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Original Article

Identifying interventions to help rural Kenyan mothers cope with food insecurity: results of a focused ethnographic study

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Abstract

An ethnographic study was conducted in two areas in southern and western Kenya to identify potential interventions to improve the quality, availability and affordability of foods consumed by infants and young children. A cultural–ecological model of determinants of nutrition identified the sectors of information for data collection related to infant and young child (IYC) diet and feeding-related behaviours, and the focused ethnographic study manual was used to guide the research. The results provide qualitative evidence about facilitators and constraints to IYC nutrition in the two geographical areas and document their inter-connections. We conclude with suggestions to consider 13 potential nutrition-sensitive interventions. The studies provide empirical ethnographic support for arguments concerning the importance of combining nutrition-specific and nutrition-sensitive interventions through a multi-sectoral, integrated approach to improve the nutrition of infants and young children in low-income, resource-constrained populations. They also document the value of ethnography as a component of landscape analysis in nutrition programme and policy planning.

Keywords: ethnography, multi-sectoral interventions, social and behaviour change communication, infant and young child nutrition.

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Introduction

Decisions about interventions to improve nutrition in poor populations reflect political philosophy, social values and fundamental assumptions about the way the world works, as well as theoretical and methodological orientations. Increasingly, there is recognition of the value of the type of implementation research that is commonly labelled 'landscape analysis' as an activity to provide context-specific data to inform decisions for planning nutrition and public health interventions (McLeroy *et al.* 1988; Shakarishvili *et al.* 2010; Du *et al.* 2013). To that end, the US government-initiated Feed the Future project in Kenya conducted studies in two areas in southern and western Kenya to help identify potential interventions to improve the quality, availability and affordability of foods consumed by infants and young children. This paper presents the results of an ethnographic study, which complements the dietary study that was carried out in the same areas (Ferguson *et al.* 2015, *Zinc, iron and calcium are major limiting nutrients in the complementary diets of rural Kenyan children*, pp. 6–20). The two complementary research approaches together constitute a 'landscape analysis'.

This paper begins with a brief background on the research tool that was used to structure the landscape analysis, followed by a short review of the study sites and the methodology. The results and discussion are integrated in the presentation in the next sections. Where results are similar for the two sites, these are presented without site specification. When results are different, these are noted and discussed. The final section of the paper lays out potential interventions to improve infant and young child (IYC) nutrition, both directly and indirectly, based on the problems that were revealed through the field research.

The focused ethnographic study manual

Focused Ethnographic Study of Infant and Young Child Feeding 6–23 Months: Behaviors, Beliefs, Contexts and Environments (Pelto & Armar-Klemesu 2014) is a research tool that was developed under the auspices of the Global Alliance for Improved Nutrition (GAIN). It is based on a model derived from three sources: (1) empirical, social and epidemiological research that provides a large body of data about factors that influence IYC nutrition; (2) a holistic, multi-disciplinary theoretical framework that reflects current understanding about the 'cultural ecology' of IYC feeding and care; and (3) the knowledge and perspectives that have been developed by private and public marketing research and by practitioner experience.

The framework (Fig. 1), which has been referred to as a 'cultural–ecological framework', was designed originally to provide an overview of the social and cultural elements that affect the nutritional status of individuals anywhere in the world (adapted from Jerome *et al.* 1980). It contains five basic components, each of which has been linked to IYC diet and nutrition. Although all of the components affect IYC feeding in all societies, the relative importance of each component varies from environment to environment. The components of the framework are inter-related, and the arrows in the figure are a simplification, intended only to indicate the concept of inter-relatedness.

The two environment components ('Physical Environment' and 'Social Environment') refer to the sources from which households acquire food. In rural areas, such as those we studied in Kenya, these two components draw attention to issues that affect household food production (e.g. climate, water resources, soil characteristics and transportation networks), as well as features of the social environment (e.g. stores, markets and informal food sellers), which are also important for food acquisition.

At the household level, the component labelled 'Social Organisation' encompasses household economic organisation (including food production), demographic factors and information on how the household is organised to care for its dependent members. It also includes the allocation of responsibilities for child care in relation to time available for other activities, including food acquisition.

The box labelled 'Technology' draws attention to the significance of the tools, techniques and equipment that are involved in the production, distribution, preparation and consumption of food, including the presence of refrigeration and other storage facilities, the quality of water available to the household, the ease or difficulty of preparing heated foods, the ease or difficulty of maintaining a sanitary environment and so on.

The box labelled 'Culture' encompasses the broad domain of 'ideas' – knowledge, beliefs, values, perceptions and emotions – that affect and relate to the acquisition, preparation and consumption of food. It also includes parents' ideas about child development (e.g. how parents assess their children's progress), their aspirations for their children's future, their concerns and interpretations of signs of illness and how to deal with them and many other aspects of the non-material resources they draw on to cope with the challenges of raising children.

Key messages

- In addition to constraints on infant and young child diet that originate in environmental and technological conditions in both agro-ecological zones, other factors that affect feeding practices include features of social organisation, household access to social support, caregivers income-earning activities and their own health.
- The results of the ethnographies, which highlight the importance of obtaining the knowledge and perspectives of caregivers of infants and young children, reveal the interactions of the multiple factors that affect child nutrition and the need for simultaneous nutrition-sensitive interventions to complement nutrition-specific intervention actions.
- Most caregivers in both areas not only understood the importance of diet and food quality for child survival, they also regarded it as essential for child growth and development. This indicates that caregivers in these rural Kenyan communities have adopted the basic biomedical interpretation of the importance of child nutrition as an integral part of their 'knowledge frameworks'.

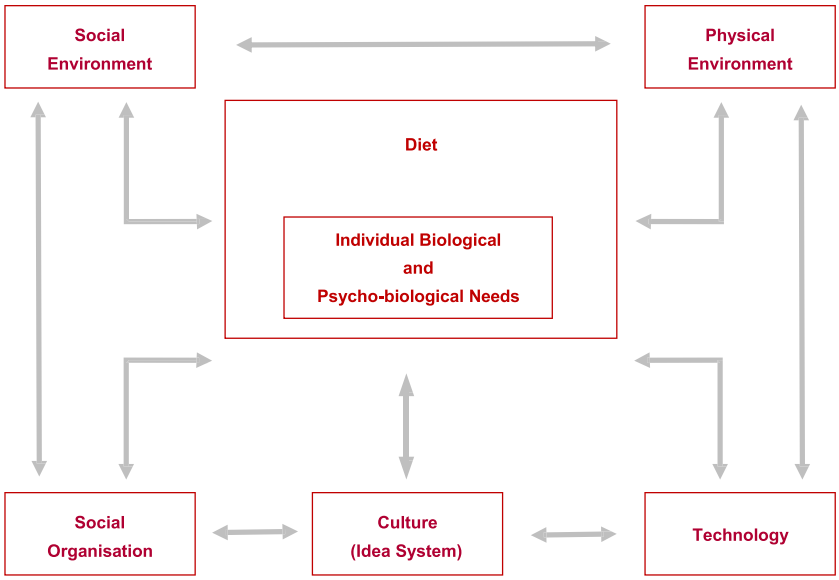

Fig. 1. Cultural–ecological model of food and nutrition.

In the findings in the succeeding sections, we present data to show how the specific conditions related to these components in the two study sites in Kenya are affecting IYC feeding.

The study sites

The studies were undertaken in two U.S. Agency for International Development (USAID)-designated Feed the Future counties: Vihiga, in western Kenya, and Kitui, in southern Kenya.

Vihiga County is located on the eastern fringes of the Rift Valley in the Lake Victoria Basin and lies between 1300 and 1500 m above sea level. Despite a favourable climate and soils, Vihiga County is not self-sufficient in food production. Most of the food needs are met by importation from other districts. In general, food insecurity in the county is associated with low agricultural yields, natural calamities and low returns on farm produce. The Luhya tribe, also known as Abaluhya, is the main ethnic group in Vihiga County.

The climate of Kitui County varies between arid and semi-arid, with very erratic and unreliable rainfall. Most of the area is hot and dry. The limited availability of water, coupled with poor soil fertility, presents major challenges for crop cultivation. More than a third of the district's residents reside in the marginal mixed farming regions, which largely rely on livestock for food (milk and other products) and revenue. However, the livelihood system is beset by high vulnerability to recurrent and prolonged droughts, lack of water and pasture, high livestock mortality and repeated crop failures. The low-lying areas of the county (eastern and central) are also prone to flooding that disrupts economic activities. The people of Kitui are predominantly Akamba in ethnic origin.

Methods

The focused ethnographic study (FES) contains sets of research protocols. A description of the structure of the FES for IYC feeding can be found in the FES manual (Pelto & Armar-Klemesu 2014). Methodologically, the FES relies heavily on interviewing respondents with 'guiding questions' that are intended to initiate a dialogue on issues and areas of concern, which are captured orally as narrative. Thematic analysis, a qualitative analysis technique, is used to analyse the 'text' created by transcription of the narratives into written form. Standard dietary intake procedures are also used, and demographic and socio-economic information is collected with the types of questions that are used by many social science disciplines.

The FES approach draws significantly from cognitive mapping techniques. The basic techniques of cultural domain analysis were described by Romney & Weller (1988), and the use of formal ethnographic methods, including cognitive mapping techniques and their use in ethnographic research, was explicated by Pelto & Pelto (1976) and Bernard (2011). Applied anthropologists have made extensive use of cognitive mapping techniques as a methodological approach that facilitates the application of ethnographic techniques in rapid assessment/formative research (Gittelsohn *et al.* 1998; Schensul & LeCompte 2012). Two recent methodological texts in applied ethnography have outlined their utility and presented guidance on their execution (Borgatti & Halgin 2012; Pelto 2013). The types of data collection techniques in the FES include free listing, pile sorting, rating and ranking.

Another essential feature of the FES methodology is that the field research is conducted in phases. Phase 1 uses classical anthropological interviewing of key informants (N = at least 8–10 individuals in a study site) and community observations. The results from Phase 1 are analysed and used to fine-tune the modules for Phase 2. Phase 2, which is conducted with a small representative sample of at least 32 caregivers of infants and young children (6–23 months of age), is designed to confirm and expand the provisional picture that emerges from the key informants. The study is designed to be conducted in a period of fieldwork of 12–16 weeks by trained investigators.

Data collection and analysis in both phases is structured into protocols; each protocol contains a number of modules. Individual modules are focused on specific issues of concern for understanding infant and young child feeding patterns and practices. For example, the modules that are concerned with household behaviours include demographic and socio-economic status characteristics; a 24-h recall of foods consumed by the index child; food preparation and feeding behaviour; cultural values related to health and food; perceptions about factors that influence IYC feeding; perceptions about micronutrient supplements and fortification of infant foods; estimated weekly food expenditure; and food and feeding-related problems, challenges and solutions. Investigators can draw selectively on specific modules, depending on the issues that need to be examined. The studies in Vihiga and Kitui used protocols that pertain to household behaviours and conditions but did not include protocols aimed at understanding marketing or food production environments.

Based on the FES manual, key informants were selected for the Phase 1 interviews, followed by random selection of caregivers, to fill in a sampling grid based on child age. Interviews with key informants typically averaged 3–4 h, and with caregivers, the average was between 2 and 3 h. Interviews were often conducted in two sessions. The fieldwork in Vihiga was conducted in July and August 2013 and in Kitui in October and November. Ethical review and permission were applied for, and authorization to carry out the research was granted by the National Council for Science and Technology of the Republic of Kenya (Research Permit No. NCST/RCD/10/012/16).

Analysis of quantitative data was conducted with the aid of spread sheets and simple descriptive statistics. Thematic analysis of text (the transcribed and translated recordings of the interviews) followed basic principles of qualitative text analysis (Miles & Huberman 1994).

Findings and discussion

The numbered findings in this section reflect the components of the cultural–ecological framework. Although some of the findings are relatively discrete with respect to the model's components, most of them cut across multiple components. All of the findings reflect the complex interactions among the components and underscore the importance of using a holistic, theoretically and empirically grounded template to guide data collection and interpretation.

IYC diet in the context of family foods

The full nutritional assessment of an IYC diet in Vihiga and Kitui was obtained with the application of a cross-sectional dietary survey and Optifood software (q.v. Ferguson *et al.* 2015, pp. 6–20). Consequently, in this study, we focused on how IYC diet relates to the organisation of food for the family, rather than on characteristics of the child diet per se. Because we are concerned here with feeding in the family context,

we started by examining whether there is cultural recognition of the concept of 'special foods for infants'. One can hypothsize that it is easier to introduce IYC-specific interventions if families already have a concept of special infant foods. This recognition is not universally the case, as it depends on how cultures conceptualise infant feeding in relation to their 'core foods'.

The concept of 'core foods' (or 'cultural core foods') has been used in nutrition to refer to the small number of foods that comprise the physical, psychological and social base of the diet. We recently suggested applying this concept to IYC feeding as a means of examining 'special foods for infants' within a broader cultural context (Pelto & Armar-Klemesu 2013). In other words, we can ask whether a society has a separate 'IYC cultural core'. We define an 'IYC cultural core' as a set of foods that are culturally identified as 'foods for infants and young children', as distinct from foods for everyone else. In some cultures, there may be almost no special foods for this age group, but in most cultures, there are some foods that people view as especially appropriate in the first 2 years of life. It is also common for people to have a set of beliefs about why some foods are important and others are dangerous and should not be given to infants and young children.

We can conceptualise the relationship of the 'IYC cultural core' to the 'household cultural core' as a Venn diagram (Fig. 2). The diagram on the left illustrates a situation in which the IYC diet in the first year of life is comprised almost entirely of special IYC foods that are not shared with the family. This is the situation in countries where commercially produced 'baby foods' predominate in IYC diets. At the other extreme (the right-hand diagram) are cultures in which there are no 'baby foods' and in which only very modest modifications are made to family foods. Cross-culturally, the amount of overlap between the IYC cultural core and the household cultural core can vary from two nearly independent domains to almost a single domain.

In addition to determining whether the concept of 'special foods for infants' is present in the two Kenya sites, we need to understand what foods constitute the IYC core, that is, which specific foods are culturally valued for infants and young children, as this is also important for intervention planning. In Vihiga and Kitui, caregivers have well-developed ideas about special foods for infants. They invest heavily in providing their infants with special porridges, particularly millet porridge, as well as other foods that are not generally shared with family members. This indicates cultural commitment to the concept of special foods for infants and young children. At the same time, however, we also found that infants and young children are frequently integrated into the household core as early as the second half of their first year of life. By 6 months of age (the point at which our dietary intake inquiries start), some children were receiving family foods, and over the ensuing months, infants were increasingly sharing family foods.

Table 1 shows both the IYC core foods and the family foods that are given to infants and young children in the two study sites. All of the foods in the table were elicited in Phase 1 when key informants were asked to list the foods that are given to infants and young children. The ensuing discussions with the key informants, together with the discussions in connection with the 24-h recalls in Phase 2, provide data to conclude that there is a clear IYC cultural core, distinct from family foods, and that this plays an important role in the household management of the IYC diet. However, very often families do

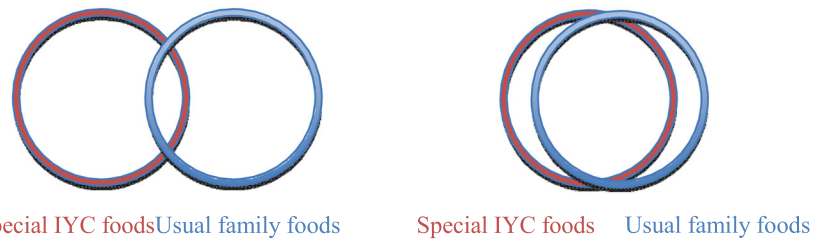

Fig. 2. Relationships of 'IYC core foods' and 'family core foods'.

Table 1. IYC cultural core foods and family foods fed to infants and young children

	County	
	Vihiga	Kitui
IYC core foods	Porridge*	Porridge*
	Rice	Rice
	Irish potatoes	Irish potatoes
	Green bananas	Green bananas
	Tea with milk and sugar	Animal milk
Family foods fed to IYC	*Ugali*†	*Ugali*†
	Tomato soup/stew and small dried fish	Tomato soup
	Greens, especially kale	Greens, especially kale
	Beans	Beans
	Fruits	Fruits
	Eggs	

*Preferably millet or mixed grains, as maize is a much less desirable, although frequently used, option. †Ugali: the maize-flour staple preparation that forms the basis for many meals.

not have the economic or food resources to act on these preferences.

Sources of IYC foods

Understanding the opportunities for and the barriers to improving IYC feeding practices requires information not only on what children are being fed but also about where the foods are coming from and how they are being prepared. As shown in Table 2, food was acquired in Vihiga and Kitui through both home production and purchasing from a variety of sources, including relatives, neighbours, local kiosks, markets, shops and supermarkets. Foods were also acquired through borrowing or on credit, as gifts and from barter trading. Borrowing food, with and without the expectation of returning it in money or kind, was especially common in Vihiga.

The most striking finding with respect to food acquisition (Table 2) is that most of the foods that are integral components of the IYC diets and that make up

Table 2. Sources of IYC food in Vihiga and Kitui counties

	Source of foods: Vihiga			Source of foods: Kitui		
Food/Ingredient	Home production	Local*	Market/store	Home production	Local	Market/store†
Millet for porridge			XX			XX
Mixed grain flour for porridge			XX			XX
Maize/maize meal for porridge	XX		X	X		XX
Milk (goat, cow)	X	X		X	X	X
Irish potatoes	X		X			XX
Green bananas	X	X				XX
Rice			X			X
Tea			XX			XX
Dried sardines			X			
Vegetables in sauce						
Kale	XX	X	X	X	X	XX
Cowpea leaves	XX		X			XX
Tomatoes	X	X	XX	X		XX
Onions	X	X	X			XX

Note: 'XX' indicates that a large majority (at least 70%) of respondents reported this acquisition source. *These products are produced within the local area and purchased directly from local producers, often neighbours. †The predominance of this source reflects acquisition in the dry season, when home-produced crops are not available.

the 'IYC cultural core' were solely acquired from external sources – shops, neighbourhood kiosks, markets or supermarkets. These includes millet, some mixed grain porridge flours, rice and small fish (in Vihiga, but not in Kitui), as well as the ingredients that are used to prepare foods for infants and young children – sugar, oil and bouillon cubes, which are not culturally conceptualised as 'foods'. A significant fact depicted in Table 2 is that all of the millet in the 24-h recall data for the IYC porridge given to children in Vihiga was purchased, whereas much of the maize came from home production. In Kitui, none of the millet came from home production, and the contribution of home-produced maize was more modest compared with that in Vihiga.

Household food production

A central finding of the study is that households do not rely heavily on home-produced foods to meet their nutritional needs. Household members are not subsistence farmers, as this designation is commonly understood. Nearly all households in both study sites engage in agricultural production for home consumption and, to a much lesser extent, as a means of generating much-needed cash. In Vihiga the majority of households in our sample owned one acre or less, and in Kitui the average land holding was three acres. However, only a small fraction of households produce sufficient staple foods to meet basic household food needs throughout the year, and all of them rely on the market for some foods. In short, all households are dependent on the market for part of their household food basket. Moreover, as we highlighted in the previous finding, all households, regardless of their level of production of staple foods, purchase the majority of the foods that are specially prepared for infants and young children (with the exception of maize, the least preferred grain for IYC porridges). Millet, used to make porridge for infants and young children, was not reliably a successful crop in Vihiga, and a number of respondents described their difficulties trying to grow it.

Food insecurity

The pervasive problem of food insecurity in sub-Saharan Africa and its relationship to climate change and rural poverty have been extensively studied (cf. Lobell *et al.* 2011; Wheeler & von Braun 2013), and these studies are now expanding to have an explicit focus on nutrition (Jones & Yosef in press). It is no surprise that in the ethnographic interviews on general issues concerning taking care of infants and young children, food insecurity emerged as a major problem for most households in Vihiga and Kitui. While it is a central issue for families throughout the year, it is particularly acute in the dry season, when there is no food in family fields and the supply of stored staples is gone. Food insecurity affects the economic organisation of households and many aspects of IYC care.

When we asked caregivers specifically about food-related challenges associated with taking care of their children, the majority of respondents said that 'not having enough money to buy food' for their infants and young children was a primary concern. Others said 'lack of good food' was the key problem. The comments below were typical:

Mueni: *I have no stable job to get enough money. My income is not adequate to support [my child]. This makes things difficult. I also have other needs, such as school fees, school uniform, shoes and clothing for other children. My income is just a drop in the ocean. It solves very few problems. My baby needs clothing, medical care and food, and I have no food to feed him always.*

Mary: *[When I lack food] I breastfeed her so that she does not sleep hungry. This makes me very weak because I am doing so when I have also not eaten anything.*

Sarah: *Whenever I lack a job I lack the means to buy the baby food. This happens when there is no job in the locality or in the nearest town.*

Negative changes in IYC diet occur during the periods of greatest food insecurity

There are two main sources of dietary changes associated with seasonal food insecurity:

- There is less consumption of the specific foods that are purchased rather than home produced. In periods of food insecurity, the purchased foods are replaced with cheaper, less nourishing foods. For example, in both sites, because the ingredients for millet or mixed grain porridges must be bought, infants and young children eat them less and are

instead fed maize gruel. In households in Vihiga, this inability to purchase food means not buying small fish for stews. In the poorest households, it means being reduced to eating maize preparations and little or nothing else and drinking black tea.
- Differences in seasonal availability in households' fields and gardens or animals and animal products (e.g. milk) affect the consumption of specific foods. This means making stews without fresh vegetables or only with the cheapest vegetables available for purchase in the market. It means cutting out fresh fruits from IYC and household diets, and it also means significant reductions in animal milk for infants and young children.

Other aspects of household dietary changes during periods of economic stress and food scarcity include:

- Modifying recipes due to a shortage of funds to buy ingredients that are used in preparing foods. For example, women shift from frying to boiling, and they do not add fortified margarine to IYC foods. They make 'milk tea' for infants that contains very little milk.
- Modifying recipes and preparations because of reduced availability of foods from household production.

Other ways in which families make adjustments to seasonal food insecurity involve alterations in the number of meals (typically shifting from three meals a day to two or even one); alterations in when meals are eaten (extending the time gap between meals to adjust to eating only twice a day); and, most importantly, changes in intra-household food allocation.

Across the globe, families' efforts to buffer children from food shortages have received a great deal of attention in studies that are aimed at understanding responses to hunger and food insecurity (Hamelin *et al.* 1999; Oldewage-Theron *et al.* 2006). Parental buffering has been described for virtually every society where investigators have examined household behaviours in the face of food scarcity. It occurs in resource-poor countries and industrialised countries alike.

Caregivers in Vihiga and Kitui offered many comments to explain why they buffer their children, particularly their infants and young children, in times of household food insecurity. Most of these statements are related to protecting children's health and growth. Caregivers fear that their children's health will be compromised by lack of food, and, therefore, they direct their scarce food supply to those who are seen as most vulnerable to the negative health consequences of insufficient food. However, a number of women also said that hungry babies disturb adults in the household, and, consequently, it is necessary to provide them with sufficient foods to prevent their crying and disturbing older children and adults. In highlighting parental buffering to protect children from hunger, it is also important to point out that buffering is only relative and does not protect children from either the experience of overt hunger or the reductions in both dietary quality and quantity that occur during periods of seasonal food scarcity.

The central role of women in household food acquisition

Another key finding from the ethnographic studies in the two geographic and culturally different sites is that both household economic organisation and cultural expectations place the primary responsibility for food acquisition for adult and young family members on women. Although the residents of Vihiga County and Kitui County have different ethnic traditions and affiliations, the role of women in securing food for the household is essentially the same. 'Food acquisition' is a broad term. For women in Vihiga and Kitui, it encompasses food production in household fields and gardens, securing money to purchase food and the actual purchase of food, as well as acquiring the means to prepare food (i.e. water and fuel). This range of responsibilities, along with the necessity of carrying out other domestic chores, has profound implications for the amount of time women can devote to meeting their children's care needs. Here the UNICEF framework (UNICEF 1990), with its emphasis on pre-requisites for IYC care, is particularly relevant for understanding the constraints that the combination of household economic organisation and cultural expectations about women's roles and responsibilities place on caregivers.

There has been considerable discussion and debate in the international literature about the nature of women's economic responsibilities in food production historically and in contemporary sub-Saharan African communities (Bryson 1981; Lado 1992; Quisumbing

2003). In addition to regional, cultural and ecological differences within and between countries, differences in colonial experiences, the rise of cash cropping and patterns of urbanism have all affected the roles of women in home food production. In the areas of Kenya where our studies took place, these multiple factors have produced a situation in which women have come to see themselves as being primarily responsible for ensuring the economic and nutritional well-being of themselves and their children.

Other aspects of social organisation in Vihiga and Kitui are also fundamentally important for food acquisition. Of particularly importance is the role of social support, especially as it relates to social support for food acquisition, but other aspects of social support are also part of the picture. The extent to which caregivers' partners participate in providing food from agricultural activities, money to buy food and help with IYC feeding affects IYC diet both directly and indirectly. When women have supportive partners, they invariably articulate the importance of this support. Some respondents described support that goes beyond monetary contributions to encompass mutual problem solving with respect to IYC feeding and care. Apart from husbands, the role of in-laws, parents and siblings, as well as neighbours, is often critical.

The following quotes from respondents illustrate both the importance of husbands in helping manage food insecurity and the fact that, culturally, they have a secondary role:

"My husband buys food for the children, if he has money."

"Though my husband helps out, sometimes when I ask him for money to buy food he says he does not have it."

"My husband went looking for a job in Nairobi and is not finding a stable job. He has been there for quite some time, about 5 years now; he has not been supporting me in any way (food, clothing or school fees) because he is not able to."

Caregivers' cultural values concerning their personal responsibility for their child's well-being

In addition to being responsible for food for the household, women are responsible for their children's well-being. This is captured in a common sentiment that emerged from the interviews: *It is up to me to ensure that my child is healthy*. There are several positive implications of this value. It means that when children are growing and developing well, caregivers have the satisfaction of observing this and taking pleasure in their role in supporting it. It also means that they are open to new health and nutrition interventions when they believe that these will improve child health. However, there is also a negative side in that it can lead to self-blame and even judgemental blame from others when a child is ill or is identified as not growing well. Another negative corollary is that it opens the door for caregiver anxiety and depression when they cannot meet their expectations, as illustrated in the following quotations:

"It's very painful not to be able to feed your children. Sometimes I sit down and cry because I look at unhappy children sitting around me yet I can't give them anything…. I feel sad."

"My head aches because of thinking a lot. I keep worrying because I do not have food and I do not know where to seek help. I think, yet I do not know what to do. Sometimes the head aches and the body feels weak and sick."

"Sometimes I end up with migraines. I spend sleepless nights thinking of the way forward. I sometimes wonder whether I should keep by my husband's side or divorce and go away from here to look for a job so that I can support my child on my own."

"I feel extremely bad. Sometimes I re-think my decision about marriage. Did I make a wrong decision getting married without having any reliable source of income?"

There is a growing body of evidence linking maternal depression to poor growth and development in infants and young children (Collins 2009; Ndokera & Macarthur 2011; Nasreen *et al.* 2013). It is probable that much of this association is due to the fact that poverty and food insecurity affect both food availability for infants and young children and maternal depression, independently and interactively. At the same time, however, depression affects other aspects of mother–child interactions and thus exacerbates the effects of inadequate food availability and low-nutrient intake.

Women's strategies to feed their families

Caregivers in Vihiga and Kitui are active and resourceful in the face of food security challenges,

as they are in relation to the myriad other challenges and demands they encounter. All of the respondents described actions and strategies that they use to obtain money to buy and/or otherwise obtain food for their children. The strategies that they use to address the challenges of food insecurity, in general, and particularly its seasonal nature, take a number of different forms. The lack of income-earning opportunities was a repeated theme in the interviews.

We have classified women's strategies to obtain food and/or money to buy food into two main categories: (A) income-earning activities and (B) non-income-earning food acquisition activities.

A. *Income-earning activities*

1. Making charcoal for sale in the local area
2. Selling farm produce and milk during periods of agricultural productivity
3. Engaging in short-term activities to earn money by providing services for neighbours (e.g. gathering firewood, hauling water and weeding) or travelling further to have day labour work in nearby population centres
4. Engaging in small-scale entrepreneurial activities (selling food and other goods, which they bring from larger centres to sell in the local community)

In Kitui, there were two other sources of income and/or food acquisition that were not reported by women in Vihiga:

1. Kitui has a number of external programmes to buffer economic insecurity, particularly food-for-work programmes and some food aid programmes. These are not routinely available but are occasionally a resource women can turn to.
2. Kitui has a long tradition of basket weaving and other craft production, and women also engage, to a very limited degree, in making and selling crafts.

B. *Non-income-earning food acquisition activities*

1. Receiving money from husbands/fathers to purchase foods
2. Receiving credit from local stores to buy food
3. Borrowing food and/or money from relatives and neighbours
4. Foraging and hunting
5. Social welfare programmes (reported only in Kitui)

Variability in family structure

An important finding that emerged clearly from the studies is the significance of intra-community differences in family structure for women's management of the challenges of feeding and caring for their infants and young children. To date, the ways in which variations in household composition and structure affect nutritional risk within communities have not received adequate attention, either by the research community or in nutrition programme development. The composition of the household establishes the conditions within which women organise the multiple and competing demands on their time and resources. In both sites, there is a great deal of variability in household structure and composition. Some caregivers are living in multigeneration extended families in which there are several adults, including more than one person who assumes direct child care responsibilities. At the other extreme are single mothers with their child or children. In families in which there are no children old enough to care for younger siblings or take on other household food acquisition-related tasks, all of the household tasks have to be managed by the mother.

Being part of a larger, extended family does not necessarily mean that a woman has more time to care for her infants and young children. Depending on family dynamics and the health of other family members, larger households can also mean that a woman must spend more time on non-infant care activities. Living in a nuclear family, composed of the mother, her husband and their children, can also present challenges for food acquisition management, particularly when there are several children and inadequate food production resources. Without quantitative demographic data to determine the relationships between child nutrition and family structure, one cannot draw definitive conclusions about how structural differences affect child nutrition in these communities. However, as a general statement, it appears that women who are alone with

their children face the greatest challenges in coping with food insecurity.

Lack of water

Shortage of water is a fundamental issue for the households in both sites, and it is especially acute in Kitui. Lack of sufficient rainfall has dramatic effects on caregivers' ability to grow crops. Some households are fortunate enough to be located near water sources that can be used to irrigate fields, but most are not. When rains fail, crops fail.

Lack of rainfall affects the traditional wells that are the source for household water and water for animals. Sometimes women have to slaughter their animals because they have no water for them and no money to buy water.

There is no piped water in the houses so water for cooking, as for all other purposes, has to be brought from an external source. This requires a substantial time commitment from individuals within the household. Often this is the caregiver herself, but it may be others, depending on household composition. The following quote illustrates the effects of water shortage on women's time allocation:

> We went all over looking for water, but we were not lucky to get any….
> Sometimes one has to walk for 5 km just to fetch water, only to find a long line of people looking for it too.

In addition to its other effects, severe seasonal water shortages affect how women cook and what they prepare for their families, including their infants and young children:

> There are no rains. There is no water. When we have no rain we are forced to buy everything. When there is no water we sleep hungry sometimes. This year I slept hungry because… there was no water for cooking completely.

The negative effects of food preparation and storage technology on IYC feeding behaviours

The combination of exclusive reliance on firewood or charcoal as the only fuel for cooking and the lack of refrigeration that characterises household life in Vihiga and Kitui has negative consequences on IYC feeding and care practices. Women cook with wood scraps, which are collected from the environment. As with water, the amount of time a caregiver personally devotes to the activity of collecting firewood depends on whether there is someone else in her household she can delegate the task to or whether she has funds to pay others to supply her fuel. Often women will delegate the care of infants to other household members who are too young or too fragile to collect firewood (and water) while she carries out these essential food-related tasks.

In addition to the time demands, quality of firewood as a fuel for cooking can be a problem. Caregivers pointed out that poor quality creates uncertainties about how much time will be required to establish a fire, how hot it will burn and, therefore, how long it will take to have food ready to serve their families. Poor quality also affects a caregiver's ability to respond to IYC signs of hunger. To moderate these effects, women typically prepare food early in the day and then store it to give to their children later. It is probable that this practice contributes to diarrhoea in infants and young children.

In summary, the negative effects of food preparation technology in the two sites include: (1) the time required to obtain firewood; (2) the need to re-establish the fire to heat or reheat food, which affects caregivers' ability to respond to IYC hunger cues in a timely fashion; and (3) long periods of food storage that occur because it is too difficult and uneconomical to restart the fire just to heat up food for infants and young children.

Caregivers' clear understanding of the importance of food for child health and growth

All human societies recognise that food is essential for survival. However, the concept that food quality, as contrasted with food quantity, directly affects child health and development is not universal. An important and unexpected finding from the studies is that the majority of respondents not only understood the importance of diet and food quality for child survival but also regarded it as essential for child growth and development. Consequently, they are strongly committed to providing their infants and young children with the

best foods that they can obtain. The implications of this finding are far-reaching. They indicate that the caregivers in these rural Kenyan communities have adopted the basic biomedical interpretation of the importance of child nutrition as an integral part of their 'knowledge frameworks'.

Caregivers' 'knowledge frameworks' for IYC feeding are composed of the organised set of concepts that define their beliefs and values about how children, including their own child, should be fed (Monterrosa *et al.* 2012). Of course, knowledge frameworks alone do not determine how a woman will actually feed her child, as a number of other factors play important, often more primary, roles. But these frameworks enter into the conscious and unconscious decisions that are reflected in their caregiving actions. The results from the FESs indicate that the foundation for behaviour change communication (BCC) has already been laid in these communities.

In addition to the fundamental concept of nutrition, health, growth and development linkages, some of the caregivers we interviewed also have more specific nutrition knowledge. Here are two examples selected from many similar statements by respondents:

"There are different types of vitamins—A, C and D—which help prevent the baby from illness, such as typhoid. If the baby is safe from infection, she will generally be healthy, and I will feel good. In my view, the type of diet the baby eats will make the baby strong."

"I feel bad because giving the child these [less desirable but affordable] foods may affect how the child grows. For example, they might take longer to walk or to talk than other children of this age, and you might not know whether there are also bad things happening to their bodies. [In the best season] I feel happy because the baby is doing well. The child is eating food to give her energy. Then she can gain weight and grow well."

The first example illustrates a high level of familiarity with scientific nutritional concepts, albeit with some shifts from textbook nutrition. The second example illustrates both familiarity with modern nutrition concepts and the psychological pain women experience when they cannot act on their knowledge. It is also important to point out that the knowledge frameworks that are reflected in these quotes are not universal within the sample of respondents, and there is considerable variability in levels of knowledge.

Identifying potential interventions to support IYC nutrition in Vihiga and Kitui

Ruel & Alderman (2013) introduced the important distinction between nutrition-specific and nutrition-sensitive interventions. The former can be used to characterise actions that have a direct impact on the prevention and treatment of undernutrition, while the concept of nutrition-sensitive captures a range of interventions that have indirect impacts on nutritional status. Two papers in this supplement focus on nutrition-specific interventions to improve IYC nutrition (q.v. Ferguson *et al.* 2015, pp. 6–20 and Hotz *et al.* 2015, *Constraints and opportunities for implementing nutrition-specific, agricultural and market-based approaches to improve nutrient intake adequacy among infants and young children in two regions of rural Kenya*, pp. 39–54). In this paper, we take up the challenges of identifying nutrition-sensitive interventions that can be derived from the FESs. We present them below in relation to the cultural–ecological framework shown in Fig. 1. To some extent, placing them in a specific component is arbitrary because most of them involve actions that cut across multiple components, so this allocation is essentially heuristic.

Interventions related to technology and the physical environment

- Improve access to water for both farming and home use. Less water is required to meet household needs than is required to maximise food production from farming, but even fulfilling household water needs would save women a great deal of time and energy. It would also improve hygiene and might improve the quality of the water for human consumption, particularly as caregivers are knowledgeable about good hygiene practices.
- Introduce stoves that would use firewood more efficiently and decrease the reliance on firewood as the only cooking fuel (e.g. with fuels with higher caloric density, solar heat to preheat water and solar ovens). These interventions would save time and might make more frequent preparation of food feasible. This, in turn, would reduce the time that IYC food is stored

and provide caregivers with greater flexibility to meet IYC food scheduling needs.

- Develop better methods for safer food storage or reduce IYC food storage time after preparation. The inter-related roles of technology and the physical environment have a fundamental negative impact on IYC feeding in the study sites. They affect food production, food preparation, the safety of food storage and the caregiver's time to devote to child care. The recommendations related to technology will incur costs. Some of the costs are one-time and can be subsidised. But implementation of the recommendations will also entail on-going costs, including maintenance costs. An examination of currently available modern technologies to address these important technological and environmental constraints to adequate child feeding, together with an assessment of the feasibility of introducing them, is strongly recommended. Investments in research to develop new technologies will also have payoffs in improved child nutrition and health and may also contribute to the amelioration of these problems in other regions.

Interventions related to household economy and economic security

- Increase income-generation activities for women. Consistent with the finding that families are heavily dependent on the market economy and income to feed their families and that women have primary responsibility for food acquisition, it is clear that improving women's opportunities for non-farm income is a high priority for improving IYC nutrition. The shortage of income-earning opportunities was a recurrent theme in both sites. Further investigation, including participatory research, is the first step to identifying appropriate interventions. Based on the FES results, special emphasis should be given to increasing opportunities for women to earn money by working from their own homes. Home-based piece work and craft production, including basket making, are among the options to explore. This will require support for marketing.

Another avenue to investigate is supporting the development of small-scale manufacturing. This needs to be set up in a fashion that protects breastfeeding and ensures that infants and young children are not left in the care of inappropriate caregivers. Note that there is a substantial body of literature highlighting the negative consequences of infants and children of being left with inadequate and unmotivated caregivers.

- Institute safety net programmes to address food insecurity. The following suggestions will require policy support at national and regional levels:
  - Develop a universal support system to ensure a basic diet for all households in the dry season, when most households are experiencing serious food insecurity.
  - Develop comprehensive social welfare/economic support for high-risk food insecure households.

The major threat to IYC health and nutrition, as well as to the health of their caregivers and other family members, is food insecurity. Without a safety net of food and other economic support (including support to prevent food subsidies from being sold to secure funds for other essential needs), it is difficult to foresee how this fundamental threat to infant and young child health and nutrition can be overcome, at least in the short term until more sustainable economic development occurs. In developing food security programmes for Vihiga and Kitui, it is important to make the distinction between *seasonal support*, which is needed by most households, and support for those households whose circumstances are such that resources are required throughout the year.

Because of the continuing desertification, all households that rely on home-produced foods, at least to some degree, experience food insecurity in the dry season. In both sites, universal support in the most difficult months would enable families to buffer all of their members – men, women and children – during the most difficult periods. Of special concern are the households that are at high risk for food insecurity and that are single parent, women-headed households. Illness in women is another condition that puts families at high risk. Targeting these families for special help is essential for addressing current malnutrition in the most vulnerable infants and young children.

Interventions related to household food production

- Improve millet production. As described above, millet is a preferred grain for porridges that are given to infants and young children. It is also a crop that should do well in more arid regions. However, there is clearly a problem with millet production in both study sites. It would be highly advisable to identify the extent and causes of the difficulties that the respondents report in producing millet and find ways to correct them.
- Improve milk production at the household and community levels. Many households are giving home-produced milk to their infants and young children and/or purchasing it from neighbours. It is likely that more consistent use of this valuable local food resource would be possible with improved animal husbandry practices directed at small-scale dairy production. An examination of ways to improve local milk production would be a first step. Note that this issue is closely tied to solving water shortages. A consistent theme in women's reports about food production – both crops and animals – was the effects and consequences of lack of water on their efforts to provide their infants and young children with food.

In addition to the constraints on agriculture that are found in the physical environment, major constraints on household food production originate in features of social organisation, from macro-level factors (e.g. land distribution) to micro-level issues (e.g. the organisation of labour in households related to home food production, access to loans, access to agricultural innovations and knowledge through extension agents). Although this landscape analysis was not directed to these areas of investigation, the FES findings provide compelling evidence that interventions directed towards improving social organisation to support home food production would have direct benefits on IYC nutrition.

Interventions related to the social environment

Although our ethnographic studies in Vihiga and Kitui did not specifically investigate features of the external social environment in relation to IYC feeding, some insights into this domain, as seen through the eyes of caregivers, emerged from the study. They, too, have implications for interventions to improve child nutrition.

- Ensure availability of nutritionally appropriate IYC and family foods in the local marketplace during the dry season at prices families can afford. Fortunately for interventions aimed at improving household use of nutritionally appropriate foods for infants and young children, the foods that are viewed as most desirable by caregivers are, in fact, appropriate from a nutritional standpoint. This was the case in both Vihiga and Kitui. Although the effects of seasonality on the IYC diet are mainly due to the inability of households to purchase foods when income is at its lowest point and are most constrained in the dry season when fields and home gardens are not producing, there also appears to be less availability of fresh vegetables and fruits for purchase during the dry season. This needs to be confirmed through local market studies. The explanation for lack of availability of produce is undoubtedly tied to lack of household income to purchase these foods, so that interventions to increase local access will have to involve support for household acquisition. This could help buffer infants and young children from seasonal effects on diet.

Interventions related to culture

- Expand nutrition education efforts to identify and reach women who do not yet have the level of knowledge that characterises many caregivers in Vihiga and Kitui today. It is important to recognise that not all women are equally positioned with respect to having essential knowledge about IYC nutrition. Even in the small samples of the FES, it is apparent that while many women have an impressive understanding of what to feed infants and young children, some caregivers do not. Special efforts need to be made to identify and reach women who have been left behind as new knowledge has become more widespread.
- Expand nutrition BCC activities to include all the caregivers who are involved in feeding infants and young children. It would be especially valuable to

develop interventions to increase the participation of male members of the household in household food acquisition responsibilities and activities, including acquisition of nutritious foods for infants and young children. It is inappropriate to concentrate efforts exclusively on mothers. The findings from Vihiga and Kitui, as from most other parts of the world, confirm that grandmothers, fathers, older children and older women in the community also have important roles in feeding infants and young children. Many, if not most, of these other types of caregivers have less access to new knowledge than do mothers. Programme models for reaching alternative caregivers, particularly grandmothers and fathers, are beginning to emerge and can provide guidance for these efforts (Aubel *et al.* 2004; Aubel 2012).

- Culturally focused interventions directed towards household behavioural dynamics could focus on increasing fathers' knowledge and skills. These should be seen as part of a larger effort to facilitate and encourage fathers' direct and sustained investments in food acquisition and food security for their children as a cultural norm. No one should doubt that fathers in southern and western Kenya are committed and concerned about their children's welfare in the larger sense of emotional or social investment. However, the difficult conditions that men have faced as a result of transformations associated with globalisation, socio-political forces and climate change have conspired to create an environment in which some fathers are not able to provide their wives and children with the types of consistent support that protect the household food supply. Respondents who have this type of support were eloquent in their expressions of how important it was for child nutrition and how fortunate they considered themselves, compared with their peers who lack it. There are intervention models available to guide the establishment of this type of cultural change (cf Satzinger *et al.* 2009; Martin *et al.* 2010; Sloand *et al.* 2010).
- Integrate early development education with feeding-directed education. Caregivers are concerned about and interested in development, as well as growth, so the cultural underpinning to support this type of integrated BCC is already in place. There is a growing body of literature in nutrition and child development that provides both the theoretical rationale and the empirical evidence for the benefits of integration as a programmatic strategy (Powell *et al.* 2004; Black *et al.* 2008).
- Develop services and programmes to address psychological stress, particularly depression, in women. We did not explicitly set out to examine the role of psychological stress within the broader picture of IYC care. However, when you give women 'voice' to discuss child care as a lived experience, as the FES does, the constellation of factors that produce psychological stress emerge clearly, as does its costs. By teaching mothers about the importance of nutrition for their children's health and telling them which foods their children need to be healthy and grow well, we set the stage for psychological distress when their economic and ecological circumstances constrain their capacity to act on their new knowledge. When this happens in a cultural and social organisational environment in which women have primary responsibility for food acquisition and in an environment characterised by seasonal food insecurity, overlaid on the stresses of poverty, the inevitable result is psychological stress. Some women have social support to buffer this stress, some turn to religion for support and some are protected by personality traits (e.g. optimism and self-efficacy). But for some, psychological stress brings them to the thin line separating psychological health and illness. The nutrition intervention community and intervention actors in general need to recognise this fundamental problem and take steps to address it. Establishing meaningful support structures for all women in resource-constrained situations is important, and addressing depression is essential. This is not only a moral obligation, it is also essential to protect the nutritional, physical and psychological health of infants and young children.

Concluding comments

A full explication, with references to the empirical evidence to support our contention that each of the interventions we have identified would improve the

nutritional status of infants and young children, is beyond the scope of this paper. Moreover, of the 13 potential interventions we discussed, focused ethnography cannot give us the priorities among them from the perspective of how much each of them would reduce infant and young child undernutrition. Assessing the relative contribution of the determinants we have identified requires quantitative data and analysis.

Concerning the mechanisms through which the interventions we have identified link to undernutrition, some of the linkages will be immediately apparent for specialists who work in the agriculture and food production sectors. Specialists in the area of poverty reduction, social welfare and child health will see the linkages to other intervention recommendations. Some of the proposed interventions will be obvious for those who work in nutrition, including nutrition BCC. Many of these interventions are currently on the agenda – in the work plans or in on-going intervention activities – of different agencies, policies and programmes, but they are not pursued in a coordinated fashion to take advantage of their synergies to improve nutrition.

We conclude with the suggestion that it is time to recognise the concept of 'responsive interventions' and begin to institute holistic programmes that are contingent on the conditions that are constraining children′s normal health and development. In other venues we have described the role of 'responsive parenting' (Pelto *et al.* 1999; Engle *et al.* 2000) for IYC nutrition interventions, and we have advocated for the importance of a holistic, rather than piecemeal, programmatic approach to supporting parental behaviours that affect children′s nutrition, health and development. Responsive caregiving is, above all, based on contingent response, in which caregiver responses are contingent on children′s needs and behaviours. As all parents know, one does not respond to some needs and leave others unattended, such as changing a soiled nappy but not feeding a hungry baby or cleaning a cut finger but ignoring a high fever. There are many interventions that have the potential to improve the nutritional status of infants and young children in Vihiga and Kitui. Focused ethnography, which presents data from the lived experience of caregivers, helps uncover the realities of household and community conditions and reveals the 'landscape' for integrated, responsive planning and actions.

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Conflicts of interest

The authors declare that they have no conflicts of interest.

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