfeeding and fluid/solid intake to speed recovery and catch-up growth		
Current practices & beliefs	Facilitating conditions for behaviour change	Barriers to behaviour change
• A sick child is fed light foods, such as *jaulo*, porridge, fruits, *lito* and black lentil porridge • A minority of mothers increase liquids, particularly mother's milk • A majority of mothers decrease feeding, particularly solids • A child who does not want to eat is often not fed	• Some children are fed more breast milk during illness • More mothers in qualitative research than in survey expressed importance of feeding sick child and in offering favourite foods	• Most caregivers reduce feeding during illness • There is widespread uncertainty about what can be fed during illness and when the child needed to be taken to the health worker
Communication messages and strategies:		
• Homestead food production to increase access to nutrient rich foods • The sick child needs extra food and fluids to fight and heal from illness. Animal-source foods are especially important sources of nutrients • Breastfeed more often when the child is ill to comfort child as well as help recovery • Sick children may need extra coaxing to eat. Feed favourite foods to encourage child to eat • Feed one additional meal daily to child for 2 weeks after illness to help prevent child from becoming too thin and weak		

Table 4. Continued

Maternal nutrition: one additional meal daily during pregnancy and two during lactation and increase animal-source foods; reduce workload		
Current practices & beliefs	Facilitating conditions for behaviour change	Barriers to behaviour change
• Mothers are generally given more calories (especially oils and molasses) during both pregnancy and lactation • Some are given animal-source foods while others feel they are difficult to digest during pregnancy • A few traditional taboos remain, such as pregnant women should avoid green vegetables, pumpkin, fish and milk • Certain foods enhance milk production, including *ajowan* and caraway seeds, molasses, meat, rice and ghee	• Many mothers already eat additional calories • Many mothers recognise importance of animal-source foods during this period	• Some misunderstandings of digestibility of animal-source foods • Financial and access constraints • Expectations or requirements for women's labour
Communication messages and strategies:		
• Homestead food production to increase access to nutrient-rich foods. • Target elder women and husbands with messages about the nutritional needs of pregnant and lactating women and need for rest and support • Mothers need animal-source foods to maintain their strength to feed a growing child • Mothers need to remain with their infants for at least 6 months to breastfeed optimally		

breastfeeding. Feeding of colostrum was common but emphasis was given to initiation of breastfeeding within the first hour after birth. As new pregnancies often led to the cessation of breastfeeding, with negative consequences for the young child, the safety and value of continued breastfeeding during pregnancy was highlighted. In light of findings that feeding frequency was generally adequate, messages emphasized increasing diversity. Thus messages especially addressed the importance of introducing animal-source foods beginning at 6 months of age, when the infant is physically ready for more than breast milk and has heightened nutritional needs. Also, given that multiple caretakers in the family share responsibility for feeding young children, the project ensured all were reached with messages and counselling on optimal practices. Grandmothers in particular were invited to all discussion sessions and demonstrations and special effort was made to address their generally more conservative beliefs.

Because the AAMA project also links nutrition education messages to the HFP activities, utilizing the foods produced by these activities is emphasized, especially animal-source foods given their nutrient density and importance to pregnant and lactating women and children 6–24 months. For example, messages emphasized the ability of children ages 6–12 months of age to digest animal-source foods as long as they are pureed or made soft enough to swallow without chewing, while special attention was given addressing cultural aversion to chickens, which are considered dirty. Eggs were promoted as rich sources of vitamin A, the importance of which is well appreciated in Nepal, and as protected against contamination by the shell. Messages were also developed to convey more clearly and precisely the quantity (using the ubiquitous tea cup to illustrate portion size) and diversity ('foods of many colours') of complimentary foods needed by the growing child at each stage of development, following international recommendations of WHO/PAHO (2003).

After an initial set of counselling cards and message boards was drafted, the messages and images were pre-tested with four focus groups each comprised of 10–12 pregnant women and mothers, two focus groups of seven to nine FCHVs, and two interviews with nutrition focal points at the VDC level to solicit feedback on the materials. Audiences were shown images and messages asked to explain their interpretations and express any confusion.

These discussions were recorded and transcribed and used to refine the materials. For example, an illustration representing an FCHV was not considered realistic; mothers found the depiction of the correct texture of the porridge difficult to interpret; and an image used to convey the appropriate quantity of feedings caused confusion. In a final step, the materials as revised according to the findings of these discussions were reviewed at a workshop comprised of district health officials and project staff.

Discussion

This paper outlines how formative research – using quantitative and qualitative methods – was utilised to elucidate barriers to the adoption of optimal IYCF and care practices in Baitadi district in Far Western Nepal. The quantitative data revealed significant inconsistencies between knowledge and practices, while the qualitative data enabled programme managers to understand the reasons for these gaps. The combined methodology also helped to identify erroneous beliefs about feeding and care practices in order to shape educational messages for the Baitadi context. The findings presented in this paper are limited to this setting and may not be generalisable to other regions; however, the methodologies are relevant for the design of nutrition education strategies in any context.

Limitations of this study include the small number of IDIs conducted, which may not have achieved data saturation. Nevertheless, the IDIs reflected similar beliefs and practices as those expressed in FGDs. Recall of the majority of the quantitative survey sample (mothers of children 12–23 months) of early infancy was distant, but an additional sample ($n = 209$) of mothers of infants <6 months provided useful data on knowledge and attitudes regarding exclusive breastfeeding.

Our findings on immediate breastfeeding and confusion over the value of colostrum are in line with other research on this topic in Nepal. An analysis of data from the 2006 Demographic and Health Survey for Nepal (Pandey *et al*. 2010) found that 33.3% of mothers in the hill regions breastfed their children within 1 h of birth; in our sample the proportion was 45%. A study from Makwanpur district in central Nepal found that informants often made a distinction between healthy colostrum ('*bigouti*') and '*khil*', which they perceived as a small, unhealthy plug that must be removed for colostrum to be released. Within that population, the initiation of breastfeeding within 1 h of birth was a common practice, but colostrum and foremilk were often discarded (Masvie 2006). Another study of newborn care in the same district reported that about half of the Brahmin and Chhetri mothers stated they gave prelacteal feeds and the same percentage discarded colostrum (Osrin *et al*. 2002). In our survey sample, only 4% provided prelacteal feeds while 28% reported discarding colostrum.

There is currently limited published literature on complementary feeding practices in Nepal; however, the few articles identified also suggest a poor dietary quality and a particularly limited amount of animal-source foods in the diets of young children. A study of the epidemiology of anaemia among children 4–17 months of age in Sarlahi district found that mothers fed only a low diversity of complementary foods, with only 29% of the full sample and fewer than 18% of those 4–11 months of age given animal-source foods (Siegel 2006). Our findings also reveal low dietary quality among young children in Baitadi district, with only 42% of children consuming four or more food groups, and 4% and 2% of children eating flesh foods and eggs, respectively. Our research also indicated that both religious traditions and beliefs of indigestibility prevented upper caste families in Baitadi from feeding young children eggs and animal flesh foods, although nearly 90% did feed dairy products. The research of Gittelsohn *et al*. (1997) in Sarlahi, a terai district in Nepal's central region, found that many informants classified foods according to their digestibility, and that this was particularly important when considering the diets of young children, the elderly and the infirm. The investigators found the community perceived poorly cooked foods, fatty meats and many kinds of legumes, including soybeans, peanuts, peas and lentils, as difficult to digest, while rice, nuts, sweets and yogurt were considered easy to digest and thus more suitable for young children.

In conclusion, our paper seeks to present how comprehensive formative research – through a combination of quantitative and qualitative research methods – can be used to both identify and quantify knowledge, attitudes and determinants of IYCF practices and shape communications strategies to address the most salient behavioural determinants. These strategies are currently being implemented and are likely to be more effective than boilerplate approaches in improving breastfeeding and complementary feeding practices and, ultimately, improving growth and development of children in the district. These findings from Baitadi are also likely applicable to other hilly districts of the Far Western region. Finally, with the increasing international recognition of the crucial importance and feasibility of improving nutrition practices (see *The Lancet* series on Maternal and Child Nutrition, 2008 and Scaling up Nutrition: a Framework for Action 2010) the approaches described here are likely to be particularly valuable to other programme planners.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

Contributions

LL, DA, AO and JN analysed the data and wrote the initial draft of the manuscript. JN, DA, PP, DS and AO designed the research, and supported the implementation, data collection, analysis and interpretation of results. NH and VQ provided leadership in the original project design. All co-authors participated in manuscript preparation and critically reviewed all sections of the text for important intellectual content.

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