ABSTRACT

Many social and environmental factors affect infant growth in the Andes including hypoxia, economic variability, and access to health care. Cultural adaptations developed by Quechua peoples over millennia may mitigate these challenges. This research explores the relationship between traditional knowledge and health in the context of biomedical health services through a mix of qualitative and quantitative data collected in four highland Quechua communities located in Cusco, Peru. It draws on ethnoecological and biocultural perspectives through a case study focusing on maternal traditional knowledge and infant growth outcomes in order to examine the role of traditional knowledge in facing the challenges of infant growth at high-altitude. In particular, it examines 1) maternal traditional and public health knowledge of infant feeding and care, 2) the association between maternal traditional and public health infant feeding knowledge and infant growth, and 3) the links between maternal infant feeding knowledge and observed behaviors.
This research demonstrates complementarities and tensions between Andean and public health systems that influence how mothers experience infant feeding and growth. Specifically, this research found that 1) maternal knowledge associated with infant feeding and care is embedded within an Andean theory of illness causation; 2) mothers incorporate what is foreign and reorganize knowledge to make use of multiple source of infant care including home remedies, traditional healers, and public health services; 3) a mother’s formal education is positively associated with her child’s weight; 4) a mother’s traditional knowledge is negatively associated with her child’s length; 5) mothers conceptualize infant feeding and care through an Andean ethnomedical lens but, in practice, follow a combination of public health and traditional recommendations. Findings suggest tensions surrounding infant feeding and care which are likely compounding the problem of providing culturally appropriate health care. Findings also show that public health campaigns are working as mothers are changing their behaviors in relation to infant feeding and recognize public health services as an important resource. Finally, these findings depart from the assumption that in order to change behavior one has to change ideology and emphasize the importance of personal experience in mediating the dialectical relationship between belief and behavior.

INDEX WORDS: Cultural resilience, infant feeding, breastfeeding; infant growth, Andes, traditional knowledge, maternal knowledge, public health
CULTURAL RESILIENCE, MATERNAL KNOWLEDGE, AND INFANT GROWTH IN THE PERUVIAN ANDES

by

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BA, University of Washington, 2000

A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment of the Requirements for the Degree

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CULTURAL RESILIENCE, MATERNAL KNOWLEDGE, AND INFANT GROWTH
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Pachamamay, awichay, mamay, hinallataq ñañay

Apukuna, machulachay, tatay, hinallataq yanay

Chaskakunapaq, Leo Suri kaq Nalia Mayu wawaykuna

To my motherearth, my grandmother, mother, and sister
To the mountains, my grandfather, my father, and husband
To my stars, my children Leo Suri and Nalia Mayu
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CHAPTER 1
INTRODUCTION AND LITERATURE REVIEW

1.1 Research problem

This research explores the relationship between traditional knowledge and health in the context of biomedical health services. I draw from ethnoecological and biocultural perspectives through a case study in the Peruvian highlands focusing on maternal traditional knowledge and infant growth outcomes. In particular, I examine 1) maternal traditional and public health knowledge of infant feeding and care, 2) the association between maternal traditional and public health infant feeding knowledge and infant growth, and 3) the links between maternal infant feeding knowledge and observed behaviors. My analysis is supported by a mix of qualitative and quantitative data collected in four adjacent highland Quechua communities located in the region of Cusco, Peru.

Many social and environmental factors affect infant growth in the Andes. Hypoxia\(^1\), for example, is associated with reduced birth weight and slower infant growth (Wiley 2004). Economic variability and access to health care also play a critical role in shaping infant growth outcomes (Leatherman et al. 1995). Cultural adaptations developed by

---

\(^1\) Hypoxia is the decreased partial pressure of oxygen that occurs at higher elevations. With increasing altitude oxygen density decreases steadily so that at 3000 meters (10,000 feet), the partial pressure of oxygen is less than 70% of sea-level pressure. Above 5,000 meters, oxygen pressure is sufficiently low that permanent human settlements cannot be maintained. Oxygen plays a key role in physiological functioning across animals, including cellular respiration and growth (Pawson and Jest 1978).
Quechua peoples over millennia may mitigate these challenges. Previous research has shown that Quechua women are knowledgeable about the medicinal and nutritional properties of plants, animals, and minerals that are good to eat during breastfeeding (Froemming 2006, Graham 2003). In this context, it is important to understand the role of traditional knowledge in facing the challenges of infant growth at high-altitudes.

Recently in Peru, the Ministry of Health has taken an active role in investigating and preserving traditional medical knowledge, incorporating traditional birthing practices such as the vertical birth, and addressing the cultural appropriateness of health services for indigenous women (UNICEF 2008). While acknowledging the importance of traditional knowledge, public health initiatives in Peru are simultaneously addressing disparities in maternal and child health by improving access to basic health care in rural communities. This includes promoting the infant feeding recommendations of the World Health Organization (WHO). Prior to recent reforms, mothers chose to access public health services or mediated infant feeding at home with the assistance of family and traditional birth attendants (TBAs). Now mothers in rural communities are required to obtain prenatal care, give birth, and have the growth of their children monitored at a public health clinic. Current public health infant feeding recommendations rely heavily on health messaging and individual behavior change and there is little discussion of similarities or conflicts with traditional infant feeding recommendations. In the process of promoting WHO infant feeding recommendations, the role of traditional infant feeding knowledge, including the medicinal and nutritional properties of plants and animals consumed during breastfeeding, has thus far not been incorporated. In this dissertation I
seek to understand how traditional and public health infant feeding recommendations are lived, experienced, and used by Quechua women in the Peruvian Andes.

1.2 Theoretical significance

This research contributes to, and bridges, two subspecialties within anthropology: ethnoecology and biocultural anthropology. I explore theoretical issues in ethnoecology and biocultural anthropology including: 1) considering the cultural resilience of traditional maternal knowledge in the context of biomedical infant nutritional campaigns, 2) understanding the contributions of traditional knowledge (Johns 2003) to infant growth, and 3) examining the links between knowledge (ideology) and behavior by considering how rural Quechua indigenous women living at high-altitude use traditional knowledge associated with infant feeding. Following I present the theoretical contributions of each of these three issues.

Cultural Resilience in the context of change

In this dissertation I explore the concept of resilience of traditional medical systems within a pluralistic medical setting. In particular I examine cultural resilience which according to Healy (2006) is “the capacity of a distinct community or cultural system to absorb disturbance and reorganize while undergoing change, so as to retain key elements of its structure and identity that preserves its distinctiveness” (Healy 2006: p.10). I employ Healy’s (2006) concept of cultural resilience to explore the persistence and change of maternal traditional knowledge related to infant feeding practices in highland rural communities of Peru, where the Ministry of Health has implemented
strategies to improve maternal and infant health, changing how women obtain pre- and post-natal care.

A central question in ethnoecology is to understand the effects of globalization (schooling, market economies, biomedical health services) on the maintenance and use of traditional knowledge (McDade et al. 2007, Reyes-Garcia et al. 2005). In recent years ethnoecologists have employed the concept of resilience to explore this question asking: What are the situations that promote the retention or the accommodation of knowledge? And in what instances is knowledge lost?

A resilience framework has been employed by ecologists and conservation biologists as an approach for understanding the ability of socio-ecological systems to adapt to environmental stress through transformation (Holling 1973). While there are varying definitions of socio-ecological resilience, it is largely defined as a system’s capacity to deal with disturbance while still maintaining essentially the same function, structure, and identity (Walker et al. 2004). The framework allows for the recognition that change is a constant force in socio-ecological systems (Adger 2000, Berkes and Folke 2002). A system which is resilient maintains a flexibility of options for adapting to and even shaping change. Reduced resilience is seen as leading to vulnerability in the face of change (Gallopin 2006).

In recent years we have seen a flurry of research at the intersection between conservation biology and ethnoecology exploring the role of social memory, knowledge, and social networks as well as institutional and organization capacity in providing buffers for resilience (Berkes and Turner 2006). This research agenda stems in large part from concern regarding the effects of the possible loss of traditional knowledge on health and
the environment (Gomez et al. 2010, Diaz et al. 2006, Alves and Rosa 2007). Given that many indigenous groups have a long history of dealing with change, I use traditional ecological knowledge (TEK) as a source of resilience (Berkes et al. 2000, Riedlinger and Berkes 2001, Olson et al. 2004).

When considering how a resilience framework could be explored in the Andean region I draw on scattered research that has addressed how Andean peoples have dealt with centuries of change. In his research with shamans who migrated to urban Lima, Kreimer (1990) delves into the question of how Andean culture has dealt with change brought on by colonization. Analyzing shamans’ own discourse about their experience with westernization, Kreimer (1990) finds that they are consciously accepting of foreign ideas in order to give space for their own concepts and culture to develop. Ellen (1988) and Grillo-Fernandez (1998) argue that Andean culture ‘digests’ what is foreign and fits it into the Andean way of seeing the world. Brush (2004) when considering whether new potato varieties would displace native potato diversity, found that farmers in Cusco adopt new improved varieties in to their previous system farming the new varieties alongside the native varieties and in much the same manner. Brouques (2002) in Ecuador found that farmers adopted only those technologies or crops that would fit in to their farming system. These researchers show that Andean culture has adapted to change brought on by westernization through cultural shifts in ideas about health and farming. Analyzing why and how traditional knowledge is lost or retained in the context of the increased dominance of biomedicine is important for a better understanding of health care behavior and the relation of knowledge and health. This dissertation builds on previous knowledge relating to change and persistence of Andean medical and food systems (Bastien 1987,

**Contributions of traditional knowledge**

A second major research area that merges ethnoecological and biocultural perspectives involves the contributions of traditional knowledge. Cultural capital, as presented by Bourdieu (1986), refers to a people’s symbolic and informational resources including traditional knowledge. It is often argued that traditional knowledge\(^2\), serves as a potential moderator of life stressors (Walters and Simoni 2002). Several researchers have shown that engagement with traditional beliefs and practices has considerable positive impacts on the well-being of indigenous populations (Reynolds et al. 2006, Strand and Peacok 2003, McKay and Prokop 2007).

A prominent theme in studies of individual resilience is the importance of cultural knowledge. In psychiatry, it is used to describe an individual’s capacity to achieve (mental and physical) health and thrive despite significant adversity (Tugade et al. 2004). Several researchers have shown that engagement with traditional knowledge and practices has considerable positive effects on the well-being of indigenous populations (Reynolds et al. 2006, Strand and Peacock 2003, McKay and Prokop 2007). For example, a study conducted among American Indian and Alaskan native students found that those youth that were “embedded in traditional culture” exhibited resilience (Strand and

\(^2\) I define traditional knowledge as the cumulative body of knowledge of a culture that has been handed down through generations, that is socially shared by members of the same generation, and that has been adapted to a particular place (Toledo 2002).
Peacock 2003). In this study, connection to tradition involved several characteristics, including: “feeling good about tribal culture”, participating in both mainstream and native worlds, feeling a strong belonging to community, appreciating parents and Elders, and being exposed to native school curriculums (Strand an Peacock 2003). Similarly, McKay and Prokop (2007) found that children’s resilience was enhanced by a strong sense of belonging to a vibrant community that “celebrates its own culture and history” (p.47).

Such studies have generally shown a positive relationship between cultural identity, knowledge, and health. However, this is not always the case. A study of Southwestern American Indian youth living on a reservation or in urban settings found that participation in American Indian traditional activities was actually associated with higher levels of substance abuse (Waller et al. 2003). The authors suggest that this counter-intuitive result may reflect negative peer and family influences and being more visibly indigenous may expose youth to greater levels of racism and discrimination which may, in turn, have a negative effect on their coping and well-being. These divergent finding suggest the need to examine the implications of culture within varying contexts considering historical, social, economic, and political realities.

Several researchers have recently focused on the relationship between traditional forms of knowledge and child nutritional and health outcomes. Among the Tsimane’ of Bolivia McDade et al. (2007) found that mother’s ethnobotanical knowledge has a positive effect on child health outcomes. Furthering these findings Tanner et al. (2011) found an association between Tsimane’ mothers’ ethnobotanical knowledge and a decreased probability of helminth infection in their children. Miller (2011) conducted similar research Among the Ariaal people of Kenya focusing on infant nutritional and
health outcomes and found that higher rates of traditional and Western health knowledge are positively associated with infant health. Specifically, mothers with greater knowledge of traditional medicine had infants who were significantly less likely to have been ill in the previous month.

Additionally, Miller (2011) argued that infants (birth to 12 months) are a more sensitive measure of population health and nutrition than children for three reasons. First, infants have high levels of mortality and morbidity under severe conditions. Second, infants require intensive maternal care, which strengthens the effect of maternal knowledge on infant health outcomes compared to children whose care maybe more distributed throughout communities. Finally, older children - as opposed to infants who are highly dependent on their parents for care – have their own knowledge and behavior that may be independent of parental involvements. My own research follows Miller’s focus on infant’s growth. In addition, I focus on measuring the effect of maternal knowledge specifically associated with infant feeding.

In the Andes, previous research has shown that Quechua women are knowledgeable about the medicinal and nutritional properties of plants, animals, and minerals that are good to eat during breastfeeding (Froemming 2006, Graham 2003). This research asks whether cultural adaptations developed by Quechua peoples over millennia may mitigate the challenges of infant growth in the Andes. I address this issue by investigating the associations between measures of traditional knowledge in a high
altitude setting where mothers have access to both traditional and biomedical³ health traditions when making decisions about what, when, and how to feed their infants.

*Links between ideology and practice*

An ongoing critique of ethnoecological research centers on the lack of a clear method for linking ideology with behavior (Fowler 1977, Rappaport 1979, Nazarea 1999, Gragson and Blount 1999, Rhoades and Harlan 1999). Rappaport (1979) proposed considering the distinction between “cognized” and “operational models” as a framework for understanding how people think about and act in their environments. Nazarea (1999) pays attention to the interface between ideology and practice or “decision-making frameworks and behavioral outcomes – and the lenses and latitudes that shape and structure these inter-connections” (Nazarea 1999: p.7). In this dissertation I examine the relationship between ideology and behavior considering the specific case of infant feeding and care in the context of public health infant feeding messages.

A central feature of anthropological theory that has influenced anthropologists’ conceptualization of the relationship between health beliefs and behavior is the idea that the habits and beliefs of people are not separate items, but are part of a cultural system (Paul 1955). This notion is also tied to the assumption that people in “traditional” communities would not accept biomedical health care and medical practices until they learned and accepted the major part of the cultural belief system of biomedical medicine (Pelto and Pelto 1997). However, researchers found that regardless of cultural beliefs,

³ I define biomedicine as a global, hegemonic medical system based on western scientific principals which includes the use of pharmaceuticals, healthcare professionals and biomedical facilities (Giovannini et al. 2011)
people access biomedical health care, use pharmaceutical medicine and other elements of medical practice without giving up on major aspects of their traditional explanations of illness. For example, multiple studies in Asia (Byg et al. 2010), Africa (Etkin et al. 1990, Muela et al. 2002), and Latin America (Mathez-Stiefel et al. 2012, Giovannini et al. 2011) demonstrated that families utilize both indigenous and biomedical health care resources simultaneously. While the literature does not reflect the outright rejection of biomedicine, it does reflect that specific conditions that involve spiritual beings such as susto (fright illness) and evil eye are often only treated by accessing traditional healers or employing home-remedies. For example, Logan’s (1988) research in urban areas of Mexico revealed that participants did not access biomedical services or employ pharmaceuticals for the treatment of susto because they did not believe them to be effective for this particular illness.

Social scientists have long studied the distinction between actions and ideational systems noting that they are both part of cultural systems (Goodenough 1961, Geertz 1985, Holy and Stuchlik 1981, Shore 1996). I define ideology as the body of beliefs or thoughts held by individuals or communities and behaviors as the observable actions of individuals. Ideology or beliefs exist regardless of whether they are being put into action and include knowledge of how to behave and how to interpret actions.

I depart from a purely deterministic view of the relationship between knowledge and behavior, that beliefs determine actions. Instead I follow Keesing (1975) and Holy and Stuchlik (1981) who discuss a dialectical relationship between ideology and behavior. This idea implies a mutual feedback between the two in that “past and present knowledge may shape present and future actions, present actions may lead to future
knowledge, and past actions may be interpreted by present knowledge” (Holy and Stuchlik 1981 p. 27). People in this view are active managers of their knowledge/beliefs and the application of knowledge into actions, they are not determined by them. In this sense beliefs constitute a set of options which can be applied into actions. Furthermore the results of actions (experience) is interpreted and inform beliefs.

The literature focusing on the broad category of child (and infant) care and feeding demonstrates this tension between culture, knowledge, and beliefs by showing how cultural processes and maternal behaviors are thought to effect health and survival of children. Maternal attitudes toward, for example, children, food, and health, may shape the ways in which children are fed and cared for (Millard and Graham 1985, Dettwyler 1986). For example, Izurieta and Larson-Brown’s (1995) research in rural Mexico found that mothers fed normal-weight children thicker foods more often and under-weight children thinner foods less often regardless of the availability of foods within the household. Another example is Dettwyler’s (1986) research in Mali that found variation in child nutritional status and growth was associated with practices such as weaning (cessation of breastfeeding) as soon as the mother gets pregnant and letting children decide when and how much to eat. Further, Sellen (1998) found that Datoga mothers in Tanzania feed newborns non-milk substitutes (water, sugar water) while they wait for their mature breast milk to come in a few days post-partum because of the belief that colostrum⁴ causes indigestion in the newborn. This practices is associated with inadequate nutrient intake and higher rates of infection. This research points to the

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⁴ A “yellowy” and “thick” substance that is replaced by breast milk a few days after birth, containing important immunological and nutritional properties that are exceptionally valuable to the newborn infant.
importance of maternal beliefs and practices in relation to infant feeding as they relate to child health and growth performance.

By focusing the research on infant feeding beliefs and practices among Quechua women in Peru, I provide descriptive evidence of the ideologies or theories that guide mother’s behaviors with respect to infant feeding. I argue that a mother’s ideologies structure the multiple constraints she faces in relation to feeding and caring for her children. Apart from economic considerations, and other issues like time and resource allocation, caregiver’s conceptual beliefs reflect in their concerns about what is good food for their children. Infant feeding is thus is in part structured by local theories of child well-being. What, when, and how much infants are fed depends in part, on a number of factors that underlie the feeding process in a particular society (Dettwyler 1986, Van Esterik 1994, Pelto, 1987). This research has implications for both the study of the relationship between belief and behavior and the implementation of public health interventions.

1.3 Review of the literature

Ethnoecology and the study of traditional knowledge

Anthropologists have paid considerable attention to how the relationship between human populations and their natural environment leads to the formation of specific systems of indigenous knowledge, also termed traditional knowledge (TK), or traditional ecological knowledge (TEK) (Conklin 1957, Posey 1985, Attran 1998, Nazarea 1999, 2006). Most anthropological studies of traditional knowledge employ an ethnoecological approach, which refers to the study of how populations organize and classify their
knowledge of the environment (Toledo 2002). The prefix ethno refers to the system of knowledge that is typical of each culture (Toledo 2002). An important aspect of an ethnoecological approach is a concern with describing and presenting knowledge from the cultural viewpoint of the people being studied.

Ethnoecologists also explore the relations between knowledge and actions. Such an approach implies the basic assumption that the interaction of humans with their environment is greatly influenced by thought, knowledge, and language (Goodenough 1961). These influencing factors interact to form a worldview that strongly affects how humans act (Denton 1970). As argued by Denton (1970) “people do not directly respond to the environment but rather to the environment as they conceive it: e.g. to animals and plants as conceptualized in their minds and labeled by their language” (p.24). Similarly Vayda and Rappaport (1968) discuss the “cognized environment” (the environment as it is perceived and understood by a particular group of people, and the “operation environment” (the sum total of all environmental features).

A second basic assumption of an ethnoecological approach is that different groups of people perceive the world somewhat differently as a result of varying social, historical, cultural, and environmental conditions and experiences (Conklin 1954, Posey 1979, Hunn 1993, Ellen 1993). This perspective emphasizes that groups of people who have lived in a particular environment and have dealt with its constraints over time have acquired knowledge to manage those constraints. Stemming from this approach ethnoecology scholars (Posey 1984, Posey and Balee, 1989, Posey and Overal 1990, Brush et al. 1992, Hunn 1999) raised interest in how indigenous perceptions, knowledge
and understandings of the environment could inform conservation and development projects.

Applied anthropologists argued that traditional knowledge represents ecological adaptations of humans to diverse environments and that this knowledge has the potential to serve as basis for designing better ways to conserve biological diversity (Brush 1993, Orlove and Brush 1996). Based on this idea, the cause and the rate of loss of knowledge became of considerable interest for its potential as a source of ideas to confront questions of sustainability and global change.

The role of different knowledge systems is analyzed in relation to adaptive management. For example, researchers recognized that peoples who have been living in mountain environments for centuries hold unique understandings of ecological resources and hazards (Brush 1976) including knowledge regarding location, materials and building styles of homes and structures, the layout of settlements, organization and types of agricultural practices and products and the annual pattern of life. Scholars warn against the dangerous of ignoring local knowledge, which is based on prior experience and argued that development interventions may change or disrupt local practices (Posey and Balee 1989, Posey and Overal 1990, Brush 1992, Martin et al. 1996, Hunn 1999).

Researchers focused on how changes affect outcomes such as health, deforestation, sustainability, and use of plants and animals. The loss, retention or expansion of TEK of knowledge and its consequences became a major concern (Brush 1993, Zent 2001, Ross 2002). For example Ross (2002) studied differences between younger and older Lacandon Maya men in Mexico and found significant differences
between their conceptual models as a result of recent life style changes in younger
generations and how these relate to forest management.

In the late 1990s postmodern critical researchers (Escobar 1998, Brosius 1999)
argued that ethnoecological research tended to over romanticize local knowledge and
portrayed it as static. In addition critics brought to light the problem of applying
traditional knowledge to development frameworks based on Western scientific and
economic models and the process of the valuation of some forms of knowledge over
others that occurs at such interfaces (Escobar 1998, Agrawal 2002, Ellen and Harris
2003, Ellen 2004). Nazarea (2006) argues that understanding traditional knowledge in the
context in which it evolved continues to be an important endeavor to foreground the
cultural dimensions often overlooked by development projects. Documenting traditional
knowledge continues to be a valued endeavor “in case the need may rise to revive,
disperse, or retool such valuable information” (Nazarea 2006). To date research in
ethnoecology continues to emphasize the embedded aspects of different knowledge
systems taking into account that change is an intrinsic aspect of traditional knowledge
(Ellen et al. 2000, Ellen 2002, Ellen 2007, Nazarea 2006). In addition, researchers
continue to study the effects of globalization (market integration, introduction of Western
education, biomedicine etc.) on indigenous quality of life and knowledge systems, and
2007). This dissertation contributes to these debates by considering the persistence and
change of maternal traditional knowledge associated with infant feeding in the Andes.
Ethnomedical knowledge of infant feeding

The study of maternal traditional knowledge relating to infant feeding should fall under the purview of two subsets of ethnoecology: ethnomedicine and ethnonutrition. In the Andean worldview there appears to be little distinction between nutrition and health and they are viewed as one and the same (Graham 2003). In this section I present a general review of the ethnomedicine literature and end with ethnomedicine in the Andes.

Ethnomedicine concerns the investigation of native categories and explanatory models of illness, including etiologies, symptoms, courses of sicknesses, and treatments (Kleinman 1978, Kleinman 1980). The aim of an ethnomedical approach is to understand illness and treatment patterns according to local explanatory models instead of through the lens of biomedicine. In this way early studies of indigenous medical systems were mostly focused on witchcraft and illnesses caused by “supernatural forces”, and the knowledge of specialists such as folk healers, and shamans (Evans-Pritchard 1937, Turner 1967, Fabrega and Silver 1973). These researchers emphasized the meaning of illness and the symbolism of the curing rituals performed by the folk healers (Waldstein and Adams 2006).

Moving away from a narrow focus on the study of shamanism and witchcraft, Kleinman (1980) expanded the scope of ethnomedical studies identifying a popular, a folk, and a professional health sector within health care systems. The popular sector includes the self-medication of laypeople, the folk sector refers to traditional healers or shamans, and the professional sector involves training in medical schools. Kleinman’s

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5 Defined here as a global, hegemonic medical system based on western scientific principals which includes the use of pharmaceuticals, healthcare professionals and biomedical facilities (Giovannini et al. 2011).
classifications proved useful in permitting researchers to identify which of the sectors is studied.

Spurred by the recognition that self-treatment is usually the first therapeutic choice across cultures, in both urban and rural settings, interest in medical knowledge of laypeople became an increasingly popular research arena (Kleinman 1980, Ngokwey 1995, Giovannini 2009). Kleinman (1980) estimated that in the U.S. and Taiwan, people choose self-treatment in about 80% of illness episodes. Berlin and Berlin’s (1996) highly influential long-term research among Maya communities in Mexico also served to broaden the previous focus on the folk (traditional healers and shamans) sector study the medical knowledge of laypeople.

In this dissertation I focus on the popular sector that is, the ethnomedical knowledge of mothers in relation to infant feeding and care. In addition, I also focus on the professional health sector examining infant feeding recommendations from the point of view of public health personnel. I examine the interactions between these two knowledge systems.

This dissertation engages discussions within ethnomedicine involving medical pluralism – when within the same population we find theories and practices about illness that have different origins (Fabrega 1997). Much of the research on medical pluralism centers on the relationships that develop between traditional medicine and biomedicine when worldviews meet (Calvet-Mir et al. 2008, Etkin et al. 1990, Hoa et al. 2009, Muela et al. 2002, Cosminsky and Scrimshaw 1980, Vandbroek et al. 2004, Giovannini et al. 2011, Mathez-Stiefel et al. 2012). Many researchers argue that biomedicine displaces traditional medical systems through a process of “medical hegemony” (Elling 1981). For
example, Ngokwey (1995) in Brazil and Saethre (2007) in Australia found that the use of biomedical concepts displaces the use of traditional medicine and local medical beliefs.

In contrast, other scholars show that traditional and biomedical medicines co-exist, complement, and/or blend with each other (Byg et al. 2010, Etkin et al. 1990, Muela et al. 2002, Giovannini et al. 2011). For example Giovannini et al. (2011) found a positive association between an individual’s knowledge and use of medicinal plants and the same individual’s knowledge and use of pharmaceuticals in rural indigenous communities of Oaxaca, Mexico. These results suggest that an individual’s knowledge of medicinal plants and pharmaceuticals interact in a way that is complementary (Giovannini et al. 2011).

In the Andes there is a long history of medical pluralism that includes Kleinman’s three health care sectors 1) the popular sector (health care provided by the sick persons themselves, their families, social networks, and communities); 2) the folk sector (health care provided by traditional healers, shamans, bonesetters, and midwives); and 3) the professional sector (health care provided by biomedical practitioners). Researchers in the Andes have long recognized the co-existence of these three health care sectors and the medical traditions from which they draw (Bastien 1987, Crandon-Malamud 1991, Vandebroek 2004, Mathez-Stiefel et al. 2012), and that there is likely much exchange happening between them (Crandon-Malamud 1991). Some authors stress that traditional medicine and biomedicine might be part of the same cognitive system, characterized by the integration and syncretism of the medical knowledge and practice of the different healing traditions (Crandon-Malamud 1991, Sikkink 2009). Other researchers affirm that traditional and biomedical systems in the Andes are distinct but complement each other,
as exemplified by multiple use or active collaboration between practitioners of both types of medicine (Bastien 1987, Mathez-Stiefel et al. 2012). Given the overall dominance of biomedicine, it is important to consider the unequal relations involved in the use of particular health care systems. Since biomedicine in the Andes is supported by the state, one might predict the displacement of traditional medical systems.

There is also a long history of research delving into Andean conceptualizations of health and illness, the ideologies of Andean medical systems (Bastien 1987, Greenway 1998, Masses, Crandon-Malamud 1991) For example, Bastien (1987) studied the healing traditions and traditional understandings of health and illness of Kallawaya healers in highland Bolivia. Bastien (1987) found that Kallawaya healers perceive their health as dependent the maintenance of reciprocal relationships with the mountain environment in which they live and the flow of internal fluids and solids within the body. Illnesses derive from internal imbalance of flows within the body and between the environment and are treated with herbal remedies and rituals that aim to remedy imbalances. Greenway (1998) studied the cosmological basis of health in the northern Andes of Peru and found that from a Quechua worldview health is associated with household, community, and the landscape. The cause, meaning, and experience of illness are rooted in the maintenance of relationships between the individual, the social, and spiritual landscape. Crandon-Malamud (1989) argued that culture plays a role in the existence of illness, its expression, and its treatment and that there is much value in understanding illnesses in their indigenous terms. However, a specific focus on women’s conceptualizations of health and illness, or gendered knowledge is sparse. Exceptions include Hammer’s (1998) work on the ethnophysiology of menstruation in the Andes; Larme’s (1998) research
examining ethnomedicine in relation to women’s roles and reproductive status; Graham’s (1997) study on ethnomedical concepts relating to food allocation; Finerman’s (1987, 1989) research on women’s worldview and family health in highland Ecuador; and Oth’s (1999) study of debilidad, a women’s illness that derives from a lifelong accumulation of productive and reproductive stress.

In addition to the scholarship on medical pluralism in the Andes, this project focuses on the connection between mother and child. Research delving into parental knowledge and child health has found stronger links between women’s knowledge and child health (Tanner et al. 2011, Miller 2011, McDade et al. 2007). This suggest that women hold more ethnomedical knowledge than men because of their specialized reproductive and pediatric roles that reflect their prominent involvement in caregiving and as primary custodians of family health. Maternal traditional knowledge relating to infant feeding and health includes knowledge of specific plants, animals, and minerals and broader patterns of categorization that are guided by the particular worldviews in which they are embedded. The varied knowledge that mothers possess and employ is an important, yet largely overlooked, element in the analysis of traditional medical and nutritional systems (Finerman 1989). My research expands our knowledge of the neglected topic of maternal knowledge and infant care in the Andes. This topic is of importance because of the hypoxic and socioeconomic conditions of a high altitude environment place particular stresses on infant health.
**Biocultural approaches to the study of infant feeding**

A biocultural approach is a holistic approach that considers how both biological and cultural factors shape health. It has also been defined as the study of social, ecological, and biological aspects of health issues, and how these interact within and across populations (Wiley and Allen 2013, Stinson 2012). This approach is built on the premise that humans do not live in isolation from their ecological and sociocultural milieu and thus are shaped by them. Human bodies have thus been shaped by evolutionary history and by ever changing environmental conditions (Wiley and Allen 2013). In other words, the body is in a dynamic relationship with the environment and reflects the stresses and resources in that environment. Such an approach has more recently been expanded to consider how the body is affected by contemporary social environments, especially those characterized by poverty (Goodman and Leatherman 1998, Worthman and Costello 2009). In this way environmental stresses facing many human populations are of largely social origin and derive from the intersection of global and local political economies that more often than not produce conditions that severely threaten health.

Biocultural anthropologists have long noted that there is a great deal of variation in human populations relating to infant feeding (Dettwyler 1986, Vitzthum 1988, Harrison et al. 1993, Gray 1996, Sellen 1998, Moffat 2001). Maternal choices regarding breastfeeding and alternative infant feeding strategies are based on interacting factors such as environmental conditions that shape access to adequate nutrition for the mother. Some examples of factors that have been found by researchers to affect infant feeding include seasonality (Sellen 2001), economic and political conditions (i.e. economic and
food scarcity and its effects on maternal nutrition) (Scheper-Hughes 1992), women’s workloads (Van Esterik and Greiner 1981), as well as cultural beliefs about the nature of infant growth and food (Dettwyler 1988, Nichter and Nichter 1983).

Much of the biocultural research on infant feeding has emphasized the behavioral component of infant feeding, highlighting caregiver’s behavior as a primary determinant of nutritional outcomes (Munoz de Chavez et al. 1974, Zeitlin et al. 1989, Engle et al. 1999, Pelto 1989). For example, Pelto (1989) found a significant association between maternal infant feeding practices and infant growth in central Mexico, reflecting the operation of differential caregiving behaviors. Pelto claimed “that the concept of ‘maternal caregiving’ has received increasing attention as a primary intervening or proximal factor in nutrition” (Pelto 1989: p.729), going on to suggest that “among the components of care-giving for which direct links to nutrition can be traced are food selection and preparation practices, which affect food safety and nutrient density, feeding practices management of illness, and an array of psychosocial actions that influence endocrine responses and other physiological functions in the child” (Pelto 1989: p.729). Bently et al. (1991) further these contributions by also taking into account household conditions but still emphasizing the behavior component of infant feeding by undertaking a series of investigations into the relationship of complementary feeding behaviors and feeding style to cultural beliefs. They found that mothers perceived their children to be ‘weak’ during diarrhea episodes and as a result actively encouraged their children to eat to regain strength during illness. Conversely, at the end of a diarrhea episode during convalescence or when the child is healthy mothers become more passive feeders. This
study illustrates that mothers change their behavior following the belief that children need more encouragement to eat during illness.

Another strand of research directs attention to the relationship between maternal education and the nutrition of young children. It is well established that maternal knowledge of health is intimately associated with child well-being as multiple studies have found that mothers’ years of formal schooling are associated with improved child health and mortality (Basu and Stephenson 2005, Caldwell and McDonald 1982, Cochrane et al. 1982). For example, there is a strong relationship between maternal education and child nutritional status in Bolivia (Frost et al. 2005) and Lesotho (Ruel et al. 1992), and maternal education and infant mortality in Bangladesh (Muhuri 1995). In addition, Desai and Alva (1998) using data from 22 developing countries found that higher maternal education predicts increased health care-seeking behavior (Desai and Alva 1998, Elo 1992). These results are often, but not always, independent of correlated factors such as socioeconomic status, hygiene, a husband’s education and available health care facilities (Cleland and Van Ginneken 1988, Desai and Alva 1998). It is clear that maternal formal education can play a strong role in alleviating infant and child morbidity and mortality, and rightfully plays a prominent role in child-focused public health campaigns (Barrear 1990). The focus on education as a proxy for maternal knowledge, however, discounts indigenous forms of health knowledge that are integrated in women’s culture and society. In addition it discounts the health knowledge of women who have had little to no formal education.
The case of infant feeding and growth in the Andes

Previous research in the Andes has shown that Andean diets are permeated by ethnomedical beliefs held by caregivers regarding what is best to feed themselves and their children to maintain health. Maternal and infant feeding practices rely on a repertoire of traditional knowledge about plants, animals, minerals, and seasons. Nursing women in southern Peru make a soup of the Andean flicker bird (*Colaptes rupicola*) to increase the supply of milk (Froemming 2006). Forty-three other galactagogues (substances believed to increase the production of breast milk), many of which are incorporated into the diets of women during lactation, have been identified throughout the Andean region (Froemming 2006). As discussed by Froemming (2006) the introduction of galactagogues into women’s diets could provide additional nutrition as the period of lactation is particularly energetically demanding for the mother.

Researchers in Peru have also identified how local conceptions of the body also underlie specific infant feeding behaviors of mothers. A mother’s concepts of her infant’s physical growth and development shape and guide her infant feeding practices (Wellin 1955). For example, mothers in Lima were more likely to breastfeed infants who suffered from linear growth faltering, diarrheal disease, and low intake of supplementary foods for a longer period of time than infants who did not suffer from these conditions (Marquis et al. 1997). In highland towns of Peru and Bolivia, mothers believe that their rage or sorrow is transmitted to their infants through breast milk (Tapias 2006, Theidon 2009). As a result, mothers under distress may temporarily alter their breastfeeding practices or stop breastfeeding altogether to avoid putting infants at risk (Tapias 2006). With this
research, I further explore Andean concepts of food and nutrition in the context of infant feeding recommendations promoted by the Peruvian Ministry of Public Health.

**Growth in the Andes**

Several studies conducted among Andean populations have shown that infant and child growth patterns are slowed compared to international standards and adult height and weight are reduced (Frisancho 1993, Frisancho and Baker 1970). High-altitude areas (defined as >2,500 meters above sea level, masl) are characterized by numerous stressors, including cold, ultraviolet (UV) radiation, harsh terrain, and probably most important, hypoxia. It is postulated that since growth requires energy, and energy metabolism requires oxygen, that growth would be slowed down under hypoxic conditions (Frisancho and Baker 1970). Further, growth might be compromised by cold, since Andean responses to cold include a higher metabolic rate, which requires additional energy to maintain (Frisancho 1993). It has been generally thought that exposure to hypoxia results in slower rates of linear growth (height) among high-altitude populations.

Further studies, however, indicate that hypoxia does not have strong, consistent, or independent effects on child growth. Rather an individual’s nutritional resources, not altitude, are the most significant factors influencing growth (Leonard 1989, Obert et al. 1994). In other words, nutritional resources related to socioeconomic status are, in fact, more important to child growth. Leonard (1989) conducted a study in the Andes comparing children of similar socioeconomic status (SES) at high and low altitudes and found that they had similar patterns of growth. Furthermore, as shown by Greksa et al.
(1985) and Stinson (1982), the height and weight of well-nourished, high SES children in the Andes differ little from that of U.S. children.

Perhaps more importantly, Andean high altitude conditions have a significant impact on the nutritional resources available to local populations. Small-scale agriculture is characterized by unpredictability of food supplies resulting from low diversity of cultigens, low productivity, and seasonal variation in food availability, and inter-annual fluctuations in productivity (Thomas and Winterhalder 1976). Differences in socioeconomic status within this context have an effect in that households with more resources (land, animals, access to other sources of income) are buffered to some extent from fluctuations in food supply more so than poorer households. Children in wealthier households have a more consistent source of resources to put toward growth, even in the face of hypoxic stress (Carey 1990, Leatherman 1996). In contrast, as argued by Berti et al. (1998) children in poorer households may have fewer resources to devote to growth and also greater energy expenditures, as they are more likely to contribute labor. Therefore, the growth of children in poorer households is compromised by the synergistic effects of malnutrition, high energy expenditure, hypoxia, and infectious disease.

It is important to consider the cause of growth faltering in the Andes. The experience of hypoxia unlike other ecological features such as temperature and availability of nutritional resources has not been modified by technologies at the population level. Thus, if hypoxia is the sole cause of growth faltering in the Andes then a mother’s resources can do little to buffer this experience. However, a mother’s resources (including cultural resources such as knowledge as well as material resources) could go a long way in helping to buffer the experience of nutritional stress in this
environment. Therefore, in light of research showing the importance of nutritional resources in high-altitude setting, my research explores maternal knowledge as a possible buffer utilized by mothers in managing nutritional resources.

1.4 Presentation of study area and context

In Peru, the Andean mountain range rises abruptly from the dry pacific coastal plain to plateaus, valleys, and glaciated massifs over 5,500 meters high. It then descends to the western Amazon Basin. This is a landscape unsurpassed in variety and complexity, packing a spectrum of climates as diverse as tropical forests to arctic tundra. In the past, Andean people adapted to this complexity, shaping the landscape into one of the great centers of plant domestication. Numerous ecological zones are compressed into a single valley within which the altitude is a critical factor in temperature, precipitation, and humidity. Temperatures are approximately 6 degrees °C lower for every thousand meters in altitude gain, and thinner atmosphere at high altitudes causes a more dramatic diurnal fluctuation than low altitude environments (Troll 1968).

The ecological variability and high altitude of the Andes provides a good example of the complementary roles of environmental limitation and opportunity in understanding cultural adaptation. Here, indigenous cultures developed agriculture and complex sociopolitical systems that support larger human populations at higher altitudes than anywhere else on Earth. Andean farmers regularly work fields at four thousand meters above sea level – the highest permanent agriculture in the world – where oxygen deficiency (hypoxia), high diurnal temperature fluctuations, low temperatures, frequent frost and hail, and thin soils limit human endeavor. Besides presenting the difficulties of
an extreme environment, the Andes offer the opportunity of great environmental heterogeneity and ready availability of distinct habitats with different physical and biological resources. The ancestors of modern Andean peoples learned how to exploit the advantages of environmental heterogeneity in several ways: domesticating plants and animals adapted to different altitudes niches, creating settlement patterns for access to different altitude zones, and developing economic and political systems that organize around the principle of “verticality” or the use of maximum number of altitude zones (Murra 1972).

I conducted this dissertation research in four adjacent rural highland Quechua communities, Cuyo Grande, Chawaytire, Pampallaqta, and Paru Paru, located in the district of Pisac, Province of Calca, Region of Cusco, Peru (Figure 1.1). These communities are set in a central Andean wet puna Eco-region (montane grassland and shrub-land biome) (Olson et al. 2001). The four communities are composed of a patchwork of small cultivated parcels, native forest and exotic plantations, streams, rocks, and grasslands. Cuyo Grande (Figure 1.2) is situated at 3,500 meters above sea level (masl) and is comprised of approximately 950 inhabitants. Chawaytire (Figure 1.3), Pampallaqta, and Paru Paru are higher-up the mountain between 3,750 and 4,500 masl and have smaller populations ranging from 300 to 650 people (INEI 2008). Residents of these communities speak Quechua as a primary language and many speak Spanish as a secondary language. A road runs through the communities, connecting them to the nearby town centers of Pisac and Paucartambo, as well as to Cusco the regional capital.

These communities share many sociocultural features with rural Andean communities in the area. The majority of inhabitants practice small-scale agriculture
based primarily on corn (Cuyo Grande) or potatoes (Chawaytire, Pampallaqta, and Paru Paru) as well as barley, wheat, legumes and a variety of other Andean tubers, grains, fruits, vegetables. Many families keep some animals such as guinea pig, cow, sheep, llamas, alpacas, chicken, pig, donkeys, and horses. These animals provide meat and dairy products, wool, help in plowing and threshing, or are sold for cash in the market. Farming is supplemented with a variety of economic activities, such as selling surplus agricultural production, weavings, crafts, driving taxis, and seasonal migration for jobs in the tourism industry (such as porters on the Inca trail), and in the lowlands (such as harvesting and informal mining).

A public health post located in Cuyo Grande services Chawaytire, Pampallaqta (a nearby community), and Cuyo Grande residents. Personnel at this health post include two auxiliary nurses, two nurses, and one obstetrician. Expecting mothers attend check-ups during pregnancy and infant growth and development monitoring are also conducted at the Cuyo Grande health post. For birth, the majority of women are referred to the health center in the town center of Pisac, located 12 kilometers (km) from Cuyo Grande and 16 km from Chawaytire. If risks are identified during pregnancy or complications occur during birth, mothers are referred to the regional hospital in the city of Cusco, located 45 km (about a 2 hour car ride) from Cuyo Grande.

Since 2002, pregnant women and children up to the age of five who are living in conditions of poverty or extreme poverty receive health insurance coverage under the ‘Seguro Integral de Salud’ (Comprehensive Health Insurance, SIS) program of the Peruvian Ministry of Health. About two weeks prior to their due date, expectant mothers are advised to travel to the health center or hospital to birth. The ministry of health has
established *mama wasis* (mother’s houses), a place where mothers can stay next to the health service center where they are to give birth. This program, established by UNICEF together with the Peruvian Ministry of Health, is aimed at easing transportation difficulties (UNICEF 2008).

The management of childbirth and maternal and early childhood health has recently changed in these communities. Until recently, mothers could choose to give birth at the local health post in Cuyo Grande and access general maternal and child health public health services, or mediate birth and infant feeding at home with the assistance of family and local midwives. In 2004 and 2006, the biomedical health post in Cuyo Grande adopted the Peruvian Ministry of Health’s resolution *‘Lineamientos de Nutricion Materna’* (Norms for Maternal Nutrition) and *‘Reglamento de Alimentacion Infantil’* (Infant Feeding Ordinance, Supreme decree N009-2006-SA) to promote maternal and infant health. These initiatives require that pregnant women now receive prenatal and postnatal monitoring and attend nutrition workshops provided at the biomedical health post in Cuyo Grande. Community members are trained as community health promoters to monitor women in compliance with these new requirements. In addition, during the data collection mothers with children five years old and younger in these communities received monthly food rations from PRONAA (national program of food assistance). This included rice, cooking oil, canned sardines, and an infant food mix of finely ground oatmeal, quinoa, *kiwicha*, and fava bean.

I chose these communities because they are representative of many communities in the region where there is a long history of maintaining tradition but also participating in broader markets and biomedical health services. The recent changes in policies and
regulations surrounding governmental supervision of prenatal care, nutritional education, childbirth, and early child health monitoring presents the opportunity to study how women manage both traditional and recent public health recommendations regarding nutrition and breastfeeding. This research is important because it focused on rural indigenous populations which are historically marginalized and have had poor access to biomedical health services. Cultural differences can compound the problem of obtaining appropriate health care (Castillo and Guo 2011). Thus, the adoption of strategies to enhance cultural competence within health agencies may improve access and quality of care for ethnic populations (Opler et al. 2004).

Because Quechua peoples have been living in the high-lands for millennia they hold knowledge regarding how to deal with the hazardous, stressful, and diverse environments therein. Examples of cultural adaptations that have allowed for people to thrive in such environments abound (i.e. housing, terracing, farming technologies, and detoxing techniques for bitter potatoes). Given these parameters this is a uniquely suitable place to study cultural resilience, or traditional knowledge as a resource that may mitigate the specific socioecological stresses found in the Andes.

In addition, because of the long history of medical pluralism in the Andes, this was an appropriate place to further explore the resilience of cultural knowledge. Previous researchers discussed some maternal knowledge in relation to infant feeding such as the presence of galactagogues (Froemming 2006). In my own preliminary research I also found that women in these communities use quinoa and the meat of the Andean flicker bird to increase breast milk production. Some mothers also reported drinking plant infusions when their infants had diarrhea or cold symptoms in the belief that the infusion
would reach the infants through breast-milk. This exploratory research suggested women of these communities draw on multiple information sources, including Andean ethnomedical concepts when practicing breastfeeding.

![Figure 1.1. Map of research communities. Map credit: Lucas Lopvet.](image)

1.5 Research framework

In this study I draw from ethnoecology and biocultural anthropology traditions to study the relationship between culture (knowledge) and health. Combining these approaches in a single framework facilitates a holistic understanding of this relationship. An ethnoecological approach emphasizes a necessary first step of understanding, describing, and presenting traditional knowledge on its own terms and examining relationships between different systems of knowledge. A biocultural approach as
discussed above emphasizes examining how the body is in a dynamic relationship with the environment and reflects the stresses and resources in that environment. Through a synthesis of ethnoecological and biocultural approaches, I then examine the relationship between knowledge and behavior as a possible mechanism linking culture and health. I employ a framework that draws on a combination of ethnoecological and biocultural perspectives to examine the case of the relationship between maternal knowledge and growth faltering in the Andes. Infant growth in the Andes is particularly stressed likely by a combination of interacting factors such as socioeconomic factors, availability and use of nutritional resources, and hypoxia. In this environment I hypothesize that infant feeding knowledge and practices developed over millennia mitigate child growth and well-being. My research questions are:

1) What are the differences and similarities between traditional and public health recommendations surrounding infant feeding and care?
   1.1) Are traditional recommendations being displaced or expanded by the promotion of public health recommendations?

2) What is the relationship between maternal, traditional and public health knowledge associated with infant feeding and infant growth?
   2.1) Is this relationship independent of potentially confounding factors such as socioeconomic status and maternal, child, and household characteristics?

3) What is the relationship between maternal knowledge and behavior?
   3.1) Are public health campaigns changing maternal infant feeding behaviors?

**1.6 Outline of the dissertation**

After discussing the research problem and reviewing the literature, in this last section I present an overview of dissertation chapters. In chapter 2, I present the research design, the research methods I applied, and the research procedures. Specifically, I discuss the value of applying a mixed qualitative and quantitative approach to this research topic. In chapter 3, I review differences and similarities between traditional and
public health messages relating to infant feeding. I examine the resilience of this system of knowledge by considering whether traditional recommendations are being displaced or expanded by the promotion of public health recommendations. In Chapter 4, I examine the links between culture and health at the level of the individual. Specifically, I present findings from analysis examining the relationship between maternal infant feeding knowledge and infant growth outcomes. I test whether mothers with greater traditional or biomedical knowledge associated with infant feeding have children with better anthropometric measures. In chapter 4, I also examine whether this association is independent of potentially confounding factors such as socioeconomic status and maternal, child, and household characteristics. In Chapter 5, I examine the relation between maternal knowledge and behavior. I compare qualitative information regarding maternal beliefs and practices with systematic observations of maternal and infant feeding practices. I found that in the context of public health infant feeding messages, mothers retain Andean ethnomedical principles that value maternal and infant health, breastfeeding, and cater to infant cues. Yet in practice they follow a combination of traditional and public health recommendations. Finally, in Chapter 6, I summarize the main findings from each of the chapters and present my overall conclusions and the theoretical and policy implications of this dissertation. I follow with a discussion of the broader theoretical and social significance of my findings, and discuss some of the possible limitations of my research. I conclude with recommendations for future research.

1.7 A note on language

As noted above, rural Quechua communities in Peru are highly bilingual, and most speak both Quechua and Spanish. In this text, words in both languages appear in
italics, as do Latin scientific species names. To distinguish between the three, Spanish
terms appear in italics, Quechua terms in bold italics, and Latin scientific species names
appear in underlined italics. Quechua is not yet a standardized language in Peru and there
are different ways of writing each word. I follow the conventions of Antonio
Cusihuaman’s Diccionario Quechua Cuzco-Callao (1976). For place names I follow
customary spelling rather than proper orthography. For example, I spell Pisac as it
appears on most maps, although the word would be rendered more correctly as Pisaq. I
also follow the Spanish spelling of words that appear frequently in the ethnographic
literature (e.g. quinoa instead of qinoa). The English names of Andean crops used are
those used by Food and Agriculture Organization of the United Nations (FAO 2013).
1.8 References

Abel, T.

Adger, W. Neil

Agrawal, Arun

Alves, R. R., and Rosa, I. M.

Attran, Scott

Baker, Thomas, and Little, M. Eds.

Bartz, Sarah and Freemark, M.

Bastien, Joseph W.

Basu, A. M., and Stephenson, R.

Barrera, A.
Batrick, M., and Reinhold, A. 

Bently, M.E., Stalling, R.Y., Fukumoto, M, Elder J.A. 

Berkes, F., Colding, J., and Folke, C. 

Berkes, Fikret and Turner, Nancy 

Berkes, Fikret and Carl Folke 

Berlin E.A., and Berlin B. 

Berti, P, Leonard, W, and Berti, W. 

Bradby, Barbara 

Brion, M.A., et al. 

Brosius P. 
Brush, Stephen B.

Brush, S.B, Taylor, J.E., and Bellon, M.

Byg, A., Salick, J., and Law, W.

Caldwell, J., and McDonald, P.

Carey, James W.
1990 Social system effects on local level morbidity and adaptation in the rural Peruvian Andes. Medical Anthropology Quarterly 4:266-295.

Castillo, Richard J, Guo, Kristina L

Ceuterick, M., Vandebroeck, I., and Pieroni, A.

Cleland, J. G., and Van Ginneken, J. K.

Cochrane, S. H., Leslie, J., and O’Hara, D. J.

Conklin, Harold C.

Cosminsky, M. and Scrimshaw, S.
Crandon-Malamud, L.


Cusihuman, Antonio

Desai, S., and Alva, S.

Dettwyler, Katherine


Díaz, S., Fargione, J., Chapin III, F. S., and Tilman, D.

Ellen, Roy


Ellen, Roy F. and Harris, Holly

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Ellen R., Parkes P., and Bicker A., Eds.  

Elo, I. T.  

Engle, Patrice L., Menon, Pumina, and Haddad, Lawrence  

Ericksen, P. J.  

Escobar A.  

Etkin, Nina L.  

Etkin, Nina L. and Ross, Paul J.  

Etkin, Nina L., Ross, P.J., and Muazzamu, I.  

Evans-Pritchard, E.E.  

Fabrega, H.  
1974 Disease and social behavior: An interdisciplinary perspective. Massachusetts Institute of Technology Press, Cambridge, MA.

Fabrega, H., and Silver, D.

FAO

Finerman, Ruthbeth

Foster G.

Fowler, Catherine S.

Frisancho, Robert A.

Frisancho, Robert A., and Baker, P.

Froemming, S.

Frost, M. B., Forste, R., and Haas, D. W.

Gallopin, G.C.
Geertz, C.

Giovannini, P., and Heinrich, M.

Giovanni, P., Reyes-Garcia, V., Waldstein, A., and Heinrich, M.

Gomez-Baggethun, E., Mingorria, S., Reyes-Garcia, V., Calvet, L., and Montes, C.

Goodenough, W.H.

Goodman, Alan H. and Leatherman, Thomas L.

Graham M.A.

Gragson, Ted and Ben Blount, Eds.

Gray, S.J.

Greenway, C.
Greksa, Larry P, Sielvogel, H., and Caceres, E.  

Haas, J., Moreno-Black, G., Frongillo, E., Pabon, J., Pareja G., Ybarneagaray, J., and Hurtado L.  

Hammer, P.  

Harrison, Gail H., Zaghloul, Zahar, S., Galal, Osman, M., and Gabr, Azza  

Healey, S.  

Heckler S.  

Hoa, N. P., Chuc, N.T.K., and Thorson, A.  

Holling, C.S.  

Holy, L. and Stuchlik, M.  
Horta, B.L. et al.  

Hunn, E.  


INEI  
2008  Encuesta demografica y de salud familiar. ENDES

Johns, T.  

Keesing, R.M.  

Kleinman, A.  


Kramer, M.S. and Kakuma R.  
2012  Optimal duration of exclusive breastfeeding. The Cochrane Library.

Kreimer, E.  

Larme, A.C.  

Leatherman, Thomas L.  
Leatherman, T., Carey, J., Thomas, B.  

Leonard, W.  

Levine, N.  

Marquis, G. S., Habicht, J., Lanata, C. F., Black, R. E., and Rasmussen, K. M.  


Mathez-Stiefel, S., Vandebroek, I., and Rist, S.  

2007 Ethnobotanical knowledge is associated with indices of child health in the Bolivian Amazon. PNAS 104(15):6134-6139.

McKay, S. and Prokop, S.  

Miles, A. and Leatherman, T.  

Miller, Elizabeth  
Moffat, Tina

Moore, Lorne G., Niermeyer, Susan, and Zamudio, Stacy

Muela, S.H., Muela Ribera, J., Mushi, A.K., and Tanner, M.
2002 Medical syncretism with reference to malaria in a Tanzanian community. Social Science and Medicine 55(3):403-413.

Muhuri, P. K.

Munoz de Chavez, M., Arroyo, P., Perez, G.S., Hernandez, M., Quiroz, S., Rodriguez, M., de Hermelo M, and Chavez, A.

Murra, John V.

Nazarea, Virginia D.


Ngokwey N.

Nichter, Mark

Nichter, Mark and Nichter, Mimi


Osmond, C., Barker, D.J.P. 2000 Fetal, Infant, and Childhood Growth Are Predictors of Coronary Heart Disease, Diabetes, and Hypertension in Adult Men and Women. Environmental Health Perspectives 108(3):545-553.


Posey, Darrell A.
1985 Indigenous management of tropical forest ecosystems: The case of the Kayapo Indians of the Brazilian Amazon. Agroforestry Systems 3:139-158.

Posey, D. A., and Balée, W. L. (Eds.)

Posey, D. A., and Overal, W. L. (Eds.)

Rappaport, Roy

Reyes-Garcia, V.


Reynolds, W. R., Quevillon, R. P., Boyd, B., & Mackey, D.

Rhoades, Robert and Jack Harlan
Riedlinger, D., and Berkes, F.
2001 Contributions of traditional knowledge to understanding climate change in the Canadian Arctic. Polar Record 37(203):315-328.

Ross, Norbert

Ruel, M. T., Habicht, J.-P., Pinstrup-Andersen, P., and Gröhn, Y.
1992 The mediating effect of maternal nutrition knowledge on the association between maternal schooling and child nutritional status in Lesotho. American Journal of Epidemiology, 135(8) 904-914.

Scheper-Hughes, N.

Sellen, Daniel W.

Shore, B.

Sikkink, Lynn

Stinson, S.

Strand, J. A. and Peacock, R.

Tanner, S.
Tapias, M.  

Theidon, Kimberly  

Thomas, R. Brook, and Winterhalder, Bruce P.  

Toledo, V.M.  

Troll, C. Ed.  

Tronick, E. Thomas, R., and Daltabuit, M.  

Tugade, M. M., Fredrickson, B. L., and Feldman Barrett, L.  

Turner V.  

UNICEF  
2008 Mamawasis (waiting houses) for safe motherhood in Peru. UNICEF

Vandebroek, I., Van Damme, P., Van Puyvelde, L., Arrazola, S., and De Kimpe, N.  
Van Esterik, P. and Greiner T.

Vayda, A.P. and Rappaport, R.A.

Victora, C.B., Horta, B.L., Loreta de Mola, C., Quevado, L., Tavares Pinheiro, R., gigante, D., Concalves, H., and Barros, F.

Vitzthum, Virginia J.

Vitzthum, V. J. and Aguayo, V. M.

Voeks, Robert A.

Waldstein A, Adams C.


Waller, M. A., Okamoto, S. K., Miles, B. W., and Hurdle, D. E.

Wellin, E.
Wiley, A. S.  
2004  
An Ecology of high-altitude infancy: A biocultural perspective. Cambridge University Press.

Wiley, A.S, and Allen, J.S.  
2013  

Worthman, C., and Costello, J.  
2009  

Young JC, Garro L.Y.  
1982  
Variation in the choice of treatment in two Mexican communities. Social Science and Medicine 16(16):1463-1465.

Zent, Standford  
2001  
Figure 1.2. Picture of Cuyo Grande landscape in March.

Figure 1.3. Picture of Chawaytire landscape in January.
CHAPTER 2
A MIXED-METHOD APPROACH TO THE STUDY OF MATERNAL KNOWLEDGE AND INFANT GROWTH IN THE ANDES

2.1 Background of a mixed method approach

Over the last 30 years a mixed methods approach to research has become increasingly popular in health and social science research. Researchers saw the need to move beyond simply using quantitative or qualitative methods as distinct separate strands of study. Policy makers, practitioners, and others in applied areas recognized the value of incorporating multiple forms of evidence to document and inform research problems. Jick (1979) and Patton (1980) were among the first to triangulate both quantitative and qualitative approaches arguing that combining these approaches would offset the weaknesses of using one methodology alone.

A salient strength of qualitative research is its focus on the contexts and meanings of people’s lives and experiences. It is a systematic and rigorous form of inquiry that uses methods of data collection such as in-depth interviews, ethnographic observation, and review of documents (NIH 1999). Qualitative methods allow for the identification of previously unknown processes, explanation of why and how phenomena occur (Pasick et al. 2009). Furthermore, qualitative methods facilitate the collection of data when measures do not exist as well as provide depth of understanding of concepts.

Quantitative research, on the other hand, is a mode of inquiry used often when the goal is to test hypothesis, gather descriptive information, or statistically examine
relationships among variables. A quantities approach is ideal for measuring the 
pervasiveness of “known” phenomena and central patterns of association (NIH 1999).

Both methods have their weakness. Quantitative methods are weak in providing 
understandings of the context or setting in which people talk, and the voices of 
participants are not directly heard (Cresswell and Plano Clark 2011). A qualitative 
approach usually entails a limited number of participants who are studied in depth, hence 
it is limited because of the difficulty in generalizing findings to a large group (Cresswell 
and Plano Clark 2011). When combined the strengths of one approach make up for the 
weaknesses of the other.

A mixed methods approach to research, however, was not accepted without 
debate. Some researchers such as Smith (1983) maintained that qualitative and 
quantitative methods could not be combined because they espoused different 
philosophical assumptions that could not be merged. On the one hand, a quantitative 
approach, is based on a positivist paradigm which makes claims for knowledge based on 
1) determinism cause-and-effect thinking 2) reductionism, by narrowing and focusing on 
select variables to interrelate, 3) detailed observation and measures of variables, and 4) 
the testing of theories that are continually refined (Smith 1983, Cresswell and Plano 
Clark 2011). On the other hand, a qualitative approach is based on a constructivist 
paradigm that focuses on understanding or meaning of phenomena that are formed 
through the subjective views of participants (Smith 1983).

Moving past this stalemate, researchers saw a mixed methods approach as an 
opportunity to transform this tension into new knowledge. Tashakkori and Teddlie (2003) 
proposed a new paradigm of pragmatic philosophy that focuses on the consequences of
the research, on the primary importance of the questions asked rather than the methods, and on the use of multiple methods of data collection to inform problems under study valuing both numbers and words. In this way, a pragmatic perspective draws on employing “what works”, using diverse approaches, giving primacy to the importance of the research problem and questions (Morgan 2007).

A mixed method approach is more generally seen today as providing a bridge across the sometimes adversarial divide between quantitative and qualitative research agendas. It encourages the use of multiple world views (i.e. beliefs and values), rather than the typical association of a certain paradigm with quantitative research and another with qualitative research. In this sense, Greene (2007) provided a definition of mixed methods as a different way of looking at the social world that “invites us to participate in dialogue about multiple ways of seeing and hearing, multiple ways of making sense of the social world, and multiple standpoints on what is important and to be valued and cherished” (Greene 2007: p.20). This stance resonates with my own approach to the use of mixed methods.

Scholars at the National Research Council (2002) argued that scientific research was best approached by tackling three different but related questions: “1) description – what is happening? 2) cause – is there a systematic effect? and 3) the process or mechanism – why or how is it happening?” (p.99). Answering these three questions necessarily involves a combination of both a qualitative and quantitative approach to inquiry (NRC 2002). My dissertation research examines these three questions in relation to maternal knowledge associated with infant feeding and growth.
Specifically, this dissertation examines infant feeding recommendations in highland Quechua communities and their relation to maternal practices and infant growth outcomes. I address this topic through an examination of the three related questions stated above. My first goal was to describe what is happening. To meet this goal I sought to gain an in-depth understanding of maternal beliefs, how mothers conceptualize infant feeding and health through the lens of their own experiences and context. This goal necessarily required a qualitative lens. My second research goal was to explore the associations between a measure of knowledge and anthropometric measures of children in order to examine the potential effects of knowledge on the larger concepts of ‘health’. This is a hypothesis driven goal that required the combination of qualitative and quantitative data. I used the descriptive information gained from my first question to develop a survey instrument to measure individual mother’s knowledge and its association with infant growth. In this manner, I used qualitative data to develop a survey instrument and also to help interpret and contextualize the numerical results of the survey. My third research goal was to explore the mechanism or process – why or how it is happening. My focus was to study the relationships between maternal infant feeding beliefs and practices, so I examined the ideology of maternal infant feeding and the systematic observation of actual feeding behaviors.

I define a mixed methods approach as not simply a method but more as a methodology that spans viewpoints and includes the collection, analysis, and mixture of qualitative and quantitative methods in many phases of the research process. As a method, it focuses on collecting, analyzing and mixing both qualitative and quantitative data in a single study or series of studies. Its central premise is that the use of both
approaches, in combination, provides a better understanding of research problems than either approach alone (adapted from Johnson et al. 2007 and Creswell and Plano Clark 2007). For the rest of this chapter I present the specifics of the mixed methods research design and methods I employed.

2.2 Research Design

I conducted the research between December 2011 and December 2013 in four adjacent highland Quechua rural communities located in the district of Pisac, within the Region of Cusco, Peru. I employed a multiphase design (Creswell and Plano Clark 2011), including several phases that were conducted over the two years of data collection. As implied by a mixed-methods approach, I employed a combination of qualitative and quantitative methods (Table 2.1). Between December 2011 and June 2012 in two adjacent communities, Cuyo Grande and Chawaytire, I collected semi-structured interviews and free-listing exercises to examine traditional and public health beliefs relating to infant feeding and health and to formulate a survey. Between September 2012 and December 2013 I administered a survey with mother and infant pairs in the same two communities plus an additional two adjacent communities, Paru Paru and Pampallaqta. In addition to the semi-structured interviews and survey, I conducted focal observations and participant observation throughout the data gathering period (December 2011 through December 2013) in Cuyo Grande and Chawaytire.
### Table 2.1. Characteristics of fieldwork, participants, and method type

<table>
<thead>
<tr>
<th>Qualitative Data Collection</th>
<th>Phase</th>
<th>n</th>
<th>Participants</th>
<th>Sites</th>
<th>Type of method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Dec 2011 - Dec 2012</td>
<td>18</td>
<td>Older mothers</td>
<td>Cuyo Grande Chawaytire</td>
<td>Semi-structured interviews and free-listing exercises</td>
</tr>
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<td></td>
<td></td>
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<td></td>
<td>Pisac Health Center</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dec 2012 - Dec 2013</td>
<td>16</td>
<td>Currently breastfeeding mothers</td>
<td>Cuyo Grande Chawaytire</td>
<td>Semi-structured interviews and free-listing exercises</td>
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<td></td>
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<td>Pisac Health Center</td>
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<th>Quantitative Data Collection</th>
<th>Phase</th>
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<th>Sites</th>
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</thead>
<tbody>
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<td></td>
<td>Dec 2012 - Dec 2013</td>
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<td>Mother and child pairs</td>
<td>Cuyo Grande Chawaytire</td>
<td>Structured questionnaires and anthropometric measures (weight and length)</td>
</tr>
<tr>
<td></td>
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<td>Pampallaqta Paru Paru</td>
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<tr>
<td></td>
<td>Dec 2011 - Dec 2013</td>
<td>39</td>
<td>Mother and infant pairs</td>
<td>Cuyo Grande Chawaytire</td>
<td>Focal follows</td>
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### 2.3 Research Methods

**Participant observation**

My time during the two years of data collection was split between Cusco and the communities where I conducted data collection. I lived in the city of Cusco with my spouse and son (at the time one year old) which was located 2 hours by bus from the research communities. I commuted to the research communities daily (five times a week) to conduct data collection. About four nights per month I rented a room from my field research assistant’s sister in Cuyo Grande so that I could spend time in the community doing participant observation.

Participant observation included my experiences living as a mother of a one year old in the city of Cusco as well as the time spent in the rural communities. In the city of Cusco, I took my son every month to a public health post to monitor his health and
growth. In addition, I relied heavily on public transportation to get around the city of Cusco. On many occasions my son was with me, I learned a lot about infant feeding recommendations. When my son cried someone would undoubtedly say “give him teta (the breast)!” In fact, giving teta (referring to breastfeeding) was such a casual and public activity that my son’s first word was teta. When I fed him something on the long ride of public transportation fellow commuters would invariably comment on the qualities of the food item. When I continued to breastfeed my son beyond a year and a half people commented that he was too old to be breastfeeding. It was rare an occasion when traveling with him that I would not receive some piece of advice or comment regarding child rearing.

In the rural communities my participant observations consisted in assisting with food production and preparation, participating in meals and community festival, and observing breastfeeding activities. In addition, I brought my son with me to the field on several occasions either to visit a family in particular or the local health post (Figure 2.1). My personal experiences with breastfeeding in public and visiting local health posts both in the city and rural communities provided rich insight into the conceptualization of breast milk and breastfeeding from the perspective of community members, public health personnel, as well as from my experience in the urban context of the city of Cusco.

*Free-listing and semi-structured interviews*

I employed free-listing exercises and semi-structured interviews to elucidate traditional and public health knowledge of infant feeding and care and assess differences and similarities between the two models. In addition, I also explored whether traditional
recommendations are being displaced or expanded by the promotion of public health recommendations. In Chapter 3, I focused on a qualitative discussion describing what the knowledge consists of and what was happening in the context of public health recommendations. To do so it was important to focus on understanding the context and setting in which people talk as well as highlight participant’s perspectives. The specific questions I answered in Chapter 3 include: Q.1 What are the differences and similarities between traditional and public health recommendations surrounding infant feeding and care? Q.1.1 Are traditional recommendations being displaced or expanded by the promotion of public health recommendations?

To characterize traditional infant feeding knowledge and identify different foods and medicines and their uses during lactation and infancy, I conducted semi-structured interviews (Bernard 2006) and free-listing exercises (Quinlan 2005) with 18 older mothers 45 years old and above. These mothers were identified by community members as most experienced regarding breastfeeding and infant care. I first asked each older mother to free-list or name foods and medicines associated with breastfeeding. With the results of the free-listing exercises, I generated a list of all foods and plants known by at least one older mother (Reyes-García, et al. 2004). I also asked older mothers to free-list illnesses associated with infant feeding and care and generated a list including etiology, symptoms and treatments. In semi-structured interviews, I asked older mothers to recall their experiences with breastfeeding and infant nutrition and discuss how they related to more general beliefs and behaviors. Questions included: When does breastfeeding start? How often are infants breastfed throughout the day? What makes breastfeeding more or less difficult for the mother? Is breastfeeding exclusive? When are supplementary foods
introduced? When does breastfeeding stop? What prompts a change in diet or breastfeeding? See Appendix A for a complete list of interview questions. I used this qualitative data as an indicator of traditional breastfeeding knowledge since the older women would have been mothers before the introduction of the maternal and infant health initiative in 2004 (see below).

To characterize public health recommendations on infant feeding and care in the area, I conducted semi-structured interviews and free-listing exercises with all public health staff in the two research communities. This consisted in a total of 15 nurses and nurse obstetricians at the local health post and a health clinic located in Pisac, the district capital. These two public health establishments service both communities of Cuyo Grande and Chawaytire (Figure 2.2). I chose to interview nurses and nurse obstetricians at these local public health establishments because they provide mothers with advice regarding infant feeding at prenatal check-ups, immediately after birth, and during monthly infant growth check-ups. In addition, I reviewed clinic and policy documents regarding breastfeeding and infant feeding recommendations. Questions for the public health staff included: What are the recommendations related to breastfeeding promoted by this establishment? When should breastfeeding be initiated? Why? For how long should breastfeeding continue? Why? These data served to construct a proxy for Peruvian public health knowledge. I used this qualitative data to elucidate traditional and public health models of infant feeding and care and assess differences and similarities between these models.

In addition, I conducted semi-structured interviews with a purposive sample of currently breastfeeding women (eight from each community for a total of 16 women)
considering a balanced distribution across age groups, socioeconomic status, and place of residence within communities (Bernard 2006). I asked the 16 currently breastfeeding mothers the same questions I asked the older mothers, i.e. to list substances that are proscribed or prescribed in relation to breastfeeding, to list illnesses associated with infant feeding and care, and answer questions regarding the timing and reasoning of infant feeding. I compared these responses with those of the older mothers to explore change and persistence in maternal breastfeeding knowledge patterns. The results also helped to construct a more complete ethnographic understanding to interpret the results of the survey and focal follows (see below).

Survey

To explore the contributions of traditional knowledge to infant growth, which is the focus of Chapter 4, I employed an exploratory mixed-methods research design. This design entails qualitative data collection and analysis in an initial phase and quantitative data collection and analysis in a second phase (Cresswell and Plano Clark 2011). I used the qualitative data gathered in the first phase to develop traditional and public health knowledge test modules for the survey (described below) based on this data. In addition, I used the results from the semi-structured interviews and free-listing exercises (described above) to help interpret the results of the survey. The specific questions I answered in Chapter 4 include: Q.2 What is the relationship between maternal traditional and public health knowledge associated with breastfeeding and infant growth? Q.2.1 Is this relationship independent of potentially confounding factors such as socioeconomic status and maternal, child, and household characteristics?
I conducted the survey with an exhaustive sample of all mothers with children three years or younger who agreed to participate — a total of 101. I chose to include mothers with children three years and younger because there is literature that states that beyond three years maternal recall of breastfeeding initiation and duration is unreliable (Li et al. 2005). I carried out this survey in the four adjacent communities of Cuyo Grande, Chawaytire, Pampallaqta, and Paru Paru. The purpose of the survey was to examine the association between two outcome variables (longitudinal measures of infant length and weight) and two explanatory variables (maternal traditional knowledge and maternal public health knowledge) associated with infant feeding and care, controlling for individual maternal, infant, and household characteristics. The survey was composed of three modules: 1) traditional infant feeding and care knowledge, 2) public health knowledge of infant feeding and care, and 3) demographic and socioeconomic characteristics of mother and child pairs. The complete survey is included in Appendix B.

To develop the first two modules (traditional knowledge and public health knowledge of infant feeding and care), I used the results of the free-listing exercises and the semi-structured interviews with older mothers and public health staff. I compiled the answers from the semi-structured interviews and free listing exercise into two lists of responses associated with traditional or public health infant feeding recommendations with the frequency of greater than one. From semi-structured interview and free-listing exercise results, I generated 40 true or false questions associated with traditional infant feeding knowledge and 40 true or false questions associated with public health infant feeding knowledge with varying degrees of difficulty (easy, medium, and difficult) based on the results of the free-listing exercises. Examples of traditional knowledge questions
include “plant X is good to eat during breastfeeding to increase breast milk production”, “plant Y is good to eat to dry up the production of breast milk”, “breast milk is medicine for backache”, and “if the baby has milk with cheese-like diarrhea she has ūñup’ a.” Examples of public health knowledge questions include “babies who are fed before six months get sick more often”, “breastfeeding should begin as soon as possible after birth”, and “vitamins given at the health post help increase a baby’s appetite.”

I wrote the survey in Spanish and then translated the survey to Quechua with the assistance of a Quechua professor. My field research assistant and I then pilot tested the survey with seven women in the research communities who were not participating in the research. We revised the survey to correct for awkward phrasing and ensure understanding. Once the survey was tested and the field research assistant became familiar with the survey, it took us about 30 minutes to administer the survey. All surveys were conducted face-to-face. When we began to administer the surveys I was present and once the field research assistant was comfortable with administering the survey she carried out many in my absence. We recorded who administered the survey in our records to check for any biases.

I used these modules to assess the relationship between ethnonutritional knowledge and public health knowledge. For example, I designed the survey to examine if breastfeeding mothers in this community conceptualize breastfeeding and infant feeding according to local recommendations, public health recommendations or a combination of both (Hruschka, et al. 2008). I elaborated a true/false answer key and then calculated individual summary scores.
I measured maternal knowledge of all mothers in the sample by asking the 101 mothers the 80 true and false questions developed in phase one. These questions served as a proxy for traditional and public health knowledge because they score a mother’s ability to correctly answer questions about breastfeeding, infant feeding, and infant care that are consistent with either information from the older mothers or the public health experts. I evaluated the answers and generated a score for each mother consisting of the sum of all correct answers. I then converted the scores to a range from 0 to 1, with a higher number indicating higher level of knowledge. Each mother received a score from 0 to 1 for traditional knowledge and public health knowledge.

The third module (socioeconomic and demographics module) includes information on child, parental, households, and community variables that have been associated with infant growth in previous research (Leonard 1989, Obert et al. 1994, Leatherman et al. 1994). This information includes self-reported monthly cash income for the mother and for the father (monthly cash income earned by the father reported by the mother). I asked mothers to report estimates of their own and also the monthly income of the father. I asked mothers to report their years of education (maximum school level attained). I asked mothers about their age, religion, place of birth, number of children (total number of children for the mother), and household size (total number of people living in the household at the time of the survey). I also asked questions about the youngest child (three years or younger) including age, birth place, and sex. I cross checked child birthdates by asking mothers to show the child’s public health growth and immunization card.
Infant Anthropometrics (length and weight)

I obtained longitudinal recumbent length (cm) and weight (kg) measures for 101 participating children from the local health post records after obtaining permission from mothers and health post officials. Anthropometric measures are collected and recorded on a monthly basis during required check-ups from birth up to 12 months of age by health post personnel who are trained to apply the protocols for anthropometric measurement of the World Health Organization (WHO 1995).

I converted the weight and length measures into age and sex specific growth indices, weight-for-age (WAZ), length-for-age (LAZ), and weight-for-length (WLZ) using the WHO 2006 international growth standards based on breastfed infants. A child is deemed affected by chronic malnutrition (stunting) when his or her z-score of height-for-age is -2 or lower, or two standard deviations, below the international mean for age and sex adjusted height. Similarly, a child is deemed affected by undernutrition defined by low weight-for-age z-scores (-2 or lower) (WHO 2008). Similarly, he or she is affected by acute malnutrition (wasting) when his or her z-score of weight-for-age is -2 or lower. Acute malnutrition may reflect occasional weight loss as a result of recent disease episodes (WHO 2008). Stunting, however is more representative of insufficient growth due to persistent dietary deficiencies, disease, or some combination of the two (WHO 2008).

At the beginning of data collection I planned on taking my own recumbent length and weight measures for participating children. I estimated that I would be able to obtain weight and length measures every two months (beginning the first month of the infant’s life up to 12 months of age) for 40 infants during the data collection period. Obtaining
these many measures proved to be difficult because we often had to seek mothers in their fields carrying the equipment to measure anthropometrics (weight and length) up hillsides. Public health collects infant weight and length from birth up until 12 months of age on a monthly basis. Mothers are diligent about attending infant health clinics because they receive food rations during these visits. Obtaining height and length measures from public health records allowed me to increase my sample size from 39 to 101 mother and infant pairs. This was because instead of catching infants from birth up to 12 months during the data collection period, I was able to retroactively obtain infant anthropometric data for all mothers with children three years and younger in the sample. In addition, public health infant growth records contain monthly length and weight measures which are more complete than would have been possible for me to collect during fieldwork.

I used results of the survey and the longitudinal anthropometric measures to assess the effect of maternal traditional knowledge and public health knowledge (exposure variables) on infant growth (outcome variable), controlling for the following covariates: maternal socioeconomic status, age, and parity, age and sex of the infant.

_Focal Follows (continuous observation)_

The focus of Chapter 5 is to examine the links between ideology and behavior by considering how rural Quechua indigenous women living at high-altitude use traditional knowledge associated with infant feeding. I employed an embedded mixed-methods research design (Cresswell and Plano Clark 2011). This design entailed the concurrent collection and analysis of qualitative and quantitative data. I gathered semi-structured interviews with currently breastfeeding mothers (see above section on semi-structured
interviews) and focal follows to explore connections between belief and practice. I used the qualitative data (participant observation and semi-structured interviews) to interpret the results of maternal infant feeding practices and growth outcomes. The specific questions I answered in Chapter 5 include: Q.3 What is the relationship between maternal knowledge and behavior? Q.3.1 Are public health campaigns changing maternal infant feeding behaviors?

I recruited all infants 0 to 6 months of age and their mothers in the communities of Cuyo Grande and Chawaytire, subsequently incorporating new infants as they were born during the first year of data collection. I obtained a list of mother and infant pairs that would fit this sampling criteria from the Cuyo Grande health post. In addition, I cross-checked the completeness of this list with the field research assistant and other mothers as they were recruited. There were 46 mothers who met the criteria to participate in the focal observations. Of those 46 mothers two declined to participate, and four mothers dropped out from the study. Ultimately, I was able to recruit a total of 39 mother and infant pairs.

I followed this exhaustive sample of infants and mothers longitudinally capturing as much of four stages of breastfeeding (1 day-3 months, 4-6 months, 7-9 months, and 10-12 months) as possible through the two years of data collection. This age set enabled the detection of changes in breastfeeding practices throughout infancy including supplementation and the process of weaning (Vitzthum 1988, Piperata and Gooden Mattern 2011). Of the 39 mother and infant pairs, I observed 15 (36%) at all four stages, 46% at three stages, 18% at two stages, and 0% at only one stage. I observed a total of 1,476 hours.
One day during the four stages of growth specified above, mothers and infants were accompanied for a 12 hour block of time. In the majority of cases we split the 12 hour block into two six hour blocks across two days (i.e. one day the mother was observed between six in the morning to twelve noon and on a second day from twelve noon to six at night). We split up the 12 hours into two days of observations because it was a more manageable block of time for both the researcher and the mother being observed. In some cases we observed mother and infant pairs for 12 consecutive hours, particularly for mothers who lived in harder to reach areas or because some mothers preferred to have the observation done in one block.

The focal observations consisted in accompanying mother and infant pairs on their daily activities. During observations I recorded spacing and duration of breastfeeding sessions as defined by Vitzthum (1994) as a series of nursing episodes (time nipple is in the infant’s mouth) spaced less than one minute apart. I did not differentiate between nutritive and non-nutritive suckling during these observations. I recorded data on two aspects of breastfeeding structure: 1) the number of breastfeeding sessions per observation (6am to 6pm) and 2) the duration (minutes) of individual breastfeeding sessions per observation (6am to 6pm). I also recorded the spacing, duration, type, and quantity of foods or liquids consumed by the infant and/or mother. These activities were recorded in an observation sheet (see Appendix C).

I have three major concerns regarding this method: First, it was difficult when we began the focal follows to only observe during these designated times. Mothers were often alone with their infants and other children while fathers and other family members were away traveling for seasonal work or tending to fields. It was difficult act purely as
an observer when, for example, the mother stepped out of the room and the infant cried. I emphasized that our role was to observe, but there were times when this was not possible. For example, the field research assistant or I picked up a baby that cried for a few minutes. However, these times were exceptional and not the norm. These instances occurred the first few times we began the observations and were recorded in the observation sheet. A second concern is limiting observer bias in relation to the consumption of food and liquids. It is possible that mothers prepared more elaborate meals because the researchers were present. Finally, it is possible that mothers modified their behavior to meet my expectations as a researcher. For example, it is possible that mothers may have refrained from giving complementary foods to infants who were six months or younger because they know that public health recommendations are to exclusively breastfeed infants up to 6 months. We discussed these issues with the participants and encouraged them to go about their activities as naturally as possible. We reassured participants anything we recorded was confidential and that we would not attach their names to the recordings. We tried to lessen the potential of observer bias as much as possible. However, the method is not without its limitations.

The majority of the observations were carried out by the field research assistant. I trained the field research assistant and then was present for at least two six-hour blocks of observations (25%) for each mother and infant pair. Despite the intrusive nature of the focal follow method, mothers were generally welcoming and accepting of our presence. The field research assistant was instrumental in the success of the focal follows because she is a resident of Cuyo Grande. Her insider knowledge about how to help participants feel at ease was an immense asset to the research.
2.4 Language considerations

Field languages included both Spanish and Quechua. I am a native Spanish speaker and hold intermediate Quechua language skills. I have taken introductory Quechua classes and, prior to data collection, I completed an intensive language course in intermediate Quechua at the Centro Tinku Language School in the city of Cusco — sponsored by a Foreign Language and Area Studies Fellowship. Additionally, I worked with two female bilingual native Quechua/Spanish speakers from Cuyo Grande who worked as my research assistants throughout the two years I conducted the data collection. The first assistant worked as a field research assistant helping me to recruit research participants and translate the list of questions on the semi-structured interviews and free-listing exercises. The second assistant was an office research assistant who listened to and directly translated and typed audio recordings that were in Quechua to Spanish.

The field research assistant and I conducted semi-structured interviews with older mothers and currently breastfeeding mothers. We approached mothers in their homes and invited them to sit with us in a comfortable and quiet place. Most often interviews took place sitting on stools or a blanket in the yeard of the interviewee (Figure 2.3). We worked with a list of questions that served as a guide for the interview. I wrote the questions in Spanish and then worked with the assistant to translate them into Quechua. The majority of participating mothers held some degree of Spanish language skills, however, Quechua was their primary and preferred language. The field research assistant asked the interview questions in Quechua and translated the responses into Spanish upon my request when I needed clarifications. In turn, the field research assistant also
translated my interjections into Quechua during interviews when necessary.

All semi-structured interviews and free-listing exercises took between 20 and 60 minutes. I transcribed the interviews with public health personnel using ExpressScribe software. The office research assistant transcribed and translated (from Quechua to Spanish) the interviews with older and currently breastfeeding mothers. In addition to audio recordings, I wrote notes during interviews and used the notes to cross-check transcriptions to assure completeness and accuracy. Finally, I worked with a Quechua language scholar from the city of Cusco to double check the accuracy of the translations completed by the office research assistant.

2.5 Prior informed consent process

Each community has democratically elected officials. Before I began any data collection I approached the community president to explain the purpose of the research project and to ask permission to conduct the research in the community. In addition, I obtained informed consent from each participant before the start of each data collection session, emphasizing that participation was voluntary and that participants could choose to drop out of the research at any time. Participants gave verbal consent for their participation. I gave each participant a small gift of 5 nuevos soles (equivalent to $2USD) each time they were involved in one of the data collection methods with the exception of participant observations. In addition, I often brought a food item to share with participants during interviews and surveys such as bananas, passion fruit, avocado, or bread. The research project was reviewed and approved by the Institutional Review
Board of the University of Georgia to ensure the protection of human subjects IRB#: 2011104332

For interviews with public health staff I obtained permission from the Peruvian Ministry of Health’s head office in the city of Cusco. They provided letters stating their support for the research. The public health representative who granted permission for the interviews with public health personnel was enthusiastic about the research and requested that I share my results. I also obtained verbal permission from the head administrators of the health center in Pisac and the Cuyo Grande and Quello Quello health posts. Finally, I obtained permission to access infant growth records at the Cuyo Grande and Quello Quello health posts from the respective head administrators and from participating mothers.

2.6 Conclusion

In summary, I employed a multi-phase mixed-method design which, as the name implies, included multiple phases of data collection and analysis. I employed such an approach because different questions required different collection and mixing of methods at different stages. In Chapter 3, I employed qualitative methods to examine how mothers conceptualize infant feeding and care. In Chapter 4, I examined the association between maternal traditional or public health knowledge and infant growth. I employed a sequential mixed-method design where I first gathered qualitative data to define how mothers conceptualize infant feeding and care. With this information I developed a survey module that allowed me to measure a mother’s traditional or public health knowledge. The quantitative data provided by the survey allowed me to uncover
relationships between variables (maternal knowledge and infant growth). I also used the qualitative data also to help me interpret and contextualize the quantitative results. For Chapter 5, I gathered qualitative (semi-structured interviews with mothers) and quantitative (systematic observations of maternal infant feeding practices) concurrently. The mixing of these data occurred during data analysis. Again the qualitative results helped me to contextualize and interpret the quantitative data. A mixed method approach was instrumental to answer the questions I posted in Chapter 4 and Chapter 5. The value of such an approach to research is its capacity to bring together a more comprehensive account of infant feeding knowledge, beliefs, and practice as well as infant growth offsetting the strengths and weaknesses of qualitative or quantitative approaches on their own.
2.7 References

Bernard, Russell.  
2006 Research Methods in Anthropology: Qualitative and Quantitative Approaches AltaMira Press

Greene, J.C.  

Hruschka, Daniel J., Libley, Lynn M., Kalim, Nahid, and Edmonds, Joyce, K.  

Jick, T.D.  


Leatherman, T., Carey, J., Thomas, B.  

Leonard, W.  

Li, Ruowei, Kelley S. Scanlon, and Mary K. Serdula  

Morgan, D.L.  

National Institute of Health  

National Research Council  

Pasick, R. J., Burke, N. J., Barker, J. C., Galen, J., Bird, J. A., Otero-Sabogal, R.

Patton, M.Q.

Pelto, G.H., Jerome, N.W., and Kendel, R.F.

Piperata, Barbara, and Gooden Mattern, Lindesy M.

Quinlan, M.

Smith, J.K

Tashakkori, A. and Teddlie, C. (Eds.)

Vitzthum, Virginia J.
WHO


Figure 2.1 Picture of researcher and son in the field.

Figure 2.2. Picture of public health post.
Figure 2.3. Picture of research assistant interviewing older mother.
CHAPTER 3

PERSISTENCE AND CHANGE OF ANDEAN INFANT FEEDING CONCEPTS IN
THE CONTEXT OF PUBLIC HEALTH RECOMMENDATIONS

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Abstract

Social scientists have paid considerable attention to the loss, retention, or expansion of traditional medical systems. A commonly held assumption is that traditional medical systems are maintained and used in places where formal health care is physically inaccessible or not affordable. I employ the concept of cultural resilience to explore traditional knowledge related to infant feeding in two highland rural communities located in the Region of Cusco, Peru. Here the Peruvian Ministry of Health has implemented maternal and infant health strategies, changing how women obtain pre- and post-natal care. Through semi-structured interviews with older mothers, currently breastfeeding mothers, and public health staff the research examines: 1) concordances and discordances between traditional and public health infant feeding recommendations and 2) whether traditional recommendations are being displaced or expanded by the promotion of public health recommendations. This research adds to previous work by highlighting an Andean theory of infant feeding and health. In addition, found that Andean knowledge associated with infant feeding is resilient. Andean mothers employ a process of selective integration, accepting what they find useful and beneficial reorganizing in the face of change by maintaining the distinctively Andean way of seeing infant feeding and care. In addition, by incorporating multiple health care seeking options (home remedies, traditional healers, and biomedical treatments) mothers are maintaining a flexibility of options for maintaining health and avoiding vulnerability.
3.1 Introduction

Social scientists have paid considerable attention to the loss, retention, or expansion of traditional medical systems (Calvet-Mir et al. 2008, Giovannini et al. 2001). Many researchers argue that biomedicine\(^7\), displaces traditional medical systems through a process of “medical hegemony” (Elling 1981). A commonly held assumption is that traditional medical systems are maintained and used in places where formal health care is physically inaccessible or not affordable (Bussmann and Sharon 2006, Quinlan and Quinlan 2007). To date, research has yielded conflicting insights into how the introduction of biomedical services can affect traditional knowledge patterns (Giovannini et al. 2011). For example, Ngokwey (1995) in Brazil and Saethre (2007) in Australia found that the use of biomedical concepts displaces the use of traditional medicine and local medical beliefs. Others, however, show that traditional and biomedical medicines co-exist, complement, and blend with each other (Cosminsky and Scrimshaw, Etkin et al. 1990, Byg et al. 2010, Giovannini et al. 2011, Mathez-Stiefel 2012). I contend that these finding may reflect divergent ideas regarding the nature of change and propose the use of a resilience framework that examines change as part and parcel of cultural systems.

In this chapter I explore cultural resilience which, according to Healy (2006), is “the capacity of a distinct community or cultural system to absorb disturbance and reorganize while undergoing change, so as to retain key elements of its structure and identity that preserves its distinctiveness” (Healy 2006: p.10). I draw on Healy’s (2006) concept of cultural resilience to explore traditional knowledge related to infant feeding

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\(^7\) I define biomedicine as a global, hegemonic medical system based on western scientific principals which includes the use of pharmaceuticals, healthcare professionals and biomedical facilities (Giovannini et al. 2011).
practices in two highland rural communities located in the Region of Cusco, Peru. Here the Peruvian Ministry of Health has implemented maternal and infant health strategies, changing how women obtain pre- and post-natal care.

Researchers in the Andes have long recognized the coexistence of traditional and biomedical health traditions (Bastien 1982, Crandon-Malamud 1991, Vandebroek 2008), and that they are likely not competing domains but rather there is much exchange happening between them (Crandon-Malamud 1991). Some authors stress that traditional medicine\(^8\) might be part of the same cognitive system, characterized by the integration and syncretism of the medical beliefs, knowledge and practices of these two healing traditions (Kreimer 1990, Allen 1988, Grillo-Fernandez 1998). Kreimer (1990), for example, in his research among shamans who migrated from Andean towns to urban Lima, Peru found that they consciously accept foreign ideas in order to give space for their own concepts and culture to develop. Likewise, Allen (2002) and Grillo-Fernandez (1998) argued that Andean cultures “digest” what is foreign and fit it into the Andean way of seeing the world. Some Andean scholars have highlighted the resilience of Andean knowledge, presented as being able to react to change through mechanisms of “creative resistance” (Salas 1994) or resilient adaptation and transformation (Ceuterick et al. 2011). Other researchers affirm that the systems complement each other, as exemplified by multiple use or active collaboration between practitioners of both types of medicines (Bastien 1987, Mathez-Stiefel et al. 2011). Given the overall dominance of biomedicine, however, it is important to consider the unequal relations involved in the

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\(^8\) Consistent with Toledo (2002) I define traditional medicine as the cumulative body of knowledge of a culture that has been handed down through generations, that is socially shared by members of the same generation, and that has been adapted to a particular place.
use of particular health care systems. In the Andean setting, this is especially true because biomedicine is supported by the state.

The problem of childhood under-nutrition in low-income countries persists despite decades of efforts by local governmental and international development agencies. Poor nutrition exerts effects on growth and survival, and is associated with negative effects on reproductive performance, work capacity, and cognitive abilities later in life (Pelletier 1994, Black et al. 2008). Child under-nutrition is a major public health concern in Peru, where there are stark rural and urban differences. 44% of children in rural areas are stunted as compared to 16% in urban areas (INEI 2008). In order to address this problem, the Peruvian Ministry of Health has focused on improving access to primary healthcare and providing maternal and child health monitoring and education. Mothers in rural communities are required to attend pre-natal health monitoring, give birth at the nearest public health facility with the assistance of a biomedical physician, attend nutritional workshops, and take their children for regular growth and health monitoring. In addition, public health efforts are focused on promoting the infant feeding recommendations of the World Health Organization (WHO 2009), including 1) a balanced diet of proteins, energy, and micronutrients necessary to support breastfeeding and infant growth, 2) exclusive breastfeeding for the first six months of life, 3) introduction of supplementary foods at six months, and 4) continued breastfeeding for two years or more (WHO 2009). These practices are supported because they are associated with best maternal and child health outcomes. The underlying assumption is that rural diets and feeding practices are characteristic of most poor populations (lacking in protein and energy) and are to blame for high indices of child under-nutrition.
Prior to the changes in policy and regulations surrounding maternal and child health and nutrition, mothers chose to give birth and access general maternal and child health services at the nearest public health post or mediated birth and infant feeding at home with the assistance of family and local midwives. Attending pre-natal and post-natal nutrition and health monitoring as well as giving birth at a facility of the Peruvian Ministry of Health means that mothers are receiving advice about optimal maternal and infant feeding practices from public health staff in addition to family members and traditional midwives.

Previous research in the Andes shows that Andean diets are guided by beliefs held by caregivers regarding the medicinal and nutritional properties of plants, animals, and seasons that give the mother strength to recuperate from childbirth and are good to eat during breastfeeding (Graham 2003, Froemming 2006). For example, forty-three plants, animals, and minerals have been identified throughout the Andean region that are incorporated into the diets of women during lactation, as they are believed to increase the production of breast milk (Froemming 2006). In addition, researchers in Peru have identified how local conceptions of the body underlie specific infant feeding behaviors of mothers. A mother’s concepts of her infant’s physical growth and development shape and guide her infant feeding practices (Wellin 1955). For example, mothers in Lima were more likely to breastfeed toddlers at 15 months who suffered diarrheal disease, and low intake of supplementary foods for a longer period of time than toddlers who did not suffer from these conditions (Marquis et al. 1997). Furthermore, in highland towns of Peru and Bolivia, mothers believe that their rage or sorrow is transmitted to their infants through breast milk (Tapias 2006, Theidon 2009). As a result, mothers under distress may
temporarily alter their breastfeeding practices or stop breastfeeding altogether to avoid putting infants at risk (Tapias 2006). To my knowledge no research has documented conceptual frameworks underlying infant feeding practices in the Andes and how they are changing or not in the face of public health recommendations.

Mathez-Stiefel et al. (2012) have investigated the assumption that increased access to biomedicine displaces indigenous medical knowledge and practices through a process of “medical hegemony” in Quechua communities of Peru and Bolivia. The main research question was whether the increased presence of biomedicine leads to displacement of Andean medicine or to coexistence of indigenous and biomedical health care. The results from that research indicate that health-seeking behavior is independent of the degree of availability of biomedical health facilities, except for specific practices such as childbirth (Mathez-Stiefel et al. 2012). In this article, I build on this research and propose that the recent changes in policy and regulations surrounding governmental supervision of maternal and child health presents the opportunity to explore cultural resilience via the interface between traditional and biomedical public health models of infant feeding and health.

Aside from addressing the literature on cultural resilience and medical pluralism in the Andes, this research is important because it is focused on historically marginalized rural indigenous populations which have had poor access to biomedical health services. Cultural differences, language, and beliefs can compound the problem of obtaining appropriate health care (Castillo and Guo 2011). Thus, the adoption of strategies to enhance cultural competence within health agencies may improve access and quality of care for ethnic populations (Opler et al. 2004). I ask two questions: 1) What are the
differences and similarities between traditional and public health recommendations surrounding infant feeding and health? and 2) Are traditional recommendations being displaced or expanded by the promotion of public health recommendations? By answering these questions I explore the concept of resilience of traditional medical systems within a pluralistic medical setting.

3.2 Research Sites

I conducted this research in Cuyo Grande and Chawaytire, two adjacent highland Quechua communities located in the district of Pisac, in the region of Cusco, Peru (Figure 3.1). These communities are set in a central Andean wet puna eco-region (montane grassland and shrub-land biome) (Olson et al. 2001). Both communities are composed of a patchwork of small cultivated parcels, native forest and exotic plantations, streams, rocks, and grasslands. Cuyo Grande is situated at 3,500 meters above sea level (masl) and houses approximately 950 inhabitants. Chawaytire is higher, between 3,750 and 4,500 masl, and has a smaller population of approximately 519 people (INEI 2008). All residents speak Quechua as a primary language and many speak Spanish as a secondary language. A road runs through Cuyo Grande and Chawaytire, connecting them to the nearby town centers of Pisac and Paucartambo, and Cusco, the regional capital.

Chawaytire and Cuyo Grande are representative of many communities in the area, sharing features of cultural and social organization. They have a long history of interaction with non-governmental organizations (NGOs), indigenous rights movements, local and regional markets, and tourism. The majority of inhabitants are small-scale farmers who grow primarily corn (Cuyo Grande) or potatoes (Chawaytire) as well as
other Andean tubers, grains, fruits, vegetables, and herd livestock. Farming is supplemented with a variety of economic activities, such as selling surplus agricultural production, weavings, crafts, driving taxis, and seasonal migration for jobs in the tourism industry (porters on the Inca trail), and in the lowlands (harvesting and informal gold mining).

Cuyo Grande and Chawaytire have experienced recent changes in the way that childbirth and maternal and early childhood health are managed. In 2004 and 2006, the biomedical health post in Cuyo Grande adopted Peruvian Ministry of Health’s resolutions to promote maternal and infant health. Pregnant women are required to receive pre-natal and post-natal monitoring and attend nutrition workshops. Mothers with children five years old and younger in these communities received monthly food rations at the health post which are contingent on attending health monitoring and workshops (Figure 3.2). In addition, a community health worker monitors women’s compliance with the requirements of these new initiatives.

The recent changes in policies and regulations surrounding governmental supervision of pre-natal care, nutritional education, childbirth, and early child health monitoring presents the opportunity to study how women manage both traditional and recent public health recommendations regarding nutrition and breastfeeding.
3.3 Methods and analysis

I carried out this research between December 2011 and December 2013 as part of a broader study examining infant feeding knowledge and practices and infant health. In an initial phase (December 2011 and December 2012), I sought to characterize similarities and differences between public health and traditional recommendations relating to infant feeding and in the area. For this purpose I conducted semi-structured interviews and free-listing exercises with public health personnel at the two local public health establishments (health posts) and with older mothers in the communities of Chawaytire and Cuyo Grande. In addition, I conducted participant observation assisting with daily tasks, participating in meals, and observing infant feeding and care activities.
For the semi-structured interviews with public health personnel, I recruited an exhaustive sample of all 15 nurses and nurse obstetricians who worked at the health post in Cuyo Grande and the health center in Pisac. Nurses and nurse obstetricians provide mothers with advice regarding infant feeding at prenatal check-ups, immediately after birth, and during monthly infant growth check-ups. During semi-structured interviews I asked public health personnel to tell me about the breastfeeding recommendations promoted at local public health establishments and about their experiences with promoting these recommendations. I conducted these interviews in Spanish, the primary language of public health staff. Interviews lasted generally from 20 to 50 minutes. I recorded the interviews using a digital recording device and transcribed them using ExpressScribe software.

The public health personnel were all Peruvian women and most were mothers who grew up in a cultural milieu of Andean cities. None of the staff live in the research communities. Instead they commute for work from Cusco or live in Pisac. They acquired their education (nursing or nurse obstetrician technical degree) in universities and technical schools in the city of Cusco and either speak Quechua from childhood or learned as part of their training to work with rural Quechua communities.

I also conducted semi-structured interviews with 18 older mothers (45 years or older) who were identified by community members as the most knowledgeable about breastfeeding and child rearing. I chose to interview older mothers because these women became mothers before the introduction of maternal and infant health initiatives in 2004 and 2006, and thus by interviewing them I aimed to arrive at a proxy of traditional breastfeeding knowledge. I also conducted the same semi-structured interviews with 16
currently breastfeeding mothers to explore persistence and change in breastfeeding beliefs and practices. During interviews, I asked mothers to relate their ideal infant feeding practices and also talk about their own experiences with infant feeding and child health. I approached mothers in their homes and invited them to participate in the research. I hold intermediate language abilities in Quechua and applied these skills during interviews. However, I also worked with a research assistant who is a native Quechua speaker and resident of Cuyo Grande. We worked with a list of questions that served as a guide for the interview. Interviews were generally from 20 to 50 minutes in length. I recorded the interviews using a digital recording device. The field research assistant asked the interview questions and translated the responses into Spanish upon my request when I needed clarifications. In turn, the field research assistant also translated my interjections into Quechua during interviews when necessary. The research assistant transcribed and translated the interviews from Quechua to Spanish. To ensure that translations of interviews with older mothers were faithful to their words, I worked with a professional Quechua language scholar in Cusco who confirmed the accuracy of the translations.

I applied inductive inference, as suggested by grounded theory (Strauss and Corbin 1997), to interpret the discourses by which participants imbue social reality with meaning. I began this approach by reading interview transcripts through to gain an overall understanding. Next, I re-read the interviews and identified key ideas and concepts, fragmenting the interview transcriptions into units of information for their subsequent coding and categorization. I then grouped together interview fragments according to key ideas, and groups into emerging themes and sub-themes. Finally, I
identified patterns within themes and sub-themes formulating generalizations based on observations and prior theoretical conceptions (Ruiz 2009). Major patterns emerging from the categories formulated within the larger study were the importance of Andean ethnomedical concepts such as debilidad (weakness), fuerza (strength), and pathogenic elements in the landscape.

3.4 Conceptual differences and similarities

*Breast milk is valued as a food and medicine*

Results from interviews with public health staff and older mothers showed that both highly valued breast milk as a food and medicine. However, their underlying conceptual reasoning differed. Public health staff discussed the nutritional properties of breast milk such as the proper balance between macro and micronutrients to meet nutritional and energy needs of infants. The immunological defenses that colostrum provides for infants were also emphasized. According to an obstetric nurse “colostrum is like a first vaccination, the only thing that is needed for [the infant’s] health and good growth and development, to not have problems.” Other benefits ascribed to breastfeeding by public health staff included speeding up the contraction of the uterus for the mother after birth, strengthening the bond between mother and child, as well as general psychological and development health benefits for the infant.

For older mothers breast milk is also highly valued as the best form of nourishment for infants. It is a normal and expected part of motherhood. Therefore, every mother breastfeeds her child. In fact breast milk is more than infant food. It is identified
as a “cold” medicine that is used to cure “hot” illnesses such as costado (culturally defined illness), cough, back ache, eye infections, and “hot” fevers.

“Milk, human milk, for wounds, for that. If a wound doesn’t heal then there is that [human milk]. For that [wounds] it is also good. Quickly with a person’s milk it [a wound] heals…Also for lung, it [human milk] is also good right! When the lung is breathing with difficulty, then you have [the person whose is sick] drink the boy’s milk, you rub, so then quickly the person reacts. For that…, also human milk is good for costado. You drink it inwardly, and you rub [on back], then, quickly it calms [eases symptoms]” (Older mother).

“They [people in the community] say that it is good for back pain. They [people in the community] take milk out to rub on their backs. Also I used to put it in the eyes of the baby. When the baby’s eye is red you put a little bit of milk, it returns to normal, it is no longer red. When [the baby] has fever I also rub him with my milk. Milk is fresco [cold], the milk takes away [the baby’s] heat” (Older mother).

To older mothers, phoge (colostrum) is also seen as an important source of nourishment for infants, providing strength and protection from illness. As stated by an older mother “we give colostrum, all, the baby breastfeeds everything, so that it is strong. It is the same in cows, we make the calves drink its mother’s colostrum so that it’s strong, and also its development is quick, and it will be strong at work” (Older mother).

*Links between maternal and infant diets and health*

Public health and older mothers also agreed that diets are important for maternal and infant health. However, again they differed in their beliefs (conceptual reasoning) for placing importance on diets for maternal and infant health. Public health staff identified a link between nutritional deficiencies in local diets and high indices of infant under-nutrition. On the other hand, older mothers emphasized the importance of avoiding illness and maintaining strength (fuerza) both for the mother and child, for they are considered
particularly weak (debil). Eating a diet balanced in hot and cold and wet and dry properties helps protect against this weakness and promote strength.

Public health staff identified deficiencies in local diets, viewing the local diet as consisting of too much potatoes consumed in “watery” soups to meet the nutritional requirements of lactating mothers and to support infant growth and health. Deficiencies specified by public health staff included proteins, fats, and micronutrients (iron and vitamin A). Public health staff attributed high rates of infant under-nutrition to “the mother did not receive proper nutrition during pregnancy” and, “the mother does not receive a proper diet during breastfeeding.”

Furthermore, public health professionals also stated that introducing foods or liquids before the recommended six months of age was a factor influencing the high incidence of infant under-nutrition. Public health staff noted that infants who were fed foods or liquids before reaching six months are more likely to experience respiratory infections and diarrhea. These illnesses, according to public health staff, are associated with fevers that likely suppress infant appetites and result in weight loss and generally disrupt normal growth patterns.

For older mothers, diet is also particularly important during the post-partum recovery period and during breastfeeding. Consumption of the appropriate foods returns a new mother to health and helps her to produce nourishing breast milk. Thus, the post-partum recovery period includes a regimen of prescribed and proscribed foods. Ideally, a sheep is slaughtered after birth to make a soup of lamb’s meat and innards cooked with ch’uño (freeze dried potatoes), asnapas (garnish such as oregano, cilantro, and wacatay (Tagetes minuta). This soup or any other food that may be given to the mother post-
partum should be *chumo* (free of salt) as salt is said to fester the wounds caused during childbirth and impedes their healing. This is the ideal food for post-partum mothers, seen as best aiding the mother to regain her strength lost during childbirth, ward off illness, and produce breast milk.

Furthermore, when asked if they experienced problems with breastfeeding, some older mothers voiced the experience of insufficient breast milk. To counter this problem older mothers spoke of incorporating particular foods into their diets to increase the production. These foods included quinoa consumed in soups, stews, or as a *mate* (liquid gruel or infusion), *oqoruru* (watercress) ingested as a salad with leaves from the quinoa plant, and the meat of the *hak’achu* (Andean flicker bird, *Colaptus rupicola*) (Figure 3.3) eaten in a soup. In addition, the increased consumption of broths (fluids in soups) during breastfeeding was also often mentioned as important to aid in the production of breast milk (Figure 3.4). The underlying belief is that milky and watery substances help produce milk. Several older mothers stated “without soup there is no milk.” Congruently, eating foods that are “dry” such as *segundos* (main course meals that usually consist of white rice with a vegetable or meat stew) or “cold” substances such as garlic, or cold water are perceived to have the opposite effect, “drying up” the production of breast milk.

The narratives of older mothers regarding the connections between food and health are consistent with what other researchers in the Andes have found. Ethnographic accounts of communities in the Andean region demonstrate that Andeans believe an adequate combination of hot and cold and wet and dry substances is essential for preventing illness and maintaining the fluidity of life substances within the body (Graham
For example Bastien explains:

“For Kallawaya Andeans, health is the cycle of fluids and semi-fluids (water, air, blood, and food)… which are distilled into secondary fluids (mucus, bile, sweat, urine, gas, milk, and semen) and semi-fluids (feces and fat), which, except for fat, need to be eliminated regularly and become toxic if they accumulate. Disease is synonymous with stopping the cycle of circulating blood, distilling fluids, and eliminating waste products. Hot/cold, wet/dry are important factors because they influence the fluidity of this cyclical hydraulic system” (Bastien 1987: p.46).

Andean concepts of health and illness place importance on the relationship between health and foods (Bastien 1987, Graham 1997). An adequate diet is considered essential for preventing illness and providing strength in adults and children. Drinks, foods, and herbal remedies are classified by their perceived intrinsic properties into “hot”, “cold”, “wet”, and “dry” categories. Meals should contain a balance of hot/cold and wet/dry foods and liquids to maintain a flow of the fluids and semi-fluids within the body. Illness is caused by the disruption of the normal flow of fluids within and out of the body.

Furthermore, many illnesses are classified according to “hot” and “cold” properties and are perceived to disrupt the flows in the body. Illnesses that are classified as “hot” are normally combatted with herbal remedies or foods that are “cold” and vice versa (Bastien 1987, Graham 1997, Hammer 2001). In this research I found that breast milk is classified as a “cold” medicine, which in practice is used to combat “hot” illnesses such as fever, eye infections, and costado.

Several researchers in the Andes have found that certain individuals are perceived as being more susceptible to illness because they are weak (debil) or lack strength (Graham 1997, Larme 1998, Oths 1999). Weakness is seen as an inherent quality
of individuals at certain stages of their life including fetuses, infants, pregnant women, post-partum women, breastfeeding women and elders (Graham 1997). For example, Graham (1997) shows that parents view their infants as particularly vulnerable to environmental forces because their life force is yet undeveloped. Correspondingly, infant care practices center on mitigating susceptibility to illness by feeding them foods that provide “strength” to counter their inherent vulnerability (Graham 1997).

In comparing responses of older mothers with public health recommendations it is evident that just as important as what was said by older mothers is what was not said. None of the older mothers expressed concerns regarding infant growth or not being able to feed children or themselves optimal diets. Absent in the older mother’s responses were concerns about infant weight, height, and size in general. As one mother expressed “I am not interested that they [my children] be big but that they are healthy and strong.” Their concerns centered on the core Andean ethnomedical concepts of strength and avoiding illness both for breastfeeding mothers and infants.

Avoiding illness and following infant cues

Public health personnel highlight the importance of initiating breastfeeding as soon as possible after birth. Ideally, if there are no complications, the newborn is given to the mother to initiate breastfeeding immediately after birth. The attending nurse obstetrician encourages the initiation of breastfeeding and gives the mother advice regarding breastfeeding techniques. Beginning breastfeeding as soon as possible after birth is seen as an important factor for establishing proper breastfeeding because mothers have access to health personnel readily available to guide them in the process.
Older mothers who gave birth at home recall following infant cues to initiate breastfeeding. After birth, the infant is viewed as being full from being nourished in the womb. Rather than being hungry the infant is seen as needing rest. The following quote illustrates this point:

“[I began breastfeeding] after a day. They say the baby is born having drank lots of blood, because of that it is not hungry. After that [some hours when the baby becomes hungry again] then you give [breast milk] normal. When [the baby] is born, it sleeps deeply, does not wake, because of that people say… since [the baby] is born with a full belly, [the baby] eats blood inside [the mother’s] belly, [the baby] will not wake when [the baby] is just born, it is full of blood” (Older mother).

Breastfeeding, is initiated when the infant cries, cuing the mother to its hunger. For example, one mother explains why she immediately breastfed after birth: “I immediately give [breast milk] to my babies, because my babies were born crying.”

Initiation of breastfeeding therefore, occurs immediately after birth, a few hours, or even one or two days after birth according to infant cues.

Following WHO recommendations, public health staff emphasize the importance of exclusive breastfeeding for the first six months. Exclusive breastfeeding is defined as feeding no other foods or liquids to the baby except breast milk. Vitamins and medicines of any kind are discouraged unless prescribed by a physician. Exclusive breastfeeding for the first six months is associated with optimal infant growth and development as breast milk contains all of the macro and micro nutrients that an infant needs with added immunological benefits (WHO 2009). Public health personnel observe that infants that are exclusively breastfed (for six months) get sick less and follow an optimal growth trajectory.
For older mothers, complementary feeding (as with breastfeeding initiation) begins according to infant cues. The mother perceives that the infant is hungry or the infant is “looking” at the foods that the family is eating and seems interested in eating.

“For three months you already start to have [the baby] taste with a spoon or with your finger. [The baby] sees you eat, you have [the baby] taste a little bit. From five months, [the baby] wants to eat and at six months [the baby] eats well, because the baby sees what you are eating and craves. That is why I have [the baby] taste. From five months [the baby] wants foods already and at six months [the baby] already eats well” (Older mother).

When asked whether breastfeeding should continue beyond two years public health personnel expressed the concern that beyond the first year of life “maternal lactation should be complementary not the principal [source of nutrition].” As exemplified by the following quote, some public health staff expressed the concern of continued breastfeeding beyond two years:

“It is somewhat inconvenient, because the child is going to start to become undernourished, because [the child] does not eat foods. [Breast milk after two years] does not have the same consistency, it becomes a complement that means that the child will at least have liquids… [Breast milk] continues to have vitamins, proteins but in small quantities, for what the child needs, and it protects against diseases” (Nurse).

Older mothers again consider child cues for cessation of breastfeeding. However, the consensus for the ideal time to stop breastfeeding is when the child is a year and a half. Many older mothers stated that if the child is allowed to continue breastfeeding beyond a year and a half then he or she is likely to be *loco* (crazy), *big hearted* (feisty), or *mañoso* (spoiled) negative attributes that will shape the child’s personality even as an adult.
“Until three years I gave [breast milk], only one of my children I gave [breast milk] until two years with two months. That one, my youngest child I also gave three years with three months. That is why my children now have a big heart, when they get mad they cannot stay quiet, they get angry easily, now when they are big. That is why it is not good to breastfeed until they are too big [three years], when someone bothers them they want to hit someone. I did not know that before that this would happen, now people tell me that you have to breastfeed one year with and months” (Older mother.

Likewise, a balance of quantity of liquids and foods is important for health maintenance. Older mothers emphasized that proper diet and avoiding hunger are important aspects of health for infants. Too little food can deprive children from strength making them susceptible to illness. Too much food can also weaken children leaving them susceptible to illnesses. Correspondingly, children’s food cravings are indulged and their exposure to hunger is minimized as both are seen as increasing children’s susceptibility to illness.

A common illness associated with infant feeding is nilpo. It is similar or equivalent to the illness empacho found throughout Latin America (Weller et al. 1993). Interviews with older mothers suggest it is caused by either eating too much of one thing (too much “hot” or “cold” substances) or an unsatisfied food craving. They listed symptoms of nilpo including stomach ache, diarrhea episodes one after the other mixed with some blood, internal gasses, and loss of appetite. Cures include eating toasted cheese with blackened spices, a drink made from ground sage and other medicinal plants, and, in the case an unsatisfied food craving, eating whatever was craved. The common practice of following infant cues to begin complementing breastfeeding with other foods is often explained as a means of avoiding an unsatisfied food craving and nilpo.
In addition, nilpo illness can be passed on to the infant through breast milk. Older mothers noted that whatever the mother eats passes to the breastfeeding infant through her milk. Breastfeeding mothers have to pay attention to the foods that they eat. It is necessary to balance hot and cold substances for too much of one type of substance can bring on nilpo.

Experiencing excessive negative emotions, including anger and sadness are perceived to increase a person’s susceptibility to illness.

“Sobbing and sighing are thought to allow wayras (winds) to enter through the eyes and mouth. Negative emotions cause the folk illness mal de corazon (heart sickness; also mal de Corazon wayra),... [ ] and colerina (anger sickness). They also exacerbate other illnesses” (Larme 1998: p.1011).

Because infants have a tendency to express intense emotions, they are perceived to be more susceptible to illness. Mothers therefore in practice tend to indulge infants in order to avoid the expression of excessive negative emotions. This can be seen in the practice of on demand breastfeeding, indulgence of child food preferences, and following child cues of the cessation of breastfeeding. In addition, older mothers expressed the belief that one should not breastfeed when angry because the anger will pass through breast milk to the child and cause an illness.

Exposure to pathogenic elements in landscape

I asked public health staff if they considered environmental factors relating to the problems they identified with infant growth and local diets. I expected that they would discuss issues such as hypoxia (deficiencies in the amount of oxygen delivered to the body tissues), cold temperatures, and high solar radiation that are characteristic of high
altitude environments. However, this was not the case. Public health staff attributed the high incidence of chronic under-nutrition solely to deficiencies in local diets and suboptimal infant feeding practices.

On the other hand, older mothers expressed concerns with exposure to pathogenic forces in the landscape such as cold and heat as well as spirits. For example, many mothers expressed the belief that when breast milk accumulates between suckling bouts (breastfeeding) it is likely to “spoil” as a result of exposure to elements in the landscape. Older mothers discussed the practice of expressing some breast milk before nursing. As stated by one of the older mothers “my mother said that one has to take out [breast milk] before breast feeding. I would not take all of it [breast milk], only a little bit. In all of my children, I would always take out [breast milk], only a little bit.”

For example, illnesses mentioned by mothers that “spoil” breast milk include paq’o, wind, and pujyo. One mother explains the occurrence and treatment of paq’o and wind:

“I would always take some [breast milk] out because that is where illnesses come from like fever. When you sit in “hot” [exposed to the sun], from that [the child by way of breast milk] gets a fever with diarrhea, paq’o. [The baby then] has diarrhea like foam. I would cure [the baby] with chile chile (medicinal plant), that is good for that. I gave all my children that chile chile. You boil [chile chile], you have the baby drink it also the mom drinks it. If it is from wind then [the baby] has a stomach ache, not diarrhea, [the baby] cries a lot. For that [wind] mutuy (medicinal plant) is good, heated in the hearth. You pass [the heated mutuy] over the [baby’s] body, or with semolina (coarse ground wheat), with that [the baby] heals” (Older mother).

Furthermore, breast milk is a powerful substance, not to be disposed of lightly. When mothers express their milk following the belief that the accumulated milk has “spoiled” they should be mindful of what they do with the milk that they extract. Even
though the milk is extracted from the mother’s body this does not mean that its
collection to it is severed. If extracted breast milk is exposed to the hot rays of the sun,
bad wind, or cold it can cause the mother to fall ill. An older mother explained this
practice as follows: “When the baby does not breastfeed [when it is still a newborn],
because it is still like out of it, I would take some [breast milk] out and I would throw it
[the expressed milk] on the floor and I would bury it… I buried milk because when you
throw it out like it is nothing the wind can pass and it [the breast] could hurt more and
drip.”

These practices are also reflected in previous research findings that show that
Andean concepts of health and illness are based on the maintenance of relationships with
all elements in the landscape including the household, the community, the spirit world,
and an animate environment. Many researchers have found that Andeans perceive their
bodies and health to be constantly threatened from the elements that surround them
(Greenway 1998, Bastien1987, Graham 1997). Illness can result from encounters with
dangerous entities in the landscape, such as ancestor spirits, bad wind, as well as
excessive cold, or heat that enter the body and cause an imbalance (Graham 1997,
Greenway 1998, Bastien 1987). For example, an illness can enter the body of a person
who has been out in dangerous terrain, close to ancestral burial sites, where bad wind
flows, exposed to the sun, or by obtaining water from a water source (pujyo) that is
inhabited by spirits.

In summary, I have described mothers as subscribing to a particular set of beliefs.
However, this does not mean that all know or espouse these beliefs. Describing two
idealized conceptual frameworks in the case of Thai breastfeeding beliefs, Van Esterik asserts that the frameworks are used by members of the culture as:

“…reference points for interpreting infant feeding behavior and the behavior of those around them. These models frame activities and help women make sense out of the complexities underlying decisions. Of necessity, they simplify, exaggerate, and stereotype behavior, presenting to themselves and others cliché models which we might refer to as traditional and modern patterns of infant feeding” (Van Esterik 1985 p.1501).

Unlike the idealized model, most individuals’ understanding of a particular domain consists of shreds and patches of traditional thinking as well as other ways of thinking through the exposure to a variety of other sources such as the public health recommendations and individual experiences. I argue, however, that many of the notions espoused by mothers appear to be unique to their culture and are remarkably consistent. It is evident that a traditional corpus of beliefs about infant feeding and care exists among them, one that is consistent with Quechua ethnomedical beliefs as reflected in the literature. Although breastfeeding is a universal adaptation, mothers see it through a culturally specific lens. The coherence of cultural interpretation does not, however, reflect consistency in the beliefs of individuals, which are influenced by individual experience and background. Further, Quechua beliefs about breastfeeding are changing in response to public health influences and new feeding practices. Clearly, cultural beliefs about food and health are dynamic and in a constant state of flux.

3.5 Persistence and change, in the midst of tensions

Comparing interview results of older mothers and currently breastfeeding mothers, I found both persistence and change in traditional recommendations associated
with infant feeding and health. That is, some beliefs and practices persist and some are changing. The timing of initiation of breastfeeding is one example of change. Since 2007, mothers have been required by and ordinance of the Ministry of Health to birth at a public health establishment with the assistance of a physician. The majority (92%) of currently breastfeeding mothers stated that they initiated breastfeeding soon after birth as they are guided to do so by public health staff. Three currently breastfeeding mothers stated that they initiated breastfeeding two to five days after birth because of health complications (preterm birth, cesarean, and retained placenta). This change is exemplified by an older mother who states:

“You wait some time, when the baby cries, some two or three hours. It depends on the baby. Before all mothers gave birth at home so as soon as the baby cried then they [mothers] would breastfeed. They say that now women who give birth at the health post, they [public health staff] make them immediately breastfeed. That is what my daughters tell me, but my daughters when they were born would sleep for two to three hours sometimes more” (Older mother).

The timing of introduction of foods and liquids other than breast milk is also changing. The majority of currently breastfeeding mothers (72% or 12 of 16) stated that they begin introducing complementary foods at six months because “that is what the nurses tell us”. One stated “that her baby did not begin to crave foods until six months.” The remaining 28% of mothers stated that they begin having their babies try foods and liquids other than breast milk prior to six months because “that is what my mother told me”, or “my baby started looking at [craving] foods before six months.”

In addition, some currently breastfeeding mothers discuss problems with infant growth, reflecting that mothers today are “taking better care of children because before they were skinny and they would not grow” (Current breastfeeding mother) or “the nurses
told me that my youngest daughter was not reaching her height, her weight….the nurses gave me a syrup (iron supplement) and *chispitas* (multi-vitamin powder) now she is fine” (Current breastfeeding mother). However, discussions regarding infant size are missing from older mothers’ narratives. One older mother states: “I am not interested that they [my children] be big but that they are healthy and strong.”

Anemia is also missing from older mothers’ narratives regarding infant illnesses and health. Currently breastfeeding mothers are expected to take their children to the health center in Pisac when their infants turn six months old to be tested for anemia. All infants from six months old and above receive vitamin and iron supplements regardless of results from the anemia testing. Only two currently breastfeeding mothers mentioned anemia as a nutritional or health problem that affects infants. These currently breastfeeding mothers discussed anemia through the lens of an Andean theory of illness as follows: “…everything passes through milk… I passed anemia to my daughter [through breast milk]. They say it’s [anemia] when you are worried or angry [and it passes through the breast milk to the infant]. To cure anemia, you have to give [the baby] fruits, also vitamins.” This reinterpretation of anemia through the lens of Andean ethnomedical concepts suggests that as Allen (2002) and Grillo-Fernandez (1998) Andeans culture “digests” what is foreign and fits it into an Andean way of seeing.

Both older mothers and currently breastfeeding mothers identified culturally defined illnesses (not directly transferable to diseases identified by biomedicine) as well as common illnesses (or symptoms) like fever, cough, sore throat, and diarrhea. Treatment options are primarily home remedies of medicinal plant infusions but also include seeking the assistance of a *paqo* (traditional Andean healer), and the use of
pharmaceutical medicines from the public health post. The different treatment options are not treated as mutually exclusive but as complementary as exemplified by the following quote: “If my child has diarrhea, or a stomach ache I seek a pill from the health post, also [I give my child] herbal teas, like sage and chamomile” (currently breastfeeding mother). While mothers expressed individual preferences of home remedies as the primary treatment option there is a general awareness that any option might succeed in reestablishing health and thus it is worth a try. These results are consistent with the work of other scholars researching medical pluralism who found that individuals select from various medical systems available in a process of negotiation of cultural identity and access to economic, social, and political resources (Crandon-Malamud 1991, Mathez-Stiefel et al. 2012).

**Tensions**

While I found that traditional and biomedical health systems are complementary there is at the same time tensions between these systems. These tensions include differences in conceptualization surrounding breastfeeding and infant food and the imposition of public health care services by coercive means. Public health staff is dubious about the medical and nutritional competency of community mothers and the medical knowledge of traditional healers. Mothers from rural communities are stigmatized as being uneducated and backwards. These labels are evident in the narratives of public health staff.

“Mothers from the campo (rural communities) do not nourish [nourish their children] well, they give [them] too little nutritious food. While they are working during the day, from early in the morning they give [feed their children] only
*ch’uño* [freeze dried potatoes]. People from the *campo* (rural communities) prioritize only the *chakra* (crops)” (Obstetric nurse).

In addition, the narratives of older mothers also expressed tension.

“Me, if my son wants to eat before six months I cannot wait for what they [public health staff] say. It is up to me, if my baby wants to eat something, I have to give food. Sometimes I do not pay attention to them [public health staff], maybe in other things, I can listen to them, but not in that [feeding before 6 months]. It is something natural for me, for example if I want to eat more of something and she [public health staff] forces me to eat less, to me that is not good” (Older mother).

Furthermore, mothers who do not bring their children to regular growth and health controls may be denied access to health services in the future including the provision of monthly food rations. At least this is the perception of mothers that is illustrated by the following quote: “I bring my child to the health post because if you participate then they [public health] help you if you do not participate then they do not” (Currently breastfeeding mother).

The findings of Mathez-Stiefel et al. (2012) are reflected in my own research focused on the specific case of maternal and infant feeding. Mathez-Stiefel et al. (2012) in their examination of traditional and biomedicine in the Andes found:

“The encounter between these various medical ideologies, far from being harmonious, is characterized by the tentative hegemony of biomedicine over indigenous medical traditions. This leads to changes in some health practices in Andean households but at the same time to a reflexive maintenance and revalorization of other aspects of indigenous medicine, in a process of cultural resistance and renewal. Ethnomedicine thus becomes a resource for cultural affirmation in its confrontation with the dominant system” (p.13).

In this research I found that, while apparently accepting the imposition of public health recommendations and changing their behavior, mothers maintain part of their own
self-treatment and seek traditional healers form Andean medicine in a process of cultural resistance. It is evident that mothers are inclined towards dual use of distinct therapeutic traditions (Baer 2003) and that “indigenous healers and medical systems remain strong, both for their perceived efficacy and expertise and for the expression of cultural identity they represent” (Miles and Leatherman 2003: p.10). The fact that different healing traditions can be simultaneously complementary and conflicting is also supported by the work of Ngokwey (1995) in Brazil, who reported both multiple use of popular remedies and pharmaceutical drugs and differential expectation of efficacy with these two types of remedies, resulting from the perceived superiority of biomedicine in local culture.

*Cultural Resilience*

My study indicates that a resilience framework is a productive lens to study the links and tensions between biomedicine and other medical systems. As discussed above, a cultural resilience framework defined by Healy (2006) is “the capacity of a distinct community or cultural system to absorb disturbance and reorganize while undergoing change, so as to retain key elements of its structure and identity that preserve its distinctiveness” (Healy 2006: p.10). Because my research equates the identity of a cultural system with beliefs or knowledge and the structure of a cultural system with mother’s health seeking behaviors, a resilience framework identified key elements in each system, demonstrated links and tensions between the systems experienced by mothers, and points to the ability of the Andean ethnomedical system to adjust to the continual force of change.
I found that the Andean system of infant feeding and care endures. I have illustrated the existence of a traditional corpus of beliefs surrounding infant feeding and care (shared by older and currently breastfeeding mothers), that is consistent with Andean ethnomedical beliefs as reflected in the literature (Bastien 1987, Greenway 1998, Larme 1998, Graham 1997). Women in the study sample indicated that the key elements of the Andean infant health system include that infant health is dependent upon maintaining an internal balance of fluids and semi-fluids, maintaining a balance with elements in the landscape, and by mothers following infant cues (i.e. weakness, hunger, cries) to avoid illness (Figure 3.5). The key elements of the structure of an Andean infant health system also include that mothers are the experts in maintaining health and access traditional healers or public health services when deemed necessary. They also manage infant health with home remedies based on their experiences and knowledge.

On the other hand, the key elements of the public health system’s identity include the knowledge that infant health is maintained through proper: 1) nutrition (breastfeeding and appropriate supplementary foods); 2) sanitary conditions such as the availability of clean water; and 3) feeding behaviors of mothers (i.e. exclusive breastfeeding up until six months, continued breastfeeding along with supplementary feeding of nutritious foods through two years of life) (Figure 3.5). In addition, through the lens of a public health perspective growth faltering is an indicator of nutritional deficiencies and illness. The key elements of the structure of the public health system of infant care involves the monitoring of infant health through growth assessment and disease management, and specific infant feeding recommendations based on scientific evidence.
In the context of changes brought on by the implementation of policy and regulations surrounding maternal and child health and nutrition I found that the Andean cultural system has absorbed this disturbance and reorganized by maintaining key elements of its identity and structure but also incorporating aspects of the public health system’s identity and its structural elements. The narratives of currently breastfeeding mothers point to the incorporation of specific elements of the identity of the public health system including the recognition of growth (length and weight) and the incidence of anemia (low hemoglobin levels) as cues or indicators of infant health. In addition, mothers have incorporated key elements of the public health system’s structure: following infant feeding recommendations (initiating breastfeeding immediately after birth, exclusive breastfeeding up until six months and continue breastfeeding and supplementary feeding) as well as, attending infant growth and health monitoring at the local public health facilities. Mothers, however, continue to interpret infant cues through an Andean ethnomedical lens and continue to manage infant health employing home-remedies, accessing the services of public health and traditional healers.

I found that Andean mothers selectively integrate aspects of the public health knowledge system (growth and anemia as indicators of infant health) reinterpreting them according to their own knowledge. This demonstrates that the Andean knowledge system is not static but changes in response to a dynamic process of exchange with past and present experiences. In addition, mothers are ensuring access to multiple resources and are expanding their knowledge base to buffer infant vulnerability by accessing public health services (bringing their children to public health facilities for growth and health monitoring), traditional healers, and employing home remedies in the care of their
infants. Consistent with the literature on resilience, maintaining a flexibility of choices and knowledge presumably is associated with better health outcomes.

Norberg et al. (2008) contend that diversity is the key to resilience. They argue that knowledge systems are enhanced and not diminished by the meeting of two or more cultures, what Turner et al. (2003) have termed the “cultural edge effect”. Exploring resilience of home-remedies among Bolivian and Peruvian migrants in England Ceuterick et al. (2011) site the presence of cultural diversity as serving the promotion of the maintenance and expansion of knowledge and use herbal based home-remedies. Likewise, I argue that the recent changes brought on by the implementation of maternal and child health initiatives promote the exchange and expansion of knowledge and provides structures that increase the availability resources. In Chapter 4 I explore this assumption by examining the relationship between maternal knowledge and infant health.
Figure 3.5. Cultural resilience of the Andean infant health system. Figure credit: Lucas Lopvet.
3.6 Conclusion

Andean ethnomedicine has been previously described in varying detail by Andean scholars (Bastien 1987, Finerman 1985, 1987, Greenway 1998, Larme 1998, Graham 1997). Bastien in particular discussed the metaphorical connection between the mountain landscape and Andean people’s construction of the body, health, illness, and healing (Bastien 1985). My research further demonstrates the relevance of this holistic understanding of the Quechua world for the interpretation of infant feeding and health. This research adds to previous work by highlighting an Andean theory of infant feeding and health.

In addition, I have identified similarities and differences between Andean and public health conceptualizations of infant feeding and health. The key similarities I highlight are that both highly value breast milk as a food and medicine, both recognize synergistic connections between maternal and infant diets and health, and both recognize a connection between current and future health. Key differences include underlying reasoning or conceptualizations. Public health emphasize nutritional and immunological importance of breast milk, the importance of balanced diets (including micro and macro nutrients), and specific breastfeeding recommendations that are associated with optimal infant growth and health. Older mothers’ perceptions on the other hand are guided by general ethnomedical beliefs associated with the workings of the body and health, i.e. importance of maintaining balance within the body of hot/cold and wet/dry properties, avoiding harmful elements in the landscape, and following infant cues.

Finally, I examined persistence and change of traditional recommendations related to infant feeding and care in the context of public health recommendations. I
found that the most persistent features are maternal explanatory models or ideologies associated with infant feeding and care are illustrated by the re-interpretation within an Andean lens of 1) anemia and 2) the importance placed on infant size. The findings imply that the most malleable features of the belief system are the health care seeking options as mothers are employing the use of home remedies, traditional healers, and public health to address infant health. This indicates that the multiple systems of care complement each other as exemplified by the multiple use of both systems (Bastien 1982, Mathez-Stiefel et al. 2011).

This research highlights the relevance of Healy’s (2006) definition of cultural resilience. I found that Andean knowledge associated with infant feeding is resilient. Andean mothers employ a process of selective integration, accepting what they find useful and beneficial reorganizing in the face of change by maintaining the distinctively Andean way of seeing infant feeding and care. In addition, by incorporating multiple health care seeking options (home remedies, traditional healers, and biomedical treatments) mothers are maintaining a flexibility of options for maintaining health and avoiding vulnerability.

Traditional and biomedical health systems are often cast in terms that suggest the two systems are contradictory. As suggested by Bastien (1985), I have tried to avoid this by focusing on their important similarities and complementarities. By valuing traditional knowledge and finding points of articulation with public health recommendations, public health practitioners could address some of the tensions that are apparent between the two systems. So could encouraging dialogue, cultural sensitivity, and equitable participation of representatives from both existing health traditions.
3.7 References

Allen, C. J.

Baer, H.A.

Bastien, J.W.

Black, R.E., Allen, L.H., Bhutta, Z.A., Caulfield, L.E., de Onis, M., Ezzati, M., Mathers, C., and Rivera, J.

Bussmann, R.W., and Sharon D.

Byg, A., Salick, J., and Law, W.

Calvet-Mir, L., Reyes-Garcia, V., Tanner, S., and TAPS study team
Ceuterick, M., Vandebroek, I., and Pieroni, A.

Cosminskey S., and Scrimshaw M.

Crandon-Malamud, L.


Elling, R.H.

Etkin N.L., Ross P.J., and Muazzamu I.

Finerman, Ruthbeth


Froemming, S.

Giovannini, P., Reyes-Garcia, V, Waldstein, A., and Heinrich, M.
Graham, M.A.

Greenway, C.

Grillo-Fernandez

Hammer, Patricia

Healey, S.

INEI
2008 Encuesta demográfica y de salud familiar (ENDES).

Kreimer, E.

Larme, A.C.

Marquis, G. S., Habicht, J., Lanata, C. F., Black, R. E., and Rasmussen, K. M.
Mathez-Stiefel, S., Vandebroek, I., and Rist, S.

Mazzes, R.B.

Miles A. and Leatherman T.

Ministerio de Salud Peru (MINSA)
1997 Conocimientos actitudes y prácticas en salud y nutrición materno infantil, Cusco. Informes de Investigación.

Ngokwey N.

Norberg, J., Wilson, J., Walker, B., Ostrom, E.

Oths, K.S.

Pelletier, D.L.

Quinlan, M.B. and Quinlan R.J.

Ruiz, J.
Saethre, E.J.  

Salas, M.A.  

Strauss A.L., and Corbin, J.M.  

Tapias, M.  

Theidon, Kimberly  

Toledo, V.M.  

Turner, N., Davidson-Hunt, I., O’Flaherty, M.  

Van Esterik, P.  

Vandebroek I., Thomas, E., Sanca, S., Van Damme, P., Van Puyvelde, L., and De Kimpe, N.  
Weller, S.C., Pacther, L.M., Trotter, R.T., and Baer R.D. 

Wellin, E. 

WHO 
Figure 3.2. Picture of food rations distributed at health post.
Figure 3.3. Picture of Andean flicker bird.

Figure 3.4. Picture of soup for producing breast milk.
CHAPTER 4

EXPLORING THE ASSOCIATION BETWEEN MATERNAL INFANT FEEDING KNOWLEDGE AND INFANT GROWTH IN RURAL HIGHLAND QUECHUA COMMUNITIES OF PERU

9 Monteban, M. To be submitted to Social Science and Medicine.
Abstract

Ethnomedical knowledge plays an important role in how people perceive child growth and make decisions about feeding children. Previous research has shown that Quechua women are knowledgeable about the medicinal and nutritional properties of plants and animals that are good to eat during breastfeeding. In this article I investigate the potential value of traditional knowledge in a high altitude setting where mothers have access to both traditional and biomedical health traditions when making decisions about what, when, and how to feed their infants. Specifically, I address two questions: First, do mothers with greater traditional and public health knowledge scores associated with infant feeding and care have children who are taller and heavier than their peers? Second, is this association independent of potentially confounding factors such as socioeconomic status and maternal, child, and household characteristics? To characterize traditional and public health breastfeeding recommendations, I employed semi-structured interviews and free-listing exercises with older mothers, public health personnel, and currently breastfeeding mothers. I then designed a survey to test whether mothers with high levels of knowledge about traditional and public health breastfeeding recommendations have infants with better infant growth indicators. I compared the results of the survey with infant height-for-age, weight-for-age, and weight-for-height z-scores. I found 1) maternal traditional knowledge associated with infant feeding is embedded within an Andean theory of illness causation, 2) when treating their infants and themselves, mothers draw from both traditional and public health care sectors during breastfeeding, 3) a mother’s completed years of education has a positive association with her infant’s weight and 4) a mother’s traditional knowledge of infant feeding has a negative association with her
 infant’s length in this sample. These findings diverged from other research which found positive associations between maternal ethnomedical knowledge and child health outcomes. Further research should consider the meanings and implications of culture within varying contexts particularly the role of social and cultural marginalization.

4.1 Introduction

Cultural factors are widely recognized determinants of human health. Cultural capital, as presented by Bourdieu (1986), refers to a people’s symbolic and informational resources including traditional knowledge. It is often argued that traditional knowledge, defined here as the cumulative body of knowledge of a culture that has been handed down through generations, that is socially shared by members of the same generation, and that has been adapted to a particular place (Toledo 2002), serves as a potential moderator of life stressors (Walters and Simoni 2002). However, when cultural capital is repressed or not acknowledged, health disparities in the group tend to rise (Abel 2007).

The importance of cultural knowledge is a prominent theme in studies of adaptation to change. Several researchers have shown that engagement with traditional beliefs and practices has considerable impact on the well-being of indigenous populations (Reynolds et al. 2006, Strand and Peacok 2003, McKay and Prokop 2007). For example, a study conducted among American Indian and Alaskan native students found that indigenous youth subject to stress exhibited resilience because they were “embedded in traditional culture” (Strand and Peacock 2003). Similarly, McKay and Prokop found that children’s resilience was enhanced by a strong sense of belonging to a vibrant community that “celebrates its own culture and history” (McKay and Prokop 2007: p. 47).
Studies have generally shown a positive relationship between knowledge and health however, this is not always the case. A study of Southwestern American Indian youth found that participation in American Indian traditional activities was associated with higher levels of substance abuse (Waller et al. 2003). This study suggested that being more visibly indigenous may expose youth to greater levels of racism and discrimination which may, in turn, have a negative effect on their coping and well-being. It is clear that the meanings and implications of culture must be examined more carefully within varying contexts.

Recently, several researchers have focused specifically on examining the relationship between knowledge and child and adult nutritional and health outcomes. Among the Tsimane’ of Bolivia, McDade et al. (2007) found that mother’s ethnobotanical knowledge has a positive association with children’s height and body fatness. Furthering these findings Tanner et al. (2011), found an association between Tsimane’ mothers’ ethnobotanical knowledge and a decreased probability of helminth infection in their children. Miller (2011) conducted similar research Among the Ariaal people of Kenya focusing on infant nutritional and health outcomes and found that higher rates of traditional and Western health knowledge are positively associated with infant health. Specifically, mothers with greater knowledge of traditional medicine had infants who were significantly less likely to have been ill in the previous month (Miller 2011). In this article, I follow this line of research in exploring the relationship between culture and infant growth by focusing on a specific case study of maternal knowledge and infant growth among high-altitude Quechua communities of Peru.
The case of Maternal Knowledge and Child Growth in the Andes

Child under-nutrition is a major public health concern in Peru where 30% of children are stunted (short for age) and 18% are underweight (UNICEF 2009). Several studies conducted among Andean populations have shown that child growth is slow and adult attained height and weight are reduced (Frisancho 1993, Frisancho and Baker 1970). This is because infant growth is especially stressed due to a combination of socioecological conditions. Hypoxia, for example, is associated with reduced birth weight and slower infant growth (Wiley 2004). In addition to the ecological stress of high-altitude, economic variability, nutritional resources, and access to health care also play a critical role in limiting child growth and adult stature (Leonard 1989, Obert et al. 1994, Leatherman et al. 1995). Growth faltering early in life is associated with increased mortality and health ramifications throughout the lifespan such as reduced reproductive performance, work capacity, cognitive function, and chronic illnesses (Pelletier 1994, Black et al. 2008, Victora et al. 2008).

The Peruvian Ministry of Public Health has recently instituted initiatives to address early life under-nutrition and linear growth faltering focused on maternal and child nutrition and health in rural communities (MINSA 2004, 2006). This development means that maternal health is monitored during pregnancy, birth occurs at public health facilities with the assistance of biomedical physicians and nurse obstetricians, and infant growth monitoring and nutritional workshops are provided at public health facilities based on WHO recommendations. The WHO guidelines include recommendations that mothers and infants consume a balanced diet of proteins, energy, and micronutrients necessary to support breastfeeding and infant growth (WHO 2009). The WHO also recommends that
infant feeding consist of exclusive breastfeeding for the first six months of an infant’s life with the introduction of complementary foods at six months and continued breastfeeding through two years. These best practices are supported because they are associated with best maternal and child health outcomes (WHO 2009). Because breastfeeding is virtually universal and of long duration in rural areas of Peru, public health efforts are more focused on improving maternal and infant diets to reduce child stunting rates among rural populations (WHO 2009). Recent changes provide an opportunity to evaluate the significance of maternal traditional and public health knowledge as determinants of infant growth.

Ethnomedical knowledge, or health related beliefs, knowledge, and practices of a cultural group (Kleinman 1978), plays an important role in how people perceive child growth, health, and disease risk, understand symptoms, and make decisions about when and how to feed children (Pelto 1987, Nichter 2008). Previous research has shown that Quechua women are knowledgeable about the medicinal and nutritional properties of plants, animals, and minerals that are good to eat during breastfeeding (Froemming 2006, Graham 2003). Expanding on these findings, I ask whether cultural adaptations such as these developed by Quechua peoples over millennia may mitigate the challenges of infant growth in the Andes. In this article I investigate the potential value of traditional knowledge in a high altitude setting where mothers have access to both traditional and biomedical\textsuperscript{10} health traditions when making decisions about what, when, and how to feed their infants. Specifically, I address two questions: First, do mothers with greater

\textsuperscript{10} I define biomedicine a global, hegemonic medical system based on western scientific principals which includes the use of pharmaceuticals, healthcare professionals and biomedical facilities (Giovannini et al. 2011).
traditional and public health knowledge scores associated with infant feeding and care have children who are taller and heavier than their peers? Second, is this association independent of potentially confounding factors such as socioeconomic status and maternal, child, and household characteristics? In answering these questions I examine links between culture (traditional and public health knowledge) and growth at the level of the individual.

4.2 Research Communities

The District of Pisac is located on the southeastern Andes of Peru in the central portion of the region of Cusco. I conducted this research in Cuyo Grande, Chawaytire, Pampallaqta, and Paru Paru, four comunidades campesinas (legally protected rural communities) of the District (Figure 4.1). The communities are located between 3,500 and 4,500 meters above sea level. Pampallaqta is the smallest community with about 300 inhabitants and Cuyo Grande is the largest with approximately 900 inhabitants.

I chose these communities because they are representative of many communities in the region. They share features of cultural and social organization and have a long history of maintaining tradition but also participating in broader markets and biomedical health services. Andean, Spanish colonial, and cosmopolitan influences are evident in many aspects of everyday life in these communities. People’s first language is Quechua and many speak Spanish as a second language. The majority of people are catholic and a small portion identify as evangelical.

Livelihoods in these communities are based on a combination of small scale farming and herding and participation in the market economy. Potato is the staple crop in all communities except Cuyo Grande where corn is the main crop. Wheat, barley, fava
beans, as well as indigenous tubers, grains, and legumes are also locally grown. Sheep, cows, alpacas, and llamas are the primary herd animal and many people also raise guinea pig, chicken and pig. Agropastoral production is supplemented by wage work and small-scale commodity production. Economic activities require a mobile lifestyle, individuals travel daily to nearby town centers and migrate seasonally to various worksites located in nearby town centers.

Rural communities in Peru such as these have undergone recent changes in the way that maternal and early childhood health are managed. In 2004 and 2006, the local public health posts adopted the Peruvian Ministry of Health’s resolution *Lineamientos de Nutricion Materna* (Norms for Maternal Nutrition) and *Reglamento de Alimentacion Infantil* (Infant Feeding Ordinance, Supreme decree N009-2006-SA) to promote maternal and infant health. These initiatives require that pregnant women receive pre-natal and post-natal monitoring and attend nutrition workshops provided at public health posts. Community members are trained as community health promoters to monitor women’s compliance with these new requirements. During monthly check-ups, the infant’s length and weight are measured to assess growth status and mothers receive education workshops on best nutritional practices and food rations provided by the *Programa Nacional de Asistencia Alimentaria* (National Nutritional Assistance Program), a program of the Peru’s Ministry of Development and Social Inclusion.
4.3 Methods

This study forms part of a larger mixed-methods project on breastfeeding and infant care. I collected data in two phases: December 2011-2012 and December 2012-2013 (Table 4.1). Phase 1 consisted of free-listing exercises and semi-structured interviews to characterize traditional and public health infant feeding recommendations. Phase 2 consisted of developing and administering a survey instrument based on qualitative data from Phase 1 in order to test the association between maternal traditional and public health knowledge and infant growth outcomes among mother-child pairs. I chose to only focus on maternal knowledge because within Quechua families, women typically assume primary responsibility for childcare. I assume that maternal characteristics will affect children more directly than paternal characteristics.
Quechua was the primary language of data collection. I worked with two bilingual Quechua speakers from Cuyo Grande who assisted in data collection and transcription of semi-structured interviews. Below I discuss data collection methods in detail.

Table 4.1. Characteristics of fieldwork, participants, and method type

<table>
<thead>
<tr>
<th>Phase</th>
<th>n</th>
<th>Participants</th>
<th>Sites</th>
<th>Type of Data Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase I</td>
<td>18</td>
<td>Older mothers</td>
<td>Cuyo Grande Chawaytire</td>
<td>Semi-structured interviews and free-listing exercises</td>
</tr>
<tr>
<td></td>
<td>15</td>
<td>Nurses and nurse obstetricians</td>
<td>Cuyo Grande Health Post Pisac Health Center</td>
<td></td>
</tr>
<tr>
<td>Phase II</td>
<td>101</td>
<td>Mother and child pairs</td>
<td>Cuyo Grande Chawaytire Pampallaqta Paru Paru</td>
<td>Structured questionnaires and infant anthropometric measures (weight and length)</td>
</tr>
</tbody>
</table>

Phase I

To characterize public health infant feeding and care knowledge in the area, I recruited an exhaustive sample of all 15 public health nurses and nurse obstetricians working at the health post in Cuyo Grande and the health center in Pisac. To characterize traditional infant feeding beliefs and practices in the community, I recruited a purposive sample of 18 key older mothers (mothers 45 years old and above and identified by community members as most experienced regarding breastfeeding and nutrition) in Cuyo Grande and Chawaytire. With both samples of public health staff and older mothers I conducted semi-structured interviews and free listing exercises. I asked public health staff...
to tell me about the infant feeding recommendations promoted at the establishment where they work and about their experiences with promoting these recommendations. I asked older mothers to relate their ideal infant feeding practices and also talk about their experiences with infant feeding and child health.

I compiled the answers from the semi-structured interviews and free listing exercises into lists of responses associated with traditional or public health infant feeding and care recommendations with the frequency of greater than one. From these free lists, I generated 40 true or false questions associated with traditional infant feeding and care knowledge and 40 true or false questions associated with public health infant feeding and care knowledge with varying degrees of difficulty (easy, medium, and difficult\textsuperscript{11}). Prior to administering the survey, I pilot tested the questions with seven women in the research communities of varying ages who did not participate in the survey sample as they did not have children that were younger than three years of age. The purpose of the pilot testing was to ensure that the correct wording of the questions and that they would be comprehensible to survey participants.

Specifically, the questions associated with traditional knowledge include four categories: 1) questions regarding substances believed to increase or decrease the production of breast milk, 2) questions regarding the medicinal properties of breast milk, 3) questions associated with the timing of breastfeeding (initiation, introduction of other foods and liquids, and cessation), and 4) questions regarding infant care and illness associated with infant feeding. Table 4.2 contains a list of substances reported by more than one older mother that are believed to increase or decrease the production of breast milk.

\textsuperscript{11} For example easy questions were associated with things that were mentioned by the majority of older mothers in the free-listing exercises and difficult question were only mentioned by two older mothers.
milk. The questions associated with public health recommendations include three categories: 1) questions associated with the timing of breastfeeding (introduction of foods and liquids other than breast milk, and cessation), 2) questions associated with quantity and quality of foods and liquids other than breast milk, and 3) questions regarding infant care and growth. In Table 4.3 I present the questions posed to both older mothers and public health staff and their respective correct answers.

To be able to define traditional knowledge as such, separate from public health knowledge, I asked older mothers to identify beliefs and practices as traditional or introduced by public health staff. During preliminary research it was my experience that participants often identified beliefs or practices as either “traditional” (what their mothers or family, social network, community members believe) and nurses/public health staff knowledge. For example, a typical statement from mothers went as follows “the nurses tell us that we should start feeding babies at six months [complementary feeding i.e. continued breastfeeding with nutritious solid foods], but we believe babies need to start eating at four months because they start to crave foods.”
Table 4.2. Substances believed to increase or decrease the production of breast milk

<table>
<thead>
<tr>
<th>Substances that increase breast milk production</th>
<th>Preparation</th>
<th>Ingredient</th>
<th>Frequency n=18</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soup</td>
<td>Quinoa</td>
<td>13</td>
<td>72</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lamb meat</td>
<td>8</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Hak’achu</strong> (Andean flicker bird)</td>
<td>7</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lamb lung</td>
<td>4</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Ch’uño</strong> (freeze dried potato)</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frog</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Lamb feet</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chicken</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><strong>Mate</strong> (liquid gruel or herbal infusion)</td>
<td>Milk</td>
<td>7</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fennel</td>
<td>4</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quinoa</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td>More soup</td>
<td>11</td>
<td>61</td>
<td></td>
</tr>
<tr>
<td></td>
<td>More <strong>mate</strong></td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Quinoa</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Raqacha</strong> (tap root)</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Oqoruru</strong> (watercress)</td>
<td>2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Substances that decrease breast milk production</td>
<td>General</td>
<td><strong>Segundos</strong> (“dry” main course dishes)</td>
<td>9</td>
<td>50</td>
</tr>
<tr>
<td></td>
<td>Garlic</td>
<td>7</td>
<td>39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cold water (drank or rubbed on back)</td>
<td>6</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Urine (rubbed on back)</td>
<td>5</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Onion</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>
Table 4.3. First foods and liquids listed by older mothers and public health staff

<table>
<thead>
<tr>
<th></th>
<th>Older mothers n=17</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>General</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal foods, what I eat, what I cook, foods</td>
<td>10</td>
<td>59</td>
<td></td>
</tr>
<tr>
<td>Soups/broths</td>
<td>9</td>
<td>53</td>
<td></td>
</tr>
<tr>
<td>Cream of… soups</td>
<td>7</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>Mates (thick liquid gruels)</td>
<td>5</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Mates (medicinal plant/herbal teas)</td>
<td>2</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Mate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cow’s milk</td>
<td>6</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>Mazamorra</td>
<td>2</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Finely ground fava bean</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Papilla (fava bean, quinoa, <em>qiwicha</em>, wheat flour from health post)</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Quinoa</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Fennel</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td><em>Oq’e qoras</em></td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Soups/ Broths</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice</td>
<td>3</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Noodle</td>
<td>2</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Quinoa</td>
<td>2</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Olluco</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Chicken</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Creams of… soups</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(finely ground)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheat</td>
<td>5</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>Maiz</td>
<td>3</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td><em>Ch’uño</em></td>
<td>3</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>Barley</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Potato toasted in the cooking stove fire</td>
<td>1</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

| Public health n=12 |
|---------------------|----------|----------|
| General             |          |   |          |
| *Papilla* (solids in the form of purees or baby food) | 10 | 83 |
| Starchy foods, carbohydrates | 3 | 25 |
| Same food as adults but mashed, foods from the common pot | 3 | 25 |
| Starchy foods with vegetables | 1 | 10 |
| Mashed fruits        | 1        | 10 |
| Cooked and mashed vegetables | 1  | 10 |
| Fruit juices that contain vitamin C | 1 | 10 |
| Animal product       |          |   |          |
| Animal products that contain protein (egg, chicken, fish, liver, blood, cheese) | 4 | 40 |
| Iron (in liver, blood) | 2      | 20 |
| Meat                  | 1        | 10 |
| Papilla/ purees       |          |   |          |
| Potato                | 4        | 40 |
| Pumpkin               | 3        | 25 |
| Yuca                  | 1        | 10 |
| Potato and pumpkin    | 2        | 20 |
| Yucca and carrot      | 1        | 10 |
| Potato and carrot     | 1        | 10 |
| Apple                 | 1        | 10 |
| Banana                | 1        | 10 |
| Mazamorra             | 1        | 10 |
| Other                 |          |   |          |
| Orange juice          | 1        | 10 |
| Papaya juice          | 1        | 10 |
| Lemon juice           | 1        | 10 |
Phase 2

I invited all women with children between the ages of one and three years by the end of data collection to participate in the second data collection phase. I chose three years of age as the upper limit because there is literature that states that beyond three years maternal recall of breastfeeding practices is less reliable (Li et al. 2005). Of 121 possible participants in the four adjacent communities of Cuyo Grande, Chawaytire, Pampallaqta, and Paru Paru, 17 did not participate, resulting in a final sample of 101 mother-infant pairs. With this sample of mother and child pairs I administered a survey, which included 80 (40 traditional and 40 public health) true and false questions (described above) and additional questions related to demographic and socioeconomic characteristics of each mother and child pair.

I measured maternal knowledge of all mothers in the sample by asking the 101 mothers the 80 true and false questions developed in phase 1 as a proxy for traditional or public health knowledge associated with infant feeding and care. The participants received a score of 0-3 for each question depending on level of difficulty. A score of zero for a question indicates that the participant answered wrong or did not know the answer, a score of 1, 2, or 3 (depending on level of difficulty) indicated that the participant answered correctly. I then added the points for each correct question and divided the total score by the total points possible (78 for the traditional knowledge questions and 73 for the public health knowledge questions). These procedures left me with scores that ranged from 0 to 1 (0=0% and 1=100%), with a higher number indicating higher level of knowledge. Each mother received a score from 0 to 1 for traditional knowledge and public health knowledge.
In Tables 4.4 and 4.5 I list all of the traditional and public health knowledge questions with their correct answers (true or false), the percentage of survey participants that gave a correct answer and in order of difficulty. A score of 1 indicates that the questions was easy and a score of 3 indicates that the question was difficult. Again the level of difficulty depended upon the free listing and semi-structured interviews with older mothers. For example, if only a few older mothers mentioned a plant that increased breast milk production then the question I developed based on this information was deemed difficult and received 3 points. Accordingly if many older mothers listed a food thought to increase the production of breast milk then I developed a question that received 1 point as it was deemed easy.
### Table 4.4 Traditional knowledge questions

<table>
<thead>
<tr>
<th>Difficulty (1-3)</th>
<th>Question</th>
<th>% correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>While we are breastfeeding eating garlic increases breast milk (False)</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating Andean flicker bird soup increases breast milk (True)</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating soups increase breast milk (True)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating quinoa increases breast milk (True)</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating only main courses (segundos) increases breast milk (False)</td>
<td>65</td>
</tr>
<tr>
<td></td>
<td>Rubbing oneself with urine helps to dry-up breast milk (True)</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>Drinking cow’s milk helps to dry-up breast milk (False)</td>
<td>81</td>
</tr>
<tr>
<td></td>
<td>After birth one should eat foods with salt (False)</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>After birth one should eat lamb’s meat (True)</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Before 6 months you should have the baby taste foods and liquids so that it learns to eat well (True)</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for lungs (True)</td>
<td>74</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for costado (True)</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for cough (True)</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>One should swaddle the baby so that it is strong (True)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>You have to stop breastfeeding at a year and a half because otherwise the baby could be loco (True)</td>
<td>71</td>
</tr>
<tr>
<td>2</td>
<td>While we are breastfeeding eating lamb lung increases breast milk (True)</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>Drinking fennel tea helps to dry-up breast milk (False)</td>
<td>61</td>
</tr>
<tr>
<td></td>
<td>Rubbing oneself with cold water helps to dry-up breast milk (True)</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>After birth you must wait until the baby cries to breastfeed (True)</td>
<td>57</td>
</tr>
<tr>
<td></td>
<td>After birth you must let the baby sleep the time that it wants (True)</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>After birth you must bathe and swaddle the baby (True)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for eye infection (True)</td>
<td>93</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk comes from our blood (True)</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>If you sit long in the sun breast milk heats up and can make the baby sick (True)</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>If we are pregnant we can continue breastfeeding our baby (False)</td>
<td>77</td>
</tr>
<tr>
<td></td>
<td>If the mother eats something bad the baby can get colico (True)</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>If we breastfeed while pregnant the baby can get ayaurijwa (True)</td>
<td>95</td>
</tr>
<tr>
<td>3</td>
<td>While we are breastfeeding eating onion increases breast milk (False)</td>
<td>66</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating frog soup increases breast milk (True)</td>
<td>54</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating raqacha increases breast milk (True)</td>
<td>17</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding eating watercress increases breast milk (True)</td>
<td>72</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding one should eat roqoto (hot pepper) because it is ‘hot’ (False)</td>
<td>44</td>
</tr>
<tr>
<td></td>
<td>The baby feeds from the mother’s blood before birth (True)</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for bad wind (False)</td>
<td>23</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for indigestion (True)</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for wounds (True)</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>Mother’s milk is medicine for fever (True)</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>If the mother has wounds on her breast it could be from soqa pujilo (True)</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>If we breastfeed while sad the baby can get sick (True)</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>If the baby has cheese-like diarrhea it’s because it has ñuñup’a (True)</td>
<td>98</td>
</tr>
<tr>
<td>Difficulty (1-3)</td>
<td>Question</td>
<td>% correct</td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>1</td>
<td>We should breastfeed immediately after birth (True)</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Colostrum is good so that the baby does not get sick (True)</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>We should breastfeed for at least 15 minutes on each breast (True)</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>If a newborn sleeps more than 2 hours we should wake the baby to breastfeed (True)</td>
<td>85</td>
</tr>
<tr>
<td></td>
<td>Until 6 months the baby should only receive breast milk (True)</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>Before 6 months the baby is not ready to receive foods (True)</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>Other milks that are not mother's milk are more nutritious (False)</td>
<td>49</td>
</tr>
<tr>
<td></td>
<td>Mother's milk is the only thing that a baby needs for the first 6 months (True)</td>
<td>98</td>
</tr>
<tr>
<td></td>
<td>After 8 months mother's milk alone is enough nourishment for babies (False)</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Starting at 8 months babies should eat 5 times a day (True)</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>Liver is good nourishment for babies (True)</td>
<td>99</td>
</tr>
<tr>
<td></td>
<td>Rice alone is good nourishment for babies (False)</td>
<td>87</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding we should eat only a little meat, a little egg (False)</td>
<td>43</td>
</tr>
<tr>
<td></td>
<td>Babies should only eat animal products like meat, cheese, egg, once a week (False)</td>
<td>48</td>
</tr>
<tr>
<td>2</td>
<td>Colostrum is good food for the baby (True)</td>
<td>91</td>
</tr>
<tr>
<td></td>
<td>If the baby does not suckle the breast well it can get gases (True)</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>If the baby does not suckle the breast well it can cause the mother to have wounds (True)</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>The baby must drink from each breast until it is empty (True)</td>
<td>96</td>
</tr>
<tr>
<td></td>
<td>Babies that eat before 6 months get sick more often with colds (True)</td>
<td>69</td>
</tr>
<tr>
<td></td>
<td>You have to feed newborn babies other milks because they do not get full from mother's milk alone (False)</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Mother's milk is the best thing for the baby’s intelligence (True)</td>
<td>94</td>
</tr>
<tr>
<td></td>
<td>Starting at 8 months babies should eat animal products 3 times a day (True)</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding we should eat 5 times a day (True)</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Potato alone is a complete meal (False)</td>
<td>76</td>
</tr>
<tr>
<td></td>
<td>To prevent constipation the baby should eat only rice (False)</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>While we are breastfeeding we should eat more than when we were pregnant (True)</td>
<td>95</td>
</tr>
<tr>
<td></td>
<td>To have more breast milk one should eat less broths and more segundos (main courses) (True)</td>
<td>52</td>
</tr>
<tr>
<td></td>
<td>It is fine to continue breastfeeding after 2 years as long as the baby is eating well (True)</td>
<td>75</td>
</tr>
<tr>
<td></td>
<td>We should not swaddle babies because their hands and feet get cold (True)</td>
<td>45</td>
</tr>
<tr>
<td></td>
<td>If a baby is having difficulty breathing we should bring the baby to the health post immediately (True)</td>
<td>97</td>
</tr>
<tr>
<td></td>
<td>If the baby has a fever it will get well with a medicinal plant treatment (False)</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td>If we breastfeed while sleeping the baby can suffocate (True)</td>
<td>93</td>
</tr>
<tr>
<td>3</td>
<td>You should not let the baby fall asleep while breastfeeding (True)</td>
<td>88</td>
</tr>
<tr>
<td></td>
<td>If you are tense or worried you produce less breast milk (True)</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Other milk can cause babies to have constipation (True)</td>
<td>64</td>
</tr>
<tr>
<td></td>
<td>Breastfeeding is a form of contraceptive until 4 months (True)</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>Babies that drink from baby bottles have more gas (True)</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>The vitamins given at the health post help to increase the baby’s appetite (True)</td>
<td>55</td>
</tr>
<tr>
<td></td>
<td>To prevent constipation the baby needs to drink water (True)</td>
<td>84</td>
</tr>
</tbody>
</table>
Additional survey questions included information on child, parental, household, and community variables that have been associated with infant growth in previous research (Leonard 1989, Obert et al. 1994, Leatherman et al. 1994). These included the infant’s sex and age in days, maternal education (maximum school level attained), household size (total number of people living in the household at the time of the survey), number of children (total number of children for the mother), maternal income (self-reported monthly cash income earned by the mother), paternal income (monthly cash income earned by the father reported by the mother), and community of residence.

I obtained recumbent length (cm) and weight (kg) measures for participating children from the local health post records for the 101 infants in the sample after obtaining permission from mothers and health post officials. These anthropometric measures are collected at monthly visits throughout the child’s first year of life by trained health post workers following WHO protocols (1995). In addition to allowing for a larger sample size of infants measured at monthly intervals, relying on this dataset was preferred because it has few missing values. Mothers are diligent in attending the monthly infant growth check-ups at the local health post because they receive monthly food ratios contingent on their compliance.

I converted the weight and length measures into age and sex specific z-scores, weight-for-age (WAZ), length-for-age (LAZ), and weight-for-length (WLZ) using the WHO (2006) growth standards recommended for international breastfed children. A child is deemed affected by chronic malnutrition (stunting) when his or her length-for-age z-score is -2 or lower, or two standard deviations below the international normalized mean. Similarly, a child is deemed affected by undernutrition defined by low weight-for-age z-
scores (≤ -2) (WHO 2008). Additionally, weight-for-length z-scores < -2 indicate wasting or thinness and a score of >2 indicates overweight. Wasting or thinness indicates in many instances a recent and severe process of weight loss, often associated with acute starvation and/or severe disease. Underweight, (low weight for age) may reflect occasional weight loss as a result of recent disease episodes (WHO 2008). Stunting, however is more representative of insufficient growth due to persistent (chronic) dietary deficiencies (WHO 2008).

Data analysis

My analysis is guided by a conceptual framework in which cultural and socio-economic factors as well as individual characteristics are recognized as important determinants of infant growth (length and weight). The goal was to examine the association between two outcome variables, longitudinal measures of z-scores of infant 1) length and 2) weight, and two explanatory variables 1) maternal traditional knowledge and 2) maternal public health knowledge, controlling for individual maternal, infant, and household characteristics.

Next, I derived descriptive statistics to examine bivariate associations between infant’s length (LAZ), weight (WAZ), and weight for length (WLZ) and mother’s knowledge scores as well as bivariate associations between maternal knowledge and mother’s education or income. Next, I employed three linear mixed stepwise regression models to examine the association between mother’s knowledge and the infant’s weight-for-age, length-for-age, and weight-for-length. Each model also contained the covariates of infant sex, mother’s number of children, mother’s formal education, mother’s monthly income, father’s monthly income, and household size. I employed a repeated measures
stepwise regression method to perform variable selection. In a stepwise regression the explanatory variables are added one at a time in order of significance. If a variable became non-significant when a new variable was added (p-value exceeded 0.1), it was removed from the model. The model is a repeated measures model because the child anthropometric measures are repeated monthly, so the mixed model is necessary to simultaneously examine the independent effects time and the characteristics of the mother/infant may have on longitudinal length or weight of the infant. This is considered “mixed” because there are two separate levels of analysis.

Permissions to conduct research

Each community has democratically elected officials. Before I began any data collection I approached the community president to explain the purpose of the research project and to ask permission to conduct this research in the community. In addition, I obtained prior informed consent from each participant before the start of each data collection session, emphasizing that participation was voluntary and that participants could choose to drop out of the research at any time. Participants gave verbal consent for their participation. For interviews with public health staff I obtained permission from the public health head office in the city of Cusco and from the head administrators of the health center in Pisac and the Cuyo Grande and Quello Quello health posts. I obtained permission to access infant growth records at the Cuyo Grande and Quello Quello health posts from the respective head administrators and from participating mothers. In addition, the research project was reviewed and approved by the Institutional Review Board of the University of Georgia to ensure the protection of human subjects IRB#: 2011104332.
4.4 Results

An Andean theory of illness associated with maternal and infant health

From the free-listing exercises with older mothers, I compiled a list of 15 culturally defined illnesses (not directly transferable to diseases identified by biomedicine) associated with breastfeeding and infant health (Table 4.6). I classified these 15 illnesses into three categories that have been identified as sources of illness consistent with the findings of other Andean scholars including 1) imbalance of hot/cold and wet/dry substances with in the body, 2) imbalance within the body due to experiencing strong emotions, and 3) coming into contact with harmful elements in the landscape. The first source of illness that is tied to disruptions of flows in the body is a perceived connection between food and health (Bastien 1987, Graham 1997). Foods and medicines are classified by their hot, cold, and wet and dry properties. A proper balance of these substances is crucial to maintaining health. Likewise illnesses are classified as hot or cold, and treatments include treating hot illnesses with cold medicines and vice versa. A second illness causation is associated with experiencing excessive emotions within the body such as fright, anger, and sadness (Graham 1997). These emotions disrupt flows within the body. For example, excessive anger is associated with heat that can lead to internal fevers. Finally, a third cause of illness are harmful elements in the landscape such as heat, cold, wind, and ancestor spirits that enter the body and cause imbalances and disrupt flows in the body (Greenway 1998).

Illnesses listed in Table 4.6 can be classified into one of the three sources of illness with the exception of calor interno (internal heat) which can be caused by any one of the three categories. Interestingly, there are synergistic effects among these categories of illness causation. For example, experiencing strong emotions such as anger or sadness
may make one more susceptible to falling ill while being exposed to harmful elements in
the landscape. Experiencing an imbalance of hot/cold and wet/dry substances in the body
can exacerbate the inherent weakness of infants and breastfeeding mothers, making them
more susceptible to falling ill from exposure to elements in the landscape.
### Table 4.6 Culturally defined illnesses related to breastfeeding and infant care

<table>
<thead>
<tr>
<th>Illness</th>
<th>Etiology</th>
<th>Symptoms</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Imbalance of hot/cold or wet/dry substances in the body</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calor interno</td>
<td>- Imbalance of hot foods and drinks</td>
<td>- “Hot” fever</td>
<td>- Herbal infusion with “cold” medicinal plants &lt;br&gt;- Rub infant’s belly with breast milk, a “cold” substance</td>
</tr>
<tr>
<td>Insufficient breast milk</td>
<td>- Mother eats garlic &lt;br&gt;- Mother does not eat enough soups, and eats too much segundos (dry main course dishes)</td>
<td>- Insufficient breast milk &lt;br&gt;- Infant cries from hunger</td>
<td>- Huak’achu (Andean flicker bird) soup &lt;br&gt;- Quinoa soup with sheep lung or heart &lt;br&gt;- Eat more “wet” foods, rather than “dry” foods &lt;br&gt;- Fennel tea</td>
</tr>
<tr>
<td>Colico</td>
<td>- Eating certain foods without paying attention to balance of hot/cold or hot/cold times of day</td>
<td>- Stomach ache, discomfort &lt;br&gt;- Gases &lt;br&gt;- Constipation</td>
<td>- Ground mutuy plant with beaten egg &lt;br&gt;- Take to the health post if fever does not subside</td>
</tr>
<tr>
<td>Nilpo (empacho)</td>
<td>- Eating too much of one thing &lt;br&gt;- Unsatisfied food craving</td>
<td>- Stomach ache &lt;br&gt;- Diarrhea with blood &lt;br&gt;- Internal Gases &lt;br&gt;- Loss of appetite</td>
<td>- Toasted cheese with blacked spices &lt;br&gt;- Vapor on infants bottom &lt;br&gt;- Eat whatever you were craving &lt;br&gt;- Ground sage and other plants</td>
</tr>
<tr>
<td><strong>Experiencing excessive emotions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calor interno</td>
<td>- Experiencing strong motions</td>
<td>- “Hot” fever</td>
<td>- Herbal infusion with “cold” medicinal plants &lt;br&gt;- Rub infant’s belly with breast milk. A “cold” substance</td>
</tr>
<tr>
<td>Paq’o (Colera)</td>
<td>Mother is angry or sad and passes on her anger or sadness to the infant through breastfeeding.</td>
<td>- Internal fever &lt;br&gt;- Diarrhea</td>
<td>- The mother drinks “cold” items to pass on in the milk &lt;br&gt;- Rub infant’s body with balm made of plants classified as “cold” &lt;br&gt;- Healing ceremony performed by a paqo (traditional healer)</td>
</tr>
<tr>
<td>Nilpo’u</td>
<td>Mother falls asleep while breastfeeding.</td>
<td>- White milk like diarrhea</td>
<td>- Boiled breast milk with spices</td>
</tr>
<tr>
<td><strong>Harmful Elements in the landscape</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Calor interno</td>
<td>- Exposure to sun</td>
<td>- “Hot” fever</td>
<td>- Herbal infusion with “cold” medicinal plants &lt;br&gt;- Rub infant’s belly with breast milk. A “cold” substance</td>
</tr>
<tr>
<td>Pujo (water source)</td>
<td>- Exposure to spirits that inhabit a water source. &lt;br&gt;- Spirit enter the breast and spoil the milk.</td>
<td>- Milk dries up &lt;br&gt;- “Herpes” on breasts &lt;br&gt;- Swelling of breasts</td>
<td>- Stop breastfeeding with affected breast &lt;br&gt;- Healing ceremony performed by a paqo (traditional healer) &lt;br&gt;- Apply medicinal plant poultice applied to the affected breast</td>
</tr>
<tr>
<td>Soq’a wayra (macho wind)</td>
<td>- Exposure to spirits that live in rocky areas.</td>
<td>- Birth deformities &lt;br&gt;- Still birth &lt;br&gt;- Infant death &lt;br&gt;- Black marks on infant’s body</td>
<td>- Medicinal plant infusion with garlic &lt;br&gt;- Healing ceremony performed by a paqo (traditional healer)</td>
</tr>
<tr>
<td>Qayqa</td>
<td>- Infant is exposed to a dead person &lt;br&gt;- Infant wears clothes that were left hanging out to dry overnight</td>
<td>- Green urine &lt;br&gt;- Sweating a lot</td>
<td>- Bathe infant with medicinal plants &lt;br&gt;- Medicinal plant infusion</td>
</tr>
<tr>
<td>Wista q’ewe</td>
<td>- Infant is carried on the mother’s back without being swaddled</td>
<td>- Gel like diarrhea &lt;br&gt;- Stomach ache &lt;br&gt;- Incessant crying</td>
<td>- Medicinal plant rub and swaddle</td>
</tr>
<tr>
<td>Susto</td>
<td>- Experiencing a strong scare or fall &lt;br&gt;- The soul leaves the body</td>
<td>- Incessant crying &lt;br&gt;- Non-responsiveness &lt;br&gt;- Diarrhea</td>
<td>- A paqo (a traditional healer/shaman) or an experienced person conducts a ritual calling the child’s animo (spirit).</td>
</tr>
</tbody>
</table>
Similarities and differences between traditional and public health knowledge

Similar to findings surrounding breastfeeding (Chap. 3) semi-structured interviews revealed similarities and differences in how public health and older mothers in the communities conceptualize ideal diets and infant health for breastfeeding mothers and infants. Public health and older mothers agreed that breast milk is highly valuable as both a food and medicine, however, their underlying conceptual reasoning differed. Public health staff discussed the nutritional properties of breast milk, such as the proper balance between macro and micronutrients necessary to meet nutritional and energetic needs of infants. Public health staff also emphasized the immunological defenses that colostrum and breast milk provide for infants. Older mothers, on the other hand, value colostrum and breast milk because it confers “strength” to infants and because breast milk is viewed as a “cold” medicine. Public health and older mothers also agreed that diets are important for maternal and infant health. However, again they differed in their beliefs (conceptual reasoning) for placing importance on diets for maternal and infant health. Public health staff identified a link between nutritional deficiencies in local diets and high indices of infant under-nutrition. On the other hand, older mothers emphasized the importance avoiding illness and maintaining strength both for the mother and child through eating a diet balanced in hot and cold and wet and dry properties.

Older mothers did not discuss issues of length as an indicator of infant nutritional status, but public health professionals emphasized length or height. Older mothers were not concerned as much with the size of their children as they with their fuerza (strength) and capacity to ward off illness. When talking about signs of illness that are a cause of concern, they mentioned weight loss, loss of appetite, crying, and weakness.
Treatment options

Treatment options are consistent with three health care sectors identified by previous researchers in the Andes 1) the popular sector (health care provided by the sick persons themselves, their families, social networks, and communities; 2) the folk sector (health care provided by traditional healers, shamans, bonesetters, and midwives); and 3) the professional sector (health care provided by biomedical practitioners) (Bastien 1982, Crandon-Malamud 1991, Vandebroek et al. 2004, Mathez-Stiefel et al. 2011). Older mothers mentioned primarily self-treatment with home remedies of medicinal plant infusions but also seeking the assistance of a paqo (traditional Andean healer), and the use of pharmaceutical medicines from the public health post. The different treatment options were not regarded as mutually exclusive but as complementary. While the majority of older mothers stated the use of home remedies as the primary treatment of all illnesses, there is a general awareness that any option might succeed in reestablishing health and thus is worth a try. These results are consistent with the work of other Andean scholars who found that individuals select from various medical systems available in a process of negotiation of cultural identity and access to economic, social, and political resources (Crandon-Malamud 1991, Mathez-Stiefel et al. 2012).

Tensions surrounding infant feeding recommendations

Results indicate that traditional and public health systems are complementary. However, I also found tensions between these systems. Tensions include differences in conceptualizations surrounding infant feeding, the imposition of public health care services, and perceptions on the part of public health that mothers lack competency and
on the part of older mothers that public health blames them for issues with child health. For example, interviews with public health staff suggest concern about education and the medical and nutritional competency of community mothers. These concerns are evident in the narratives of public health staff.

“Mothers from the campo (rural communities) do not nourish well, they give [their children] too little nutritious food. While they are working during the day, from early in the morning they give [feed their children] only ch’uño [freeze dried potatoes]. People from the campo (rural communities) prioritize only the chakra (crops).”

The narratives of older mothers also expressed feelings of blame. “I used to bring my daughter to the health post when she got sick when she was young but they said to me “you only make her sick” since then I don’t bring her to the health post [when she is sick].”

In addition, an older mother expressed conflicting feelings about following public health infant feeding recommendations that counter her own intuitions and beliefs:

“Me, if my son wants to eat before six months I cannot wait for what they [public health staff] say. It is up to me, if my baby wants to eat something, I have to give food. Sometimes I do not pay attention to them [public health staff], maybe in other things I can listen to them, but not in that [feeding before 6 months]. It is something natural for me, for example if I want to eat more of something and she [public health staff] forces me to eat less, to me that is not good” (Older mother).

Finally, mothers who do not bring their children to the public health post for regular growth and health or for treatment when they are sick perceive that they will be denied access to health services in the future as illustrated by the following quote: “I bring my child to the health post because if you participate then the [public health] help you, if you do not participate then they do not.”
**Infant growth**

Table 4.7 contains descriptive information on the nutritional status of infants included in this study. Under-nutrition (Z weight-for-age <= -2.0), in this sample is 15% at 1 month, 12% at 3 months, 7% at 9 months and 12 months. Stunting (LAZ <= -2.0), an indicator of chronic under-nutrition, is common. Among infants in this sample, 48% of infants were classified as stunted at 1 month of age, 52% at 3 months, and 30% at 12 months. Wasting (Z weight-for-length <-2.0), an indicator of acute under-nutrition however, is rare in the sample, 6% of infants were classified as wasted at 1 month, 0% at month 3 and 9, and 3% at month 12. Overweight (Z weight-for-length >2.0) also appears in the sample, 9% at month 1, 25% at month 3, 5% at month 9, however, by month 12 it is and 0%.

Table 4.7. Weight-for-age, length-for-age, and weight-for-length z-scores

<table>
<thead>
<tr>
<th>Age in months</th>
<th>1 month n = 100</th>
<th>3 months n = 101</th>
<th>9 months n = 99</th>
<th>12 months n = 91</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weight (kg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (±sd)</td>
<td>3.82 (0.61)</td>
<td>5.55 (0.70)</td>
<td>8.06 (0.94)</td>
<td>8.63 (0.90)</td>
</tr>
<tr>
<td>WAZ z-score</td>
<td>-1.06 (1.19)</td>
<td>-0.91 (1.03)</td>
<td>-0.63 (1.01)</td>
<td>-0.73 (0.91)</td>
</tr>
<tr>
<td>% under-weight</td>
<td>15%</td>
<td>14%</td>
<td>9%</td>
<td>7%</td>
</tr>
<tr>
<td>Length (cm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (±sd)</td>
<td>51.22 (2.04)</td>
<td>56.50 (2.24)</td>
<td>67.69 (2.50)</td>
<td>70.91 (2.36)</td>
</tr>
<tr>
<td>LAZ z-score</td>
<td>-1.62 (1.04)</td>
<td>-2.09 (1.07)</td>
<td>-1.57 (1.07)</td>
<td>-1.67 (0.97)</td>
</tr>
<tr>
<td>% stunted</td>
<td>29%</td>
<td>55%</td>
<td>32%</td>
<td>32%</td>
</tr>
<tr>
<td>Weight-for-length</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WLZ z-score</td>
<td>0.43 (1.43)</td>
<td>1.2 (1.1)</td>
<td>0.37 (0.98)</td>
<td>1.31 (0.96)</td>
</tr>
<tr>
<td>% wasted</td>
<td>6%</td>
<td>0%</td>
<td>0%</td>
<td>3%</td>
</tr>
<tr>
<td>% overweight</td>
<td>9%</td>
<td>25%</td>
<td>5%</td>
<td>0%</td>
</tr>
</tbody>
</table>
Internal consistency and dimensionality of knowledge questions

I employed Cronbach’s alpha statistical analysis to explore the internal consistency of traditional and public health knowledge questions. Cronbach's alpha is a measure of, how closely related a set of questions are and if they measure a single construct. The alpha coefficient of reliability for the traditional and public health knowledge questions are 0.7 and 0.8 respectively suggesting that the questions have relative high internal consistency. A coefficient of 0.7 or higher is considered acceptable for social science research situations.

I then used factor analysis in order to investigate the dimensionality of the traditional and public health knowledge tests. The factor analysis for the traditional knowledge questions showed that the questions loaded onto two factors, factor one with an eigenvalue of 3.25 and factor two with an eigenvalue of 2.27. Additionally, the first factor accounted for 20% of the variance and the second factor explained 14% of the variance. This shows that as expected, the traditional knowledge questions are not one-dimensional. The traditional knowledge questions that load onto factor one (and have a unique variance of 0.5 or higher) are associated with the theme of where breast milk comes from/how it is produced and the factor 2 questions are associated with the theme of illnesses related with breastfeeding/breast milk.

The factor analysis for the public health knowledge questions showed that the questions loaded onto two factors with eigenvalues of 4.66 and 2.16. Additionally, these factors accounted for 23% and 10% of the variance. Again as expected the public health knowledge questions are not one-dimensional.
Maternal and child characteristics

Table 4.8 shows the means and frequencies of the characteristics of women who participated in the survey. Mother’s traditional and public health knowledge, on average, tended to be high. The average traditional knowledge and public health score were both 0.74 (on a scale of 0-1). The traditional knowledge scores ranged from 0.53-0.90 and the public health knowledge scores from 0.38 – 0.92. ANOVA analyses revealed statistical differences between communities. For traditional knowledge Pampallaqta had lower average of scores (0.69) than the rest of the communities and Chawaytire had higher average of scores (0.78). For public health knowledge score there was a statistically significant difference between communities (p-value = 0.05). Chawaytire had the highest average of scores (0.77) and Cuyo Grande the lowest average of scores (0.70). In addition, both mothers’ formal education and household size were statistically different between communities (p-value = 0.05).
<table>
<thead>
<tr>
<th></th>
<th>Total n=101</th>
<th>Cuyo Grande n=42</th>
<th>Chawaytire n=36</th>
<th>Pampallqaña n=7</th>
<th>Paru Paru n=16</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Explanatory variables</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional knowledge§ (mean sd)</td>
<td>0.74 (0.09)**</td>
<td>0.72 (0.10)</td>
<td>0.78 (0.10)</td>
<td>0.69 (0.14)</td>
<td>0.71 (0.10)</td>
</tr>
<tr>
<td>Public health knowledge§ (mean sd)</td>
<td>0.74 (0.11)*</td>
<td>0.70 (0.1)</td>
<td>0.77 (0.1)</td>
<td>0.73 (0.13)</td>
<td>0.76 (0.10)</td>
</tr>
<tr>
<td><strong>Covariates</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female infants (number)</td>
<td>54</td>
<td>18</td>
<td>19</td>
<td>3</td>
<td>7</td>
</tr>
<tr>
<td>Male infants (number)</td>
<td>47</td>
<td>24</td>
<td>17</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>Number of children (mean sd)</td>
<td>3.1 (2.1)</td>
<td>2.6 (1.9)</td>
<td>3.6 (2.3)</td>
<td>4.0 (2.2)</td>
<td>2.7 (1.3)</td>
</tr>
<tr>
<td>Mother formal education in years§§ (mean sd)</td>
<td>4.7 (3.1)*</td>
<td>5.8 (3.5)</td>
<td>4 (2.5)</td>
<td>3.3 (2.3)</td>
<td>3.6 (2.7)</td>
</tr>
<tr>
<td>Household size (mean sd)</td>
<td>4.9 (1.7)*</td>
<td>4.3 (1.3)</td>
<td>5.4 (1.9)</td>
<td>5.7(2.0)</td>
<td>4.9 (1.3)</td>
</tr>
</tbody>
</table>

§Range is from 0 to 1, §§range from 0 to 12, * Significant differences across communities below the 0.05 level, ** Significant differences across communities below the 0.01 level.

Traditional knowledge is significantly associated with public health knowledge (Persons r=0.56, p=0.001) among women in the sample. In addition, there is a statistically significant positive association between a mother’s number of children and her traditional (significant at the 0.01 level) and public health (significant at the 0.05 level) scores (Table 4.9).
Table 4.9. Bivariate associations between maternal knowledge and covariates

<table>
<thead>
<tr>
<th>Covariates</th>
<th>N</th>
<th>Explanatory variables</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mother’ traditional</td>
<td>Mother’s public</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>knowledge score</td>
<td>health knowledge</td>
<td></td>
</tr>
<tr>
<td>Mother’s education (0-12 years)</td>
<td>n=101</td>
<td>-0.10 (0.33)</td>
<td>-0.10 (0.37)</td>
<td></td>
</tr>
<tr>
<td>Number of children (1-9)</td>
<td>n=101</td>
<td>0.29 (0.003)**</td>
<td>0.21 (0.03)*</td>
<td></td>
</tr>
<tr>
<td>Mother’s income (mean, sd)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>n=19</td>
<td>0.72 (0.12)</td>
<td>0.77 (0.07)**</td>
<td></td>
</tr>
<tr>
<td>25-50</td>
<td>n=67</td>
<td>0.74 (0.08)</td>
<td>0.73 (0.11)</td>
<td></td>
</tr>
<tr>
<td>100-199</td>
<td>n=10</td>
<td>0.73 (0.11)</td>
<td>0.73 (0.12)</td>
<td></td>
</tr>
<tr>
<td>200-300</td>
<td>n=5</td>
<td>0.65 (0.10)**</td>
<td>0.72 (0.10)</td>
<td></td>
</tr>
</tbody>
</table>

*significant at the 0.05 level, ** significant at the 0.01 level

Association between maternal traditional or public health knowledge and infant growth

Table 4.10 shows there is no statistically significant association between WAZ and maternal traditional or public health knowledge scores after controlling for covariates including infant sex, number of children, mother’s formal education, mother’s monthly income, father’s monthly income, household size, and community of residence.

There is a statistically significant, positive association between infant WAZ and mother’s formal education level after controlling for other variables in the model. A one-year increase in a mother’s formal education is associated with a 0.07 increase in WAZ (p=0.05).

For LAZ the variables that stay in the model after variable selection are traditional score and infant sex. In contrast to WAZ, Table 4.10 shows that there is a significant
association between LAZ and maternal traditional knowledge scores. There is a negative association between mother’s traditional knowledge score and her infant’s LAZ score (beta -2.03 p = 0.05). On the contrary, there is a positive association between mother’s public health score and her child’s LAZ score however, this association is not statistically significant at the p=0.05 level. In addition, female infants tend to have lower normalized length than males. The average LAZ of females is 0.28 lower than males (p=0.01).

Table 4.10. Results of stepwise regressions. This shows association between mothers’ knowledge scores and infant LAZ, WAZ, and WLZ

<table>
<thead>
<tr>
<th>Explanatory variables</th>
<th>LAZ</th>
<th>WAZ</th>
<th>WLZ</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>β (SE)</td>
<td>β (SE)</td>
<td>β (SE)</td>
</tr>
<tr>
<td>n=101</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Traditional knowledge</td>
<td>-2.03(0.98)**</td>
<td>-1.58(1.12)</td>
<td>-0.22(0.92)</td>
</tr>
<tr>
<td>Public health knowledge</td>
<td>1.23(0.79)</td>
<td>0.57(0.9)</td>
<td>-0.49(0.75)</td>
</tr>
<tr>
<td>Covariates variables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mother’s education (years)</td>
<td>0.07(0.027)**</td>
<td>0.07(0.02)**</td>
<td>0.07(0.02)***</td>
</tr>
<tr>
<td>Infant age (days)</td>
<td>0.001(.00)***</td>
<td>-0.001(0.00)***</td>
<td></td>
</tr>
<tr>
<td>Infant sex (female)</td>
<td>-0.28(0.14)**</td>
<td>-0.28(0.14)**</td>
<td></td>
</tr>
<tr>
<td>Cuyo Grande</td>
<td>-0.41(0.21)*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pampallacta</td>
<td>-0.57(0.32)*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LAZ length for age Z-score, WAZ weight for age Z-score, WLZ weight for length Z-score. * Significant below the 0.10 level, ** Significant below the 0.05 level, ***Significant below the 0.01 level

4.5 Discussion

Social scientists have long emphasized the importance of beliefs and practices in shaping infant health, and thus, in this study, I sought to investigate the relationship between maternal traditional or public health knowledge and infant growth outcomes among Quechua rural indigenous women. My discussion centers on five findings. First, maternal traditional knowledge associated with infant feeding is embedded within an Andean theory of illness causation. Second, knowledge of traditional and public health
infant feeding and care recommendations were correlated within individuals. Mothers who had high scores of traditional knowledge also tended to have high scores in public health knowledge. When treating their infants and themselves, mothers draw from both traditional and public health care sectors during breastfeeding. Third, a mother’s completed years of education has a positive association with her infant’s weight. Fourth, a mother’s traditional knowledge of infant feeding has a negative association with her infant’s length in this sample and, on the other hand, a mother’s public health knowledge of infant feeding has a positive association with her infant’s length. Fifth, female infants tend to have lower normalized length than males.

The first finding is that maternal traditional knowledge associated with infant feeding is embedded within an Andean theory of illness causation. Many Andean scholars have identified three core ethnomedical concepts associated with an Andean theory of illness (Graham 1997, Greenway 1998, Bastien 1987, Larme 1998, Oths 199, Hammer 2001). The first are the concepts of debilidad, meaning weakness or vulnerability, and fuerza or strength. Illness prevention practices center on maintaining fuerza or strength and avoiding debilidad (Graham 1997, Larme 1998). The second core concept tied to an Andean theory of illness causation centers around the belief that illness prevention is tied to maintaining a cycle of fluids and semi-fluids that make up the body (Bastien 1985, Hammer 2001). The third core concept is that health is constantly in threat by pathogenic elements in the landscapes including wind, heat, cold, and spirits. Postpartum and breastfeeding women, as well as infants are perceived as being particularly weak or vulnerable from these three sources of illness (Graham 1997, Larme 1998, Hammer 2001). Infant feeding and care practices center on countering the
vulnerable nature of infants and promoting strength to ward off illness (Graham 1997, Larme 1998).

The second finding is that knowledge of traditional and public health infant feeding recommendations were correlated within individuals. Mothers with high traditional knowledge scores also tended to hold high public health knowledge scores. This implies that mothers draw on both enthnomedical and public health knowledge to maintain infant health. However, mothers actively referred to some infant feeding recommendations as “what the nurses recommend” versus “what my mother recommends.” As other scholars working on medical pluralism in the Andes stress, laypeople are positively inclined towards dual use of distinct therapeutic traditions (Baer 2003, Press 1969). It is therefore likely that women who are motivated to be knowledgeable about one type of medicine are motivated to be knowledgeable about another.

The third finding is that a mother’s completed years of formal education is positively associated with her infant’s weight for age. The association between maternal years of formal education and infant weight for age is consistent with results from a rich body of research establishing the connections between maternal formal education and child health (Basau and Stephensons 2005, Caldwell and McDonald 1982, Cochrane et al. 1982). For example, Frost, Frost and Haas (2005) found a strong relationship between maternal education and child nutritional status in Brazil. In addition, higher maternal education predicts increased health care-seeking behaviors in some societies (Desai and Alva 1998, Elo 1992). Furthermore, in some cases this association has been found to be independent of correlated factors such as cash-income and health knowledge (Cleland
and Van Ginneken 1988, Desai and Alva 1998). Low weight-for-age often reflects occasional weight loss as a result of recent disease episodes. It could be that mothers with higher formal education seek treatment at the local health post more quickly and avoid prolonged illness that can lead to weight loss.

It is also interesting to note that infant length for age was not associated with a mother’s formal education. This absence of an association diverges from other research findings that establishes a strong connection between maternal education and child nutrition status in Bolivia (Frost et al. 2005) and in Lesotho (Ruel et al. 1992).

Findings also show a negative association between maternal traditional knowledge of infant feeding practices and infant length. These findings differ from those found by McDade et al. (2007), Tanner et al. (2011), and Miller (2011) who found positive associations between maternal ethnomedical knowledge and child health. Considering the divergent findings of this study it may be that, as public health personnel argue, local diets are insufficient to provide the nutritional requirements of lactating mothers and growing infants. Mothers who follow traditional medical knowledge emphasize the importance of wet/dry hot/cold properties of foods, these beliefs may exacerbate low protein consumption among lactating mothers in these communities related to poverty and scarcity of protein rich food sources. In other words women who scored higher on public health knowledge may place higher importance on protein-rich foods and maybe more efficient at providing their children with diets that are superior in terms of quality as well as quantity.

A second reason for the negative association between traditional knowledge and infant length could be related to the devaluation of ethnomedical knowledge. Walters and
Simoni (2002) described cultural factors such as traditional health practices as cultural buffers that can serve as potential moderators of life stressors. I expected this to be the case with traditional knowledge relating to infant feeding, however, this was not the case. It could be that, as Abel (2007) argues, when cultural capital is repressed or not acknowledged, health disparities in the group tend to rise. Results from semi-structured interviews showed that while the two medical systems are complementary tensions between them also exist. Further research should explore the relationship between social and cultural marginalization and health outcomes.

The fifth and final finding is that female infants tend to have lower normalized length than males. This finding maybe indicative of feeding practices that give preference towards males. Previous research on this topic in Andean contexts has yielded conflicting results. For example, McKees’ (1984) work on gender difference in weaning patterns in the Ecuadorian highlands showed that males were breastfed for longer than females in her sample. Conversely, Marquis and Kolas (1986) found significant gender differences favoring females in the growth patterns of weaning-age children in a highland community of South Central Peru. Further complicating matters, Leonards’ work in a rural community located in southern Peru, found no sex differences in dietary adequacy or nutritional status among children (Leonard 1991). Graham (1997) also found no gender differences in energy intake or growth among toddlers (one through three years). Thus, within the Andean region, there is evidence that food allocation is related to local gender stratification in some communities but not in others. From interviews with older mothers there was no indication of differential preference between male and female infants. Observational research is needed to examine whether feeding practices favor males over
females and other possible reasons for the difference in length between male and female infants.

Important limitations of this study include possible omitted variables. It is possible that the variables that I have considered are associated with other unmeasured characteristics of children, mothers, or the household. I have attempted to account for this problem by controlling for child, mother, and household characteristics but I cannot discount that omitted variables bias the results. Furthermore, in this research I do not investigate the pathways linking maternal knowledge and infant growth. This would require more nuanced observational techniques investigating infant feeding practices.

4.6 Conclusion

In conclusion, this study contributes to understanding links between culture and health at the level of the individual. In this study I focused specifically on maternal traditional knowledge and public health knowledge relating to infant feeding and care held by Quechua women. I tested individuals with respect to this knowledge and was able to explore knowledge as an attribute of individual mothers that is predictive of child growth in a multivariate framework. The findings link maternal knowledge and infant growth outcomes. A mother’s education, a proxy of social capital, was associated with infant anthropometrics. However, these finding diverged from other research which found positive associations between maternal ethnomedical knowledge and child health outcomes. Further research should consider the meanings and implications of culture within varying contexts particularly the role of social and cultural marginalization. It may
be that as Abel (2007) contends that when cultural capital is repressed or not acknowledged, health disparities in the group tend to rise (Abel 2007).

Finally, this research holds implications for improving public health services. Findings suggest tensions between traditional and public health systems including differences in conceptualizations surrounding breastfeeding and infant food and the imposition of public health care services through coercive means. These tensions are likely compounding the problem of providing culturally appropriate health care to historically marginalized rural indigenous populations. To ameliorate tensions, maternal and infant health initiatives should involve local participation and recognition of complementary knowledge between the two systems linked to a design that understands and incorporates Andean ideological systems. In addition to recognizing that power inequities can play a role in health status.

4.7 Acknowledgements

I gratefully acknowledge the mothers and Peruvian public health staff who participated in the research sharing their time and knowledge. My deep appreciation also goes to my research assistants Benedicta and Valeria Velasquez-Yucra for their invaluable help in recruiting participants, data collection, and transcribing and translating interviews. I am also in debt to Dr. Susan Tanner and Dr. Virginia Nazarea for their comments that helped to improve this article. Finally, I would also like to acknowledge Dr. Kim Love-Myers, Xijue Tan, and Fei Liu from the Statistical Consulting Center at the University of Georgia for help with statistical analyses.
4.8 References


Cleland, J.G., Van Ginneken, J.K.

Cochrane, S.H., Leslie, J., and O’Hara, D.J.

Crandon-Malamud, L.

Desai, S. and Alva S.

Elo, I.T.

Frisancho, Robert A.

Frisancho, Robert A., and Baker, P.

Froemming, S.

Frost, M.B., Forste, R., and Haas, D.W.

Giovannini, P., Reyes-Garcia, V., Waldstein, A., and Heinrich, M.
Graham, M.A.  

Greenway, C.  

Hammer, Patricia  

INEI  
2008 Encuesta Demográfica y de salud familiar (ENDES).

Kleinman, A.  

Larme, A.C.  

Leatherman, T., Carey, J., Thomas, B.  

Leonard, W.  

Li, Ruowei, Kelley S. Scanlon, and Mary K. Serdula  

Marquis G.S. and Kolasa, K.M.  


Pelto, Gretel H.

Reynolds, W. R., Quevillon, R. P., Boyd, B., & Mackey, D.

Ruel, M., Habicht, J.P., Pinstrup-Andersen, P., and Grohn, Y.

Strand, J. A. and Peacock, R.

Tanner, S.

Toledo, V.M.

UNICEF

Victora, C.G., Adair, L., Fall, C., Hallal, P., Martorell, R., Richter, L, Singh Sachdev, H.,

Waller, M. A., Okamoto, S. K., Miles, B. W., and Hurdle, D. E.

Walters, K.L, Simoni, J.
WHO


Wiley, A. S.

CHAPTER 5

FEEDING BABIES IN THE ANDES: MATERNAL IDEOLOGIES AND PRACTICES IN THE CONTEXT OF PUBLIC HEALTH INTERVENTIONS\textsuperscript{12}

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Abstract

Understanding the relationship between health beliefs and behavior has long been a central question guiding research at the cross roads of public health and anthropology. It is argued that unpacking this relationship is key for health promotion. Central to this question is the assumption that indigenous peoples would not accept biomedical health care and medical practices until they learn and accept the belief system of biomedical medicine. In this article I examine the relationship between belief and behavior through a case study of how rural Quechua indigenous women living at high-altitude use traditional knowledge associated with infant feeding. I bring together qualitative and quantitative data on the breastfeeding and infant feeding beliefs and practices of 39 mother and infant pairs living in two rural, subsistence-oriented communities in the southern Peruvian Andes. I have three goals for this research 1) characterize infant feeding beliefs and behavior, 2) explore the connections between belief and practice related to infant feeding and care in the context of public health interventions, and 3) examine the effectiveness of public health campaigns in changing maternal behavior relating to infant feeding and care. I found 1) beliefs relating to infant feeding and care are embedded within Andean ethnomedical principles that value maternal and infant health and breastfeeding, and cater to infant cues 2) in the context of public health infant feeding messages mothers conceptualize infant feeding and health through an Andean ethnomedical lens but in practice follow some public health recommendations. This research shows that behavior change is not dependent upon ideological change. People may follow public health recommendations in order to maintain access to public health services, an important source of support. In addition, findings highlight that positive experiences with following
public health recommendations may feedback and inform ideologies regarding health and illness causation.

5.1 Research problem
Understanding the relationship between health beliefs, defined as ideas or thoughts held by individuals or communities, and behavior, defined as the observable actions of individuals, has long been a central question guiding research at the cross roads of public health and anthropology. It is argued that unpacking this relationship is key for disease prevention and management as well as health promotion (Rosal et al. 2014). Central to this question is the assumption that indigenous peoples would not accept biomedical health care and medical practices until they learn and accept the belief system of biomedical medicine (Pelto and Pelto 1997). However, the literature reflects that regardless of cultural beliefs, people access biomedical health care, use pharmaceutical medicine and other elements of medical practice without giving up on major aspects of their traditional explanations of illness. As demonstrated by multiple studies conducted in diverse places such as Asia (Byg et al. 2010), Africa (Etkin et al. 1990, Muela et al. 2002), and Latin America (Mathez-Stiefel et al. 2012, Giovannini et al. 2011) people utilize both indigenous and biomedical health care resources, sometimes simultaneously.

Shore (1996) developed the folk or cultural model to study the relationship between belief and behavior. This model suggests that behavior is influenced by cultural models, defined as loose, interpretive frameworks or cognitive categories used by people to understand the world and human behavior (Shore 1996). These models according to Shore (1996) maybe transmitted, between members of a group and can be applied to study the behaviors of individuals. A major assumption of this model is that members of
a group or society share cultural models, which are not fixed but malleable through an individual’s personal experiences. Cultural beliefs and behaviors may be shaped through verbal statements regarding health or health behaviors or by watching how people deal with illness, treatment, diagnoses, and the health care system. The folk model can help explain individual differences in behaviors within a subgroup. Since cultural models are malleable, individual experiences can either reinforce or challenge the current model (Shore 1996). In this chapter I engage this cultural model to examine the relationship between belief and behavior through a case study of how rural Quechua indigenous women living at high-altitude use traditional knowledge associated with infant feeding.

Worldwide, there is much variation in infant feeding practices associated with the timing or absence of breastfeeding and the introduction (timing and quality) of foods and liquids other than breast milk. The timing and quality of infant feeding are important because they are associated with adequate dietary intakes, protection against infection, and promote normal developmental maturation. The advantages of breastfeeding in relation to improved infant morbidity, mortality, and growth performance are well documented (Castillo et al. 1996, Jones 2003, Lutter Chaparro y Grummer-Strawn 2011). Breast milk is considered the ideal food for the infant as it contains the proper nutrients to support early growth and development and antibodies that protect the infant from common illnesses such as diarrhea and respiratory infections (Kramer and Kakuma 2012), as well as long term benefits including improved cognitive development (Victora et al. 2015) and reduced risk of cardiovascular disease (Parikh et al. 2009), type-2 diabetes (Bartz and Freemark 2012), and overweight/obesity later in life (Brion et al. 2011).
In addition, ample research has shown the connections between timing of introduction of supplementary foods and fluids, their nutritional quality, and the disease risks associated with preparation and feeding. The introduction of non-breast milk foods or liquids exposes infants to contamination (through the use of unclean baby bottles, or contaminated food) that otherwise is avoided by exclusive breastfeeding. At about six months of age however, breast milk alone is not sufficient to support the continued growth of infants. Thus, non-breast milk foods start to become a necessary component of an infant’s diet to sustain adequate growth beyond 6 months of age (Rowland et al. 1978, Katzenberg et al. 1996). Correspondingly, global infant feeding recommendations emphasize exclusive breastfeeding up until six months of life and the slow introduction of complementary foods and liquids starting at 6 months and continued breastfeeding through 2 years (WHO 2014). In addition, recommendations include the provision of protein rich foods particularly meat and other animal products (cheese, milk, and egg) at least once a day for infants 6 months and onwards. These practices are supported because they are associated with best child health outcomes (WHO 2009, Kramer and Kakuma 2012, Horta et al. 2007, Batrick and Reinhold 2010).

Researchers across a diverse array of contexts report that young child feeding practices rarely conform to global recommendations (Sellen 2001). Caregiver knowledge and attitudes as well as ecological and socioeconomic constraints have all been shown in different contexts to determine infant feeding practices (Popkin 1980, Gray 1996, Dettwyler 1986, Losch et al. 1995, Sellen 2001, Frost et al. 2005, Piperata and Gooden 2011). Specific factors associated with variation in infant feeding practices include work activity (Van Esterik and Greiner 1981), food availability (Sellen 2001), household
income, sanitary conditions (Gray 1996), and access to health care (Larme 1997). Cultural factors including health beliefs and practices, and food prescriptions and proscriptions are also likely to influence infant feeding patterns in a given population (Dettwyler 1986, Pelto 1987). Life constraints and cultural factors affecting infant feeding are of particular interest because they can influence child health and nutritional outcomes (Sellen 1996, Dettwyler 1988, Dettwyler and Fishman 1992, Winikoff et al. 1988, Raphael and David 1985, Ruel and Menon 2002).

Child under-nutrition is a major health concern in Peru where indigenous groups have disproportionately high rates of under-nutrition compared to other ethnic groups (Marini and Gragnolati 2006). For example, in the region of Cusco, Peru 45 percent of children under five are indigenous and of these, 32 percent are chronically malnourished (UNICEF 2011). The Peruvian Ministry of Health (MINSA) is addressing this issue by improving access to primary health care services in rural communities where most ethnic groups reside. Because breastfeeding initiation is virtually universal and often continues beyond 12 months, public health efforts in rural areas of Peru are more concerned with improving maternal and infant diets to reduce childhood stunting rates. Poor feeding practices are generally thought to be the main source of the ubiquitous growth faltering that characterizes most rural and indigenous populations (de Onasis et al. 2006, UNICEF 2009, Lutter et al. 2011).

Public health efforts to improve maternal and infant health in Peru, as well as internationally, are focused on the education and behavior change of mothers. Although the role of the father is often influential, the mother is generally recognized as the person responsible for childcare and is typically the most important participant in successful
efforts to improve child nutrition (Sear and Mace 2008). The role and practices of the mother reflect her interactions with her parents, in-laws, and other members of her circle who influence the mother’s breast and infant feeding practices. Maternal care-giving practices, which are seen as having direct links to nutrition, are frequency of foods provided for children, food selection, and food preparation practices which affect food safety and nutrient density (Pelto 1989).

Maternal attitudes toward, for example, children, food, and health, may shape the ways in which children are fed and cared for (Millard and Graham 1985, Dettwyler 1986). For example, Dettwyler’s (1986) research in Mali demonstrates that variation in nutritional status and growth is due to a confluence of cultural factors such as weaning as soon as the mother gets pregnant, and letting children themselves decide whether or not to eat. Sellen’s (1998) research among Datoga pastoralists living in northern Tanzania reports that many mothers discard colostrum in the post-partum period because it is believed to be too heavy for the infant’s stomach and would cause indigestion or general sickness. Instead mothers provide newborns with pre-lacteal feeds (water, sugar water) for a few days post-partum while they wait for their mature milk to come in.

Furthermore, many researchers across diverse settings, Moffat (2001) in Kathmandu, Scheper-Hughes (1993) in Brazil, Sellen (1998) in rural Tanzania, and Otsuka et al. (2008) in Japan, report that mothers begin supplementing breastfeeding with other milks (formula, cow’s milk) or discontinue breastfeeding altogether because of the belief that they do not have sufficient milk to satisfy their infants. These practices likely have adverse effects on child health and growth performance because they are associated with inadequate nutrient intakes and high infection rates.
In the Andes, Graham (2003) and Froemming (2006) have shown that Andean diets are guided by beliefs held by caregivers regarding the medicinal and nutritional properties of plants, animals, and seasons that give the mother strength to recuperate from childbirth and are good to eat during breastfeeding (Graham 2003, Froemming 2006). In addition, Marquis et al. (1997), Tapias (2006) and Wellins (1955) identified how a mother’s concepts of her infant’s physical growth and development shape and guide her infant feeding practices local perceptions of the body underlie specific infant feeding behaviors of mothers (Marquis et al. 1997, Tapias 2006, Theidon 2009). For example, mothers in Lima were more likely to breastfeed infants who suffered from linear growth stunting, diarrheal disease, and low intake of supplementary foods for a longer period of time than infants who did not suffer from these conditions (Marquis et al. 1997). Furthermore, in highland towns of Peru and Bolivia, mothers believe that their rage or sorrow is transmitted to their infants through breast milk (Tapias 2006, Theidon 2009). As a result, mothers under distress may temporarily alter their breastfeeding practices or stop breastfeeding altogether to avoid putting infants at risk (Tapias 2006).

In this chapter, I bring together qualitative and quantitative data on the breastfeeding and infant feeding beliefs and practices of 39 mother and infant pairs living in two rural, subsistence-oriented communities in the southern Peruvian Andes. I have three goals for this research 1) characterize infant feeding beliefs and behavior, 2) explore the connections between belief and practice related to infant feeding and care in the context of public health interventions, and 3) examine the effectiveness of public health campaigns in changing maternal behavior relating to infant feeding and care. This
research has implications for both the study of the relationship between belief and behavior and the implementation of public health interventions.

5.2 Research context

This research took place in Cuyo Grande and Chawaytire, two adjacent rural communities (Figure 5.1). The communities are set in the central Andean wet puna eco-region (montane grassland and shrub-land biome) (Olson et al. 2001) and are located between 3,500 and 4,500 meters above sea level (masl) in the District of Pisac, Region of Cusco, Peru. Cuyo Grande has approximately 950 inhabitants and Chawaytire has a smaller population of approximately 519 people (INEI 1993). A well-traveled dirt road runs through Cuyo Grande and Chawaytire, connecting them to the nearby town centers of Pisac and Paucartambo, and Cusco the regional capital.

The communities are representative of many communities in the area where small-scale farming is supplemented by a variety of cash generating activities. All residents speak Quechua as a primary language and many speak Spanish as a secondary language. The main staple crop people raise are potatoes (above 4,000masl) or corn (below 4,000 masl) and other crops including fava beans, tarwi (Lupinus mutabilis), peas, squash, olluco (Ullucus tuberosus), mashwa (Tropaeolum tuberosum), oca (Oxalis tuberosa), wheat, oat, barley, and quinoa. People raise a variety of animals including cuy (guinea pig), sheep, cattle, llama, alpaca, pig, chicken, horse, and donkey.

The homestead owned by the nuclear family is the basic social unit. Most houses are of adobe brick construction and some are of cement bricks. Few houses in the sample have electricity. Cooking takes place in earth ovens fueled by firewood (Figure 5.2).
Sanitation conditions are poor. Of the houses in the sample, 62% lack a latrine. All have access to running water via a faucet located in the household yard, however, community water is not consistently treated or monitored.

The two research communities are serviced by a Peruvian Ministry of Health Post located in Cuyo Grande where staff includes two nurses, a nurse assistant, and one nurse obstetrician. The health post provides basic health services including child growth and health monitoring, basic vaccinations and micronutrient supplements for children. Nutritional workshops are also provided to pregnant women and breastfeeding mothers. In addition, mothers with children five years old and younger in these communities receive monthly food rations from PRONAA (National program of food assistance). The rations include rice, cooking oil, canned sardines, dried beans, and an infant food mix of finely ground oatmeal, quinoa, *kiwicha*, and fava bean. Births, anemia testing, and illnesses requiring the attention of a biomedical physician are referred to a health center located in Pisac the district capital or a regional hospital in the city of Cusco depending on the need for surgery or specialists. The communities are classified as an area of poverty (where the average resident spends less than $2USD a day). Because of this designation community members receive comprehensive health insurance provided by the Peruvian Ministry of Health, which qualifies them to receive free services at these public health establishments.

Rural communities such as these have experienced recent changes in the way that childbirth and maternal and early childhood health are managed. Until recently, mothers could choose to manage birth and maternal and child health at the local health post in Cuyo Grande or at home where family, local midwives, and traditional healers (*paqos*) all
played an important role in mediating birth, infant feeding, and treating child illnesses.

As discussed in Chapter 3 new initiatives introduced in 2004 require mothers to give birth at public health facilities and monitor their own and their child’s health at public health facilities.

![Figure 5.1. Map of research communities. Map credit: Lucas Lopvet.](image)

### 5.3 Methods

Data collection took place between December 2011 and December 2013. To meet the research goals, I employed a mixed method approach (see Table 5.1). Qualitative data includes semi-structured interviews and participant observation to characterize mothers’ infant feeding beliefs and practices. Quantitative data include a structured questionnaire, focal observations of mother-infant pairs that focused on breast and feeding activities.
Quechua is the primary language of Cuyo Grande and Chawaytire residents. I worked with two bilingual Quechua-Spanish speakers from Cuyo Grande who assisted in all aspects of data collection as well as transcription and translation of semi-structured interviews. Below I discuss data collection methods in detail.

**Focal Observations**

At the beginning of data collection, I recruited all women who had infants 0 to 6 months of age, and incorporated new infants as they were born during the first year of data collection. I obtained a list of mother and infant pairs that would fit this sampling criteria from the Cuyo Grande health post. In addition, I cross-checked the completeness of this list with the field research assistant and other mothers as they were recruited. There were 46 mothers who met the criteria to participate in the focal observations. Of those 46 mothers 3 declined to participate, and 4 mothers dropped out from the study. Ultimately, I was able to recruit a total of 39 mother and infant pairs across the study period.

Mothers were visited once during each of 4 stages of breastfeeding: Stage 1 (infant is 1-3.9 months of age), Stage 2 (4-6.9 months), Stage 3 (7-9.9 months), and Stage 4 (10-12.9 months). Due to variation in the age of the infant at recruitment, not all mother-infant pairs were observed at each stage. During Stage 1, I observed 24 mother-infant pairs; Stage 2 included 28 pairs; Stage 3 include 36 pairs, and Stage 4 included 39 mother-infant pairs. Of the 39 mother-infant pairs, I observed 15 (36%) at all four stages, 46% at three stages, and 18% at two stages. This resulted in a total of 1476 observation hours.
Focal follows entailed accompanying mother and infant pairs on their daily activities for a period of 12 hours (6am to 6pm) on one day during each of the 4 stages\(^\text{13}\). Specifically, the focal observations consisted of recording spacing and duration of breastfeeding sessions as defined by Vitzthum (1994) a series of nursing episodes (suckling duration) spaced less than one minute apart. I recorded data on two aspects of breastfeeding structure: 1) the number of breastfeeding sessions per observation (6am to 6pm) and 2) the duration (minutes) of individual breastfeeding sessions per observation (6am to 6pm). I also recorded the spacing, duration, type, and quantity of foods or liquids consumed by the infant and/or mother. Although focal-follows may change behavior, I discussed these issues with the participants and encouraged them to go about their activities as naturally as possible. Despite of these limitations, mothers were generally welcoming and accepting of our presence.

*Semi-structured interviews*

I conducted semi-structured interviews with a subsample of the 39 mothers who participated in the focal follows (eight from each community for a total of 16 women). To select the subsample I considered a balanced distribution across age groups, income, and place of residence (Bernard 2006). I asked the 16 mothers to relate their experiences with infant feeding and child health. Specifically I asked mothers to list substances proscribed or prescribed in relation to breastfeeding, list illnesses associated with infant feeding and care, and answer questions regarding the timing and reasoning of infant feeding. The

\(^{13}\) Mothers and infants were always together or in relatively close contact during focal follow observations. On occasion the infant would be left asleep on a bed in another room or was carried out in the yard by a sibling while the mother was in another room.
results helped to construct a more complete ethnographic understanding to interpret the results of the survey (see below) and focal follows.

In addition, I conducted semi-structured interviews with public health personnel, I recruited an exhaustive sample of all nurses and nurse obstetricians who worked at the health post in Cuyo Grande and the health center in Pisac for a total of 15. I chose to interview nurses and nurse obstetricians at these local public health establishments because they provide mothers with advice regarding breast and infant feeding at prenatal check-ups, immediately after birth, and during monthly infant growth check-ups. During semi-structured interviews I asked public health personnel to tell me about the breastfeeding recommendations promoted at these local public health establishments and about their experiences with promoting these recommendations.

**Survey**

The 39 mothers who participated in the focal follows were also part of a survey conducted with a larger sample of mothers with children younger than 3 years. The survey was part of a study that explored maternal knowledge and infant growth. The survey included questions regarding the infant feeding practices of the youngest child including timing of initiation of breastfeeding, duration of exclusive breastfeeding, timing of introduction of non-breast milk substances, and duration of breastfeeding. I also collected information on child, parental, household, and community variables including the infant’s sex and age in days, maternal education (maximum school level attained), household size (total number of people living in the household at the time of the survey), number of children (total number of children for the mother), maternal income (self-
reported monthly cash income earned by the mother), paternal income (monthly cash income earned by the father reported by the mother), and community of residence.

Table 5.1. Characteristics of fieldwork, participants, and methods

<table>
<thead>
<tr>
<th>Participants</th>
<th>N</th>
<th>Communities</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sub-set of mothers with children 3 years or younger</td>
<td>16</td>
<td>Cuyo Grande</td>
<td>Semi-structured interviews</td>
</tr>
<tr>
<td>Nurse and nurse obstetricians</td>
<td>15</td>
<td>Cuyo Grande</td>
<td>Semi-structured interviews</td>
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<tr>
<td></td>
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<td>Pisac</td>
<td></td>
</tr>
<tr>
<td>Mother and infant pairs</td>
<td>39</td>
<td>Cuyo Grande</td>
<td>Focal follows Structured questionnaires</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Chawaytire</td>
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</tbody>
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5.4 Results

Daily diets of mothers and infants

As seen in other highland Peruvian communities (Baker 1976, Huenemann et al. 1955, Wellin 1955, Vitzthum 1988, Graham 1997, Larme 1998), mothers in Cuyo Grande and Chawaytire have primary responsibility for infant care and feeding (Figure 5.3). Mothers keep infants close by day and night and breastfeed whenever infants indicate their desire. It is rare to hear infants crying as most are fed before reaching that point. When a mother spends the day distant from home working on fields or grazing animals, she carries her infant with her. Aside from taking care of her children, mothers’ daily activities include cooking, washing dishes, feeding and grazing livestock, washing clothes, working on weavings (Figure 5.4) and handicrafts, and tending to agricultural fields.
Breastfeeding mothers and infants generally eat the diets of the household. This diet is composed of both store bought foods and locally produced foods (foods grown by the household). Locally produced foods include potato, corn, olluco, fava beans, quinoa, tarwi, oca, añu, oat, barley, wheat, squash, and peas. Store bought foods are purchased in local stores, a traveling weekly market that passes through Cuyo Grande, or from the market and stores in the town center of Pisac. These products include rice, pasta, wheat flour, sugar, bread, yogurt, canned or powdered milk, and fruits and vegetables that grow at lower altitudes.

There are generally two important meals and one less important meal. The morning meal is often important as it provides the fuel to spend the day away from home in far-off agricultural fields planting, harvesting, and tending to crops or grazing livestock in pastures. Correspondingly, breakfast usually entails two courses, a first course of mate (a hot and heavily sweetened herbal tea or liquid gruel) sometimes accompanied by bread, toasted corn, or wayk’o (steamed) potato. The first course is customarily followed by soup or occasionally a segundo (a “second course” dish consisting of a large serving of plain white rice, or potatoes accompanied by a vegetable or meat stew), a principal component of restaurant cuisine in Andean cities and towns. The midday meal may be eaten at home or in agricultural/pasture fields. If at home, lunch is similar to breakfast with a soup or segundo and a mate. If lunch occurs in fields it normally entails a qoqawi (snack) including some combination of steamed tubers, ch’uño (freeze dried potatoes), canchita (toasted maize), fava beans, mote (hominy), and fresh corn (Figure 5.5). The qoqawi is prepared during the morning meal and is wrapped in several layers of cloth to be kept warm until midday. It is easily transported to far-off work sites. The contents of
the late afternoon or evening meal depend on whether the midday meal consisted of *qoqawi* or a more hearty meal of soup or *segundo*. For example, if the midday meal consisted of *qoqawi* then the diner would consist of a soup or *segundo* and a mate. Conversely, if the midday meal entailed a more hearty meal eaten at home then the evening meal is lighter consisting of a mate and bread or boiled potatoes.

Snacking is also common in between meals, and may consist of fruits, bread, *canchita, mate, wayk'o* potato, toasted fava beans, crackers/cookies, yogurt, or sweet soda. Adults often chew coca leaves in between meals sometimes accompanied by *chicha de jora* (corn beer) which are believed to stave off hunger and provide the strength for hard work.

Meat (guinea pig, pork, lamb, chicken, or cow) is not consumed on a daily basis but rather it is added in small quantities to soups and *segundos* when available. It is consumed more frequently on special occasions such as birthdays, fiestas, and rituals. As one mother expressed about her family’s diet it is “not altogether without meat, but some meat.” For example, birthdays are occasions to celebrate by preparing a special meal of *chiriuchu* with *cuy* meat, rice tortilla, lamb meat, and fresh cheese (Figure 5.6). *Carnaval* season is another occasion to cook a special meal of *thimpu* (boiled), meat and vegetables.

The diets of breastfeeding mothers and infants in these communities as illustrated in Figure 5.7 are structured by daily activities, seasons (the agricultural cycle), and festivities. Diets are thus structured in part by what is available during different faces of the agricultural cycle, harvest, planting, and, pre-harvest. During harvest fresh produce are available and are incorporated into diets for example, in the form of olluco soup or
wayk’o (boiled corn, fava beans, potatoes, oca, or mashwa). Mothers with infants
spending harvesting eat *wat’ia*, fresh tubers cooked in an improvised earth oven prepared
and eaten in the fields. During planting mothers and infants typically eat a substantial
breakfast and prepare a qoqawi snack to eat in the fields while they work. During pre-
harvest or tending season there is less fresh produce available and mothers incorporate
more store bought foods into their diets. Pre-harvest time however, coincides with the
rainy season when fresh wild harvest greens and herbs are available such as *oqoruru*
(watercress), mint, and field mustard greens.
Figure 5.7. Agricultural and food cycle. The figure shows typical meals during harvest, planting, and tending times. The content of meals is influenced by what is available. Different produce are planted according to what grows in different altitudinal zones. In the high part of the community, near the surrounding mountain tops, potatoes, oca, and mashwa are grown, and in the lower part, below 3,500msl, corn, quinoa, and tarwi grow best. Different produce are obtained by either having fields in the three altitudinal zones, purchasing, or bartering. Figure credit: Lucas Lopvet.

**Ethnomedical concepts of infant feeding and care**

Interviews show that Andean concepts of health and illness guide maternal and infant feeding and care practices. However, mothers also consider recommendations from health professionals when making decisions about what, when, and how to feed their
infants. I first discuss general local patterns of infant and child feeding and then draw on two case studies focused on infant feeding and health care behaviors.

Maternal and infant diets are shaped by general Andean and ethnomedical concepts. As found in other Andean communities illness is represented by the core concepts of debilidad, meaning weakness or vulnerability (Graham 1997, Oths 1999, Hammer 2001), and illness prevention practices center on maintaining fuerza or strength and avoiding weakness (see Chapter 3). Postpartum and breastfeeding women, as well as infants are perceived as being particularly susceptible to illness. Sources of illness include harmful elements in the landscape, disruptions of flows in the body, and experiencing strong emotions (also described in Chapter 3). Below I briefly discuss each of these sources of illness and how they relate to observed maternal and infant feeding practices.

The belief that elements in the landscape are a source of illness is evident in care and feeding practices. Breasts are viewed as being open during breastfeeding and are thus susceptible to infiltration by harmful entities in the landscape. When mothers are exposed to elements in the landscape such as excessive heat or cold they express some breast milk before nursing following the belief that when breast milk accumulates between suckling bouts it is likely to “spoil” as a result of exposure to elements in the landscape. If the child drinks the exposed milk he or she may become ill with illnesses such as paq’o wayra (bad wind), and pujyo (spirit from water source). Mothers thus express some breast milk prior to nursing. In addition, mothers avoid exposing children to dangerous elements in the landscape by keeping them warmly clothed and swaddled in blankets (Figure 5.8) limiting exposure to heat, cold, and wind.
A perceived connection between food and health is also evident in maternal and infant diets and feeding practices. Post-partum mothers are prescribed *ch’uño* (freeze dried potatoes) soup with lamb meat for it is perceived as the best food to help the mother recover the strength needed to avoid illness and produce breast milk. The soup should also be *chumo* (free of salt) as salt is said to fester the wounds caused during childbirth and impedes their healing. Furthermore, to continue producing breast milk mothers incorporate foods that are seen as aiding in the production of breast milk. These foods include milky and watery substances perceived to help in the flow of breast milk such as *oqoruru* (watercress), cow’s milk, and the increased consumptions of soups. Correspondingly, eating foods that are “dry” or “cold” such as *segundos* (seen as “dry”), garlic, or cold water (seen as “cold”) is avoided because the perceived effect that they stop the production of breast milk.

In addition, mothers are careful of what they consume because it is believed to pass to the child through breast milk. Drinking cold water is always avoided by all but more so by breastfeeding mothers because it is believed to pass through the breast milk and can cause the infant to fall ill with cold. In addition, mothers are careful regarding the quantity of food fed to children as too much food or too little food (experiencing hunger) can cause illness.

The belief that illnesses are associated with experiencing emotions such as anger and sadness, is also reflected in maternal infant care practices. Mothers relate the practice of *hanuk’ay* (complete cessation of breastfeeding) when the child is around one and a half years old because if breastfeeding continues for longer the child is thought to grow up with a *corazon grande* (big heart) and develop an irritable personality. In addition,
mothers avoid breastfeeding when angry or sad so as not to pass on the anger or sadness to the infant through breast milk. Another salient example is the practice of on demand breastfeeding. Mothers keep infants close by day and night and breastfeed whenever infants indicate their desire. It is rare to hear infants crying as most are fed before reaching that point.

*Public health recommendations*

Interviews with Peruvian public health professionals who work in the area revealed that they are aware of these beliefs and practices. However, they are concerned with the high rates of child under-nutrition and see deficiencies in local diets and “poor” breastfeeding practices as the cause of child under-nutrition. Correspondingly, public health professionals are working hard to change certain practices through the provision of growth monitoring, advice, and educational workshops.

Specifically public health has identified the following three recommendations to reduce rates of infant and child under-nutrition. First, initiating breastfeeding as soon as possible after birth to take advantage of the nutritional and immunological benefits of colostrum and for establishing optimal breastfeeding practices. Since birth takes place at a public health facility, nurses and nurse obstetricians facilitate initiation of breastfeeding by providing the mother with information about breastfeeding techniques and recommend exclusive breastfeeding up until 6 months of age. Second, public health staff is also aware that many mothers begin feeding non-breast milk foods following infant cues, feeding their infants when they perceive that “they are ‘craving’ foods”, “they are ready for foods”, and “they are looking at foods.” In response, public health staff tell mothers at every opportunity that “infants do not crave foods before six months”, “their stomachs
are not ready to receive foods”, and “infants who are fed before six months tend to get sick more often with diarrhea and respiratory infections.” Third, the quality and quantity of local diets is seen by public health staff as being deficient in vitamins and proteins. Correspondingly, the Ministry of Health provides multi-vitamin and iron supplements on a monthly basis to all mothers with infants 6 months and older as well as food rations. In addition, public health staff encourage mothers to feed infants 6 months and above with more frequency and incorporating foods from animal sources into daily diets. Specific recommendations are that infants 6-8 months old should receive foods 2-3 times a day, infants between 9-11 months old should receive foods 3-4 times daily, infants between 9-11 months should receive foods 3-4 times a day, and infants at 12 months should receive foods 3-4 times daily with 1-2 additional nutritious snacks 1-2 times per day.

Case-studies

*Gabriela and baby girl Rosa*  

Gabriela is 22 years old. She was born in Cuyo Grande and has lived there all her life. She is catholic. Her house is well positioned in Cuyo Grande close to the town center where the health post, primary school, and church are located. The one-room house has no latrine, however it does have electricity and a *huerto* (garden), where she grows some vegetables, flowers, and herbal plants. Gabriela speaks good Spanish and completed 11 years of formal schooling.

Gabriela and her husband have five agricultural fields where they raise potato, corn, fava beans, quinoa, *tarwi*, alfalfa, and green peas. They also raise animals including

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14 I use pseudonyms instead of real names to protect the privacy of research participants.
cow, pig, \textit{cuy}, and chicken. Gabriela works making handicrafts and her husband works a variety of cash earning jobs including construction, working on other’s fields, harvesting in the lowlands, making adobe and handicrafts, and as a porter on the Inca trail.

Gabriela gave birth to her first and only child Rosa at home with the assistance of her mother, who also lives in Cuyo Grande in a separate household. She relates that the birth came on so quickly that she did not have time to make it to the health post in Cuyo Grande. She was fined $80USD by the Ministry of Public Health because she did not comply with the ordinance requiring all mothers to give birth at the health center in Pisac. She paid $24USD and her husband worked-off the rest of the fine by helping with the construction of a new health post in Cuyo Grande. A few days after birth, the nurses at the Cuyo Grande health post insisted that Gabriela be taken to the regional hospital in Cusco out of concern that she may be retaining the placenta. She was kept at the hospital for 3 days. She relates the experience of Rosa’s birth makes her a bit weary of public health services. In some ways she says “they are good because they tell you to eat egg, cheese, and vegetables, but in other ways like how they [public health staff] fine us and make us go to the hospital it is not good.”

Gabriela initiated breastfeeding a few hours after birth, she tells that “you have to wait some time, then you breastfeed, at the moment [the baby] doesn’t want to breastfeed. You breastfeed when [the baby] cries, I waited until the baby cried, about an hour or an hour and a half.” She began introducing baby Rosa to foods other than breast milk before 6 months, “before [6 months] I had her taste broths and mates, at six months she was eating well.” She plans to continue breastfeeding until Rosa is 2 years old.
Gabriela relates that Rosa got sick when she was 6 months old because she craved some food:

“When I ate she [the baby] would look at me and reach [for the food]. I didn’t imagine that she would have a craving, when they crave [and it is not satisfied] then they [babies] get sick, people say, [babies] get sick, they have diarrhea, they say [babies] lose weight, and they also vomit…. You cure that with cheese that has been toasted in the fire, only with that [the illness] will pass. [with the illness the baby] has yellow diarrhea all the time. My baby got sick once [with this illness] when she was 6 months old. I ate at a restaurant in Cusco and there I did not have her try the food, from that she got sick. I think it was gelatin, thinking that it would make her sick, but the next day she was very sick. She was sick for four days. My mom said it must be from craving and we had her eat the cheese, just with that [she was well again], we did not take her to the health post. At the health post they would have given her medicine but they don’t know about that.”

Gabriela also relates her experience with breastfeeding while angry or sad:

“I have to take out the first part of the breast milk to breastfeed. They say [people in the community] in the first part of breast milk has the anger (colera) that you have and if you breastfeed just like that [without taking some out] then it will pass on to the baby. One time I breastfed when I was angry and my stomach was hurting and [my baby] got sick for almost a whole month. I cured her giving her herbal mates. Several times when I’m worried my baby also worries, she sighs.”

Victoria and baby boy Carlos

Victoria is 36 years old. She was born in Chawaytire and moved to Cuyo Grande when she started a family with her husband. She is Evangelical. Her house is well positioned in Cuyo Grande close to the health post, primary school, and church. She shares a three-room house (kitchen, bedroom, and storage room) with her husband and 4 children. The house has no latrine, but has electricity. Victoria speaks good Spanish and completed 3 years of formal schooling.

Victoria and her husband have nine agricultural fields where they grow potato, corn, olluco, fava beans, barley, whet, quinoa, tarwi, alfalfa, and green peas. They also raise animals including cow, chicken, and cuy. She works making handicrafts and raising
animals for sale. Her husband works a variety of cash earning jobs including construction, as a porter on the Incan trail, and making adobe and handicrafts.

Victoria has four children, two boys and two girls. Her two oldest children were born at home, the third at the health post in Cuyo Grande, and her fourth baby Carlos was born at the health center in Pisac. Victoria initiated breastfeeding a few hours after birth encouraged by the nurses at the health center. She began introducing baby Carlos to foods other than breast milk at 6 months. She plans to continue breastfeeding until Carlos is 1 year and 6 months old. Victoria’s father-in-law is a well-respected pago (traditional healer) in Cuyo Grande. She is favorable towards the public health services.

Victoria relates that when Carlos was about six months old he was sick for two weeks and became “flaco total” (very skinny). He had a fever, cough and a hard time breathing. He didn’t want to eat or breastfeed. Victoria brought Carlos to the health post where a nurse advised her to buy a jarabe (syrup) from the pharmacy in Pisac and told her to stop tightly swaddling Carlos so that he could breathe easier. From then on she stopped swaddling Carlos. The jarabe was effective and soon after Victoria began to introduce baby Carlos to foods and liquids other than breast milk. She began with cow’s milk. She and her husband stated that they did not start foods earlier because “the nurses say [to start] only after six months.” Victoria tells that baby boy Carlos would look at the foods they were eating before he was six months old. They would hold him looking another direction while they ate but he would “twist around and search for our food.” Still they did not feed him before six months.

Also when baby Carlos was about six months old Victoria experienced engorgement in her breasts. Her breasts were swollen and hurting she had a difficult time
breastfeeding and she attributed the symptoms to *pujyo*. She had gone to a *pujyo* (an underground water source), which “must have been inhabited by spirits.” The spirits went into her breasts. She went to her mother-in-law who applied a homemade poultice to hear breast of medicinal plants. Victoria relates “the *pujyo* left my breasts but one of them dried up to this day. I feed [baby Carlos] with the other breast and it is enough but I still give him the other milk [cow’s milk] to make sure.”

Gabriela and Victoria’s infant feeding and care practices are similar and different in interesting ways. Gabriela’s breastfeeding and infant care practices clearly reflect Andean ethnomedical concepts of illness and care. She began feeding Rosa small amounts of foods prior to six months following her mother’s advice. In addition, Gabriela’s experience with public health shaped her attitude towards accessing public health services. She states “I used to take her to the health post when she got sick but they told me you only make her sick so I stopped taking her.” However, she attends monthly growth and monitoring appointments with Rosa at the local health post. On the other hand, Victoria is more favorable toward accessing public health services. She is diligent about following public health recommendations giving her son no foods or liquids other than breast milk before six months. She did so even when she felt that her child was craving foods prior to six months. In addition, her bout with *pujyo* (the illness that entered her breast) shows that while she follows public health recommendations she draws on Andean ethnomedical concepts when interpreting and treating an illness that affects her capacity to breastfeed.

*Infant feeding practices by the numbers*
I now turn to a descriptive and numerical summary of infant feeding practices derived from the focal observations with the 39 mother and infant pairs. This shows that breastfeeding is highly valued, and that the majority of mothers follow public health infant feeding recommendations.

In Table 5.2, I summarize key breast and infant feeding practices including the timing of initiation of breastfeeding, initiation of foods or liquids other than breast milk, and breastfeeding cessation. Breast milk is highly valued “as a good food for infants” and all infants in the study were breastfed. Lactation was initiated within a few hours of birth by 92% of the women. Three women initiated breastfeeding a few days after birth because of complications. Breastfeeding occurs on demand (whenever the infant cries) as observations indicated that infants are consistently offered the breast upon crying. Breastfeeding continued for all through the first year of life, and is of medium duration with an average of 21 months (SD ±5.96) to hanukay (complete cessation of breastfeeding). The main reasons for stopping breastfeeding include: the belief that continued breastfeeding would negatively affect the child’s personality, the mother became pregnant, or the child cues such as is eating well, is healthy, and is walking well. A variety of methods are used to accomplish termination including: giving special foods that the child would like such as bread, sweets, and putting a bitter substance like the fruit of the ñuñuk’a plant (Figure 5.9), lemon, or ground tarwi (a bitter leguminous grain of Andean origin), on the breasts, or leaving the child with another relative (father, grandmother, mother-in-law) for a few days.

Twenty-eight (72%) mothers stated that the introduction of foods and liquids other than breast milk should occur at six months. The most common reason given for
starting foods at six months was “that is when the nurses say it is best.” Another reason for introducing foods and liquids other than breast milk at six months included: “that is when my baby started looking at [craving] foods.” The remaining 28% of mothers stated that food should be introduced prior to six months. Reasons for introducing foods and liquids prior to six months include: that is “when [the baby] starts craving and looking at the foods we eat” or “so that [the baby] will eat well at six months”, or “my mother said it is best to start when the baby wants”.

Table 5.2. Infant feeding practices

<table>
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<tr>
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<th>n=39</th>
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</thead>
<tbody>
<tr>
<td><strong>Initiation (%)</strong></td>
<td></td>
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<tr>
<td>Hours after birth (%)</td>
<td>92%</td>
</tr>
<tr>
<td>Days (2-5) after birth (%)</td>
<td>8%</td>
</tr>
<tr>
<td><strong>Introduction of food/liquids (months)</strong></td>
<td>5.64 ±0.98</td>
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<tr>
<td>(mean ± sd)</td>
<td></td>
</tr>
<tr>
<td>6 months (n/%)</td>
<td>28/72%</td>
</tr>
<tr>
<td>Before 6 months (n/%)</td>
<td>11/28%</td>
</tr>
<tr>
<td><strong>Cessation of breastfeeding (months)</strong></td>
<td>20.95 ±5.96</td>
</tr>
<tr>
<td>(mean ± sd)</td>
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</table>

Mothers stated that there are no special foods for infants and that they first receive the soft foods from the family pot such as *mate* (liquid gruels or herbal infusions), and broths with soft pieces of vegetables and tubers. Observations verified that infants were eating the same foods as mothers with the exception of *papilla* (an infant flour mix made from oatmeal, quinoa, *kiwicha*, and fava bean) that is part of monthly rations given to
mothers of young children at the local health post. I observed one instance of *papilla* being fed to an infant during focal follows. Coca leaves and *chicha* (corn beer) were substances that only mothers were observed consuming. Aside from these limited instances observations confirmed that there are no special foods for infants, but rather they are fed what they can eat from the family pot.

In table 5.3 I report data on the number of breastfeeding sessions, their average duration, and the frequency of food/liquids other than breast milk observed (6am-6pm) for each of the 4 stages of observations. The average number of breastfeeding session is 12.42, 11.71, 9.42, and 9.2 for rounds 1-4 respectively. The average session duration is 6.13, 5.03, 4.49, and 3.9 minutes in each for the four rounds respectively. The mean food frequencies for rounds 2-4 are 0.75, 2.08, and 3.86 respectively. There was no food/liquid other than breast milk observed between 1 and 3 months. Average number of breastfeeding sessions as well as duration decrease as infants get older.

Results show that some mothers begin feeding non-breast milk foods to infants during ages 4-6 months (Stage 2), but all infants between the ages of 10-12 months are receiving some other foods. At stage 2, I observed 10 (of 28) infants being fed foods or liquids other than breast milk. At stage 3, I observed 32 (of 36) infants receive foods/liquids. Finally, at stage 4 all infants received at least one feeding of foods or liquids other than breast milk. The frequency of non-breast milk feeding is generally consistent with public health recommendations.
Table 5.3. Number and duration of breastfeeding sessions and frequency of foods. Observations were completed in 12 hour block of time (6am to 6pm)

<table>
<thead>
<tr>
<th>Mother / Infant Pairs #</th>
<th>Age months 1-3</th>
<th>Age months 4-6</th>
<th>Age months 7-9</th>
<th>Age months 10-12</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td># Sessions</td>
<td>Average duration (min)</td>
<td># Feedings</td>
<td># Sessions</td>
</tr>
<tr>
<td>n = 39</td>
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<tr>
<td>1</td>
<td>8</td>
<td>8.3 ± 3.2</td>
<td>0</td>
<td>12</td>
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<tr>
<td>5</td>
<td>11</td>
<td>6.3 ± 0</td>
<td>9</td>
<td>7.89 ± 0*</td>
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<tr>
<td>6</td>
<td>12</td>
<td>6.5 ± 0*</td>
<td>11</td>
<td>5.45 ± 0</td>
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<td>7</td>
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<tr>
<td>8</td>
<td>7</td>
<td>6.29 ± 0</td>
<td>11</td>
<td>5.45 ± 0</td>
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<td>9</td>
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<td>12</td>
<td>18</td>
<td>6.61 ± 1</td>
<td>10</td>
<td>4.8 ± 1*</td>
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<td>13</td>
<td>23</td>
<td>4 ± 0*</td>
<td>9</td>
<td>4 ± 0*</td>
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<tr>
<td>14</td>
<td>11</td>
<td>8.91 ± 0</td>
<td>9</td>
<td>2.89 ± 3</td>
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<td>15</td>
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<td>16</td>
<td>15</td>
<td>6.13 ± 0</td>
<td>15</td>
<td>3.27 ± 2</td>
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<tr>
<td>17</td>
<td>8</td>
<td>8.5 ± 0</td>
<td>9</td>
<td>5.11 ± 2</td>
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<tr>
<td>19</td>
<td>11</td>
<td>5.82 ± 0</td>
<td>9</td>
<td>4.78 ± 2</td>
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<tr>
<td>20</td>
<td>12</td>
<td>4.42 ± 0</td>
<td>10</td>
<td>5.9 ± 0</td>
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<td>21</td>
<td>9</td>
<td>4.22 ± 3</td>
<td>13</td>
<td>2.85 ± 3</td>
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<tr>
<td>25</td>
<td>14</td>
<td>5.57 ± 0</td>
<td>13</td>
<td>4.23 ± 0</td>
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<tr>
<td>31</td>
<td>10</td>
<td>2.9 ± 2</td>
<td>13</td>
<td>2.83 ± 5</td>
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<td>39</td>
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</tr>
<tr>
<td>Mean</td>
<td>12.42</td>
<td>6.13 ± 4</td>
<td>n/a</td>
<td>11.71</td>
</tr>
<tr>
<td>SD</td>
<td>±4.23</td>
<td>±1.57 ± n/a</td>
<td>n/a</td>
<td>±3.39</td>
</tr>
<tr>
<td>Range</td>
<td>7-23</td>
<td>3.82-9.17</td>
<td>n/a</td>
<td>7-20</td>
</tr>
</tbody>
</table>

* observed when less than 6 months old
In the sample of observed infants, 69% (25 of 36) received the recommended 2-3 feedings of non-breast milk foods between 7-9 months. By 10-12 months, 85% of observed infants (30 of 35) received at least the recommended 3-4 feedings per day of supplementary foods (Table 5.4). In addition, 39% of infants observed between 7-9 months old received at least 1 protein rich food per day, and 57% of infants between 10-12 months old received at least 1 protein rich food per day.

<table>
<thead>
<tr>
<th>Age group, months</th>
<th>Received recommended # of feedings/day</th>
<th>Received recommended # of protein rich foods/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>7-9 n = 36</td>
<td>25/69%</td>
<td>14/39%</td>
</tr>
<tr>
<td>10-12 n = 35</td>
<td>30/85%</td>
<td>20/57%</td>
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5.5 Discussion and conclusion

In this study, I investigated the ideological and practical characteristics of infant feeding in two Quechua rural indigenous communities. My discussion centers on three key findings. First, beliefs relating to infant feeding and care are embedded within Andean ethnomedical principles that value maternal and infant health and breastfeeding, and cater to infant cues. Second, in the context of public health infant feeding messages mothers conceptualize infant feeding and health through an Andean ethnomedical lens but in practice follow some public health recommendations. This finding departs from the assumption that in order to change behavior one has to change ideology. Third, findings
highlight the importance of personal experience in mediating the dialectical relationship between belief and behavior.

First, by focusing on breastfeeding infants (age 1 through 12 months) I was able to explore maternal ideologies and practices surrounding breastfeeding in addition to the period when supplementation with foods and liquids other than breast milk begins. This time period is important because in virtually all populations in which growth is constrained. The first year of an infant’s life is considered the period of greatest vulnerability (WHO 2009). Through this research I found that maternal beliefs associated with infant feeding and care are related to Andean ethnomedical principles that value maternal and infant health, breastfeeding, and cater to infant cues. Graham (1997) in her study on food allocation to children two years old and above in an Andean community found similar themes including that dietary practices are linked to local concepts of health, human development, and the body. She argues that this ideological basis for child feeding benefits rather than disadvantages children (Graham 1997). Specifically, Graham (1997) found that mothers perceived childhood as a vulnerable phase of life. Mothers correspondingly nurture their children, monitoring child development and food is seen as essential to health and well-being (Graham 1997). Infant feeding practices in these communities reflect these same themes of infant vulnerability and catering to infant cues. For example, mothers avoid letting their children experience strong emotions by practicing on demand breastfeeding. This research expands our knowledge of child feeding in the Andes during critical period of the life cycle.

The second finding is that in the context of public health infant feeding messages mothers retain Andean ethnomedical explanatory models (beliefs), but, for the most part
in practice follow public health recommendations. In accord with public health recommendations, all mothers breastfed their children beyond the first 12 months of life, the majority of mothers initiated breastfeeding as soon as possible after birth, and exclusively breastfeed until six months of life. In addition, the majority of mothers in the sample follow recommendations regarding the number of foods infant should receive during supplementation (i.e. 2-3 foods when the infant is 6-8 months old etc.). However, less mothers provided the recommended amount of protein from animal sources once a day to infants seven months and above. As illustrated by the two case studies while mothers follow public health recommendations in practice they continue to conceptualize infant feeding and health through the lens of Andean ethnomedicine. Victoria’s is a case in point as she followed the public health recommendation to exclusively breastfeed her infant even though she believed that he craved foods before six months.

All mothers in these communities attend monthly infant growth and wellness check-ups. Monthly food rations provided by the government are contingent on mother’s compliance with these wellness check-ups. Not attending growth monitoring and complying with infant feeding recommendations would likely result in limiting their access to public health resources. Thus, mothers comply with infant growth and wellness check-ups to ensure access to these resources even if they do not espouse biomedical beliefs regarding the importance of infant growth and health monitoring. These findings show that mothers in these communities recognize public health services as an important resource and source of support. In addition, this research breaks from the notion that people do not accept biomedical health care and medical practices until they have accepted the major part of the cultural belief system of biomedicine (Paul 1955).
The third finding confirms an aspect of Shore’s (1996) cultural model that an individual’s experience influences their behavior. The case studies of Gabriela and Victoria demonstrate that maternal experiences with public health services shape their attitudes towards accessing care and following infant feeding recommendations. Gabriela, a mother who has had some difficult experiences with public health, is more reluctant to seek care from public health services. She did not follow the recommendation of exclusive breastfeeding up until six months, but instead followed her mother’s advice to begin earlier so that at six months her infant would eat well. Victoria on the other hand had a positive attitude toward public health and followed the recommendation of exclusive breastfeeding up until six months even though it was counter to her belief. This finding confirms an assumption of the folk or cultural model applied to the study of the relationship between knowledge and behavior, which is an individual’s experience can modify cultural models and therefore influence an individuals’ behavior.

Finally, Victoria’s case is also significant in illustrating a dialectical relationship between belief and behavior. Keesing (1975) and Holy and Stuchlik (1981) argue that past and present ideas shape present and future actions. In turn present actions can lead to future ideas, and that past actions can be reinterpreted by current ideas. In this sense, beliefs constitute a set of options which can be applied into action and, in turn, the results of actions are interpreted and inform beliefs. Victoria’s case illustrates this point. She believed that her infant would get sick if she did not satisfy his food cravings, but in practice she disregarded this belief and waited until six months to introduce him to foods and liquids other than breast milk complying with public health recommendations. It was Victoria’s experience that her son did not get sick from an unsatisfied food craving as she
believed. This experience led Victoria to question her idea that ignoring a food craving would lead to illness.

In summary, this research shows that behavior change is not dependent upon ideological change. People may follow public health recommendations in order to maintain access to public health services, an important source of support. In addition, findings highlight that positive experiences with following public health recommendations may feedback and inform ideologies regarding health and illness causation. Public health efforts are having an effect on infant feeding and health seeking practices in these communities. These research findings hold important implications for the implementation of public health interventions. Future research should examine the relationship between compliance with public health recommendations and infants’ health.
5.6 References

Baker, T.S.

Bastien, Joseph W.

Basu, A. M., and Stephenson, R.

Barrera, A.

Batrick, M., and Reinhold, A.

Bartz, Sarah and Freemark, M.

Brion, M.A., et al.

Cai, Shirong, et al.

Caldwell, J., and McDonald, P.

Canazas, V. A.
Castillo, C., Atalah, E., Riumalló, J., Castro, R.

Cleland, J. G., and Van Ginneken, J. K.

Cochrane, S. H., Leslie, J., and O'Hara, D. J.

de Onis, M., Onyango, A. W., Borghi, E., Garza, C., & Yang, H.

Dettwyler, Katherine

Dettwyler, K. A., and Fishman C.

Gray, S.J.

Graham, M.A.

Greenway, C.
Emmett, P.M., and Jones, L.R.

Frost, M. B., Forste, R., and Haas, D. W.

Hammer, P.

Horta, B.L. et al


Jones, G., Steketee, R., Black, R.E., Bhutta, Z., Morris, S.

Kramer, M.S. and Kakuma R.
2012 Optimal duration of exclusive breastfeeding. The Cochrane Library.

Larme, Anne C.

Leonard, W.

Marquis, G. S., Habicht, J., Lanata, C. F., Black, R. E., and Rasmussen, K. M.
Moffat, T.  

Graham M.A.  

Larme, A.C.  

Losch, M., Dungy, C.I, Russell, D., and Dusdieker, L.B.  

Marini A. M. Gragnolati  

Millard, A.V., and Graham, M.A.  
1985  Principles that guide weaning in rural Mexico. Ecology of food and nutrition 16:171-188.

Oths, K.S.  

Otsuka, K., Dennis, C., Tatsuoka, H., and Jimba, M.  


Paul, Benjamin D.  
1955  Health, culture, and community. Russell Sage Foundation.

Pelto, G.H.  
Pelto, P. J., and Pelto, G. H.  

Piperata, Barbara  

Popkin, Barry M.  

Rosal, M., Want, M., and Bodenlos, J.  

Ruel, M.T., Menon, P.  

Schepfer-Hughes, N.  

Sear, R., and Mace, R.  

Sellen, Daniel W.  

Tapias, M.  

Theidon, Kimberly  
Lutter, Chessa K., Daelmans, B.M., de Onis, M., Kothari, M.T., Ruel, M.T., Arimond, M., Deitchler, M., Dewey, K.G., Blößner, M., and Borghi, E.

UNICEF

UNICEF

Van Esterik, P. and Greiner T.

Victora, C.G. et al.

Victora, C.B., Horta, B.L., Loreta de Mola, C., Quevado, L., Tavares Pinheiro, R., gigante, D., Concalves, H., and Barros, F.

Vitzthum, V. J.

Wellin, E.

World Bank
WHO


Winikoff, B., Castle, M.A. Laukaran V.H.
Figure 5.2. Picture of typical kitchen.
Figure 5.3. Picture of mother feeding infant.
Figure 5.4. Picture of mother weaving.
Figure 5.5. Picture of *qogawi* with fresh fava bean, potatoes, and corn.

Figure 5.6. Picture of birthday meal.
Figure 5.8 Picture of mother and swaddled baby.
Figure 5.9. Picture of Źuńuq'a plant with berries.
6.1 Concluding summary

In this dissertation I examined the relationship between culture (knowledge) and infant health in the context of public health initiatives. My goals were to examine 1) how Andean women understand and practice infant feeding and care in the context of both traditional knowledge and current public health messages, 2) the relationship between a mother’s knowledge about breastfeeding and infant growth, and 3) the links between maternal knowledge about breastfeeding and actual infant feeding practices. I relied on a combination of ethnoecological and biocultural approaches to achieve these goals.

It is well established that breastfeeding is the best form of nutrition for the healthy growth and development of infants with additional implications for maternal health. However, there is a great deal of variation in human populations in breastfeeding behavior linked to sociocultural and economic factors. For example, economic and political conditions influence how women perceive breastfeeding (Schepa-Hughes 1992), as do women’s workloads (Van Esterik and Greiner 1981), and cultural beliefs about the nature of infant growth and food (Dettwyler 1988). Social support from family, friends, and health care professionals also play a critical role (Anderson 2005). Although researchers have focused on these domains, limited research examines the influence of culture on infant feeding and growth outcomes.
High-altitude environments present important opportunities to investigate concordances and discordances between different sources of information for maternal-child health. This is because infant growth at high altitude is especially stressed due to ecological conditions, such as hypoxia, economic variability, and access to health care (Leatherman et al. 1995, Wiley 2004). Additionally, there is a large body of literature establishing the potential value of some traditional practices. Among Tsimane of Bolivia and Ariaal people of Kenya, researchers found a positive association between maternal traditional knowledge and child health (McDade et al. 2007, Miller 2011). In the Andes, research has shown that Quechua women are knowledgeable about the medicinal and nutritional properties of plants, animals, and minerals that are good to eat during breastfeeding (Graham 2003, Froemming 2006). My research proposes that some cultural adaptations developed by Quechua peoples over millennia may mitigate the challenges of infant growth at high-altitudes.

In addition, the Peruvian Ministry of Public Health has recently institutionalized infant and women’s healthcare by monitoring child growth and holding workshops focused on promoting the breastfeeding recommendation of the World Health Organization. In this context, I examine concordances and discordances between traditional and public health breastfeeding recommendations and how they related to infant growth. I define traditional knowledge as the cumulative body of breastfeeding knowledge of a culture that has been handed down through generations, that is socially shared by women of the same generation, and that has been adapted to a particular place (Toledo 2002). I define biomedicine as a “global, hegemonic medical system based on
western scientific principals which includes the use of pharmaceuticals, healthcare professionals and biomedical facilities” (Giovannini et al. 2011).

In this concluding Chapter I summarize and review the results of individual chapters. I then present my overall conclusions the theoretical and practical implications of this dissertation. In addition, I address some of the research limitations. Finally, I conclude with a discussion of future research directions.

6.2 Summary of chapter results

In Chapter 3, I asked whether traditional recommendations are being displaced or expanded by the promotion of public health recommendations. I described differences and similarities between traditional and public health messages relating to infant feeding and care. I also examined the resilience of traditional knowledge relating to infant feeding and care. In my results I identified similarities and differences between maternal and public health conceptualizations of infant feeding and health. Similarities included the valuation of breast milk as a food and medicine, recognition that there is a connection between current and future health, and the synergistic connections between maternal and infant diets and health. Differences included that the recommendation of older mothers and public health recommendation are based on differing conceptualization or ideologies regarding health and nutrition. Public health messages emphasize the nutritional and immunological importance of breast milk and the importance of balanced diets to meet the energetic and nutritional requirements for infants and breastfeeding mothers (including the proper balance of micro and macro nutrients). Older mothers’ recommendations, on the other hand, are guided by general ethnomedical beliefs associated with the workings of the body and health.
In Chapter 3, I also examined persistence and change of traditional recommendations in the context of public health campaigns. Results indicate that the most persistent features of traditional recommendations are the explanatory models or ideologies associated with infant feeding. I found that currently breastfeeding mothers incorporate what is foreign and fit it into their way of seeing the world consistent with what some Andean scholars found (Allen 1988, Grillo-Fernandez (1998). I also found that the most malleable components of traditional recommendations are the health seeking options, as mothers are employing the multiple venues available to them including use of home remedies, traditional healers, and public health to address infant health. This indicates that the multiple systems of care available in these communities complement each other."

The overall conclusion of Chapter 3 is that maternal knowledge of infant feeding and care is extremely resilient. It is capable of incorporating foreign ideas and reorganizing knowledge to make use of multiple venues of care, yet it also preserves a distinct Andean conceptualization of infant feeding. This is important because it shows that mothers are incorporating new (public health) infant feeding knowledge expanding their resources for infant care. This also indicates that the two systems are complementary as exemplified by the multiple use of traditional and biomedical health systems. These results are consistent with research that finds the persistence of traditional knowledge in a variety of settings (Etkin et al. 1990, Byg et al. 2010, Giovannini et al. 2011).

In Chapter 4, I explored the importance of cultural knowledge as a form of individual protective factor against stress. Specifically, I examined the association
between maternal traditional or public health knowledge and measures of infant size (length and weight). In my model I considered both cultural and socio-economic factors as well as individual characteristics as important determinants of infant growth. I discuss four key findings of this research. First, maternal traditional knowledge associated with infant feeding is embedded within an Andean theory of illness causation. Second, mothers who generally held high knowledge of traditional recommendations also held high knowledge of public health knowledge of infant feeding and care. Third, there was a positive association between a mother’s completed years of education and her infant’s weight. Fourth, a mother’s traditional knowledge of infant feeding and care had a negative association with her infant’s length, and a mother’s public health knowledge of infant feeding and care was positively correlated with her infant’s length. The negative association between maternal traditional knowledge and infant growth diverges from previous findings that found a positive association between maternal ethnomedical knowledge and child health. These findings may point to either deficiencies in local diets that are affecting growth outcomes or/and the devaluation of traditional knowledge may be having an effect on health status. Abel (2007) contends when cultural capital is repressed or not acknowledged, health disparities in the group tend to rise.

In Chapter 5, I examined the connections between maternal knowledge or conceptualization of infant feeding and care and observed patterns of their infant feeding and care practices. I combined qualitative interviews and participant observation with systematic observations of daily maternal behavior. I found that mothers conceptualize infant feeding and care through an Andean ethnomedical lens but, in practice, follow a combination of public health and traditional recommendations. This finding breaks from
the assumption that in order to change behavior one has to change ideology or cognition. The results hold implications for public health campaigns that aim to change maternal behaviors associated with infant feeding. The findings show that public health campaigns are working and mothers are changing their behaviors in relation to infant feeding. They are open to dual use of multiple health care sectors keeping as many options of support as possible. These findings also show that mothers in these communities recognize public health services as an important resource and source of support.

6.3 Theoretical significance of results


Ethnoecologists have recently engaged with a resilience framework to exploring this question asking: What are the situations that promote the retention or the accommodation of knowledge? And in what instances is knowledge lost? (Garcia-Reyes 2001, Zent 2001). A key finding of this dissertation research addresses these questions in finding that that maternal knowledge associated with infant feeding and care is part of a highly resilient ethnomedical system.

This study also contributes to understanding links between culture and health at the level of the individual. In this study I focused specifically on maternal traditional
knowledge and public health knowledge relating to breast and infant feeding held by Quechua women. I tested individuals with respect to this knowledge and was able explore said knowledge as an attribute of individual mothers that is predictive of child growth in a multivariate framework. The findings link maternal knowledge and infant growth outcomes. However, these finding diverged from other research that found positive associations between maternal ethnomedical knowledge and child health outcomes. I expected given that Quechua peoples hold traditional knowledge developed over millennia that this knowledge would act as a source of resilience or buffer to the many stresses affecting infant growth in this high altitude environment. These findings indicate instead a negative association between traditional knowledge and infant growth in this setting. It is clear that further research should consider the meanings and implications of culture within varying contexts particularly the role of social and cultural marginalization. It may be that as Abel (2007) contends that when cultural capital is repressed or not acknowledged, health disparities in the group tend to rise (Abel 2007).

Combining an ethnoecological and biocultural approach proved fruitful. I was able to explore the contributions of traditional knowledge to infant growth. An ethnoecological approach allowed for an in-depth understanding of how mothers conceptualize infant feeding and care. A biocultural approach was relevant to exploring maternal behaviors and infant growth outcomes. Careful ethnomedical documenting and observation were essential in integrating theory and practice. By merging them, I explored the links between culture and health at the level of the individual, addressing a central question in ethnoecological inquiry.
Finally, the research findings challenge a long held assumption regarding the relationship between cognition and behavior. That is, the habits and beliefs of people in a given population or community are not separate items but are part of a cultural system (Paul 1955). A notion tied to the assumption that people in “traditional” communities would not accept biomedical health care and medical practices until they learned an accepted the major part of the cultural belief system of biomedical medicine (Pelto and Pelto 1997). My research findings challenge these assumptions showing that perhaps belief and behavior are not so tightly linked. This research shows that in these communities mothers may hold certain ideologies but can choose to not put them into practice.

This research also has methodological implications. It demonstrates the usefulness of combining quantitative and qualitative methods to examine the relationship of beliefs and practices (Vitzthum 1994, Graham 1997, Piperata 2011). The combination of these data helps to explain, for example, the relationship between the descriptive analysis of infant diets (frequency of breastfeeding session, duration, frequency feeding etc.) and beliefs and attitudes that guide these practices.

6.4 Practical significance of results

This research holds implications for improving public health services. Findings suggest tensions between traditional and public health systems including differences in conceptualizations surrounding breastfeeding and infant food and the imposition of public health care services through coercive means. These tensions are likely compounding the problem of providing culturally appropriate health care to historically
marginalized rural indigenous populations. To ameliorate tensions, improving maternal and infant health initiatives should involve local participation and recognition of complementary knowledge between the two systems linked to a design that understands and incorporates Andean ideological systems. In addition to recognizing that power inequities can play a role in health status.

6.5 Limitations of the research

Important limitations of this study include possible omitted variables. It is possible that the variables that I have considered are associated with other unmeasured characteristics of children, mothers, or the household. I have attempted to account for this problem by controlling for child, mother, and household characteristics, but I cannot discount that omitted variables bias the results. Furthermore, in this research I do not investigate the pathways linking maternal knowledge and infant growth. This would require more nuanced observational techniques investigating infant feeding practices.

In addition, I recognize limitations of the research associated with the focal follow method. These limitations include 1) limiting observer bias in relation to the consumption of food and liquids and 2) it is possible that mothers prepared more elaborate meals because of my presence or otherwise modified their behavior. For example, it is possible that mothers may have refrained from giving complementary foods to infants who were six months or younger because the public health staff they interact with recommend exclusive breastfeeding infants up to six months. I discussed these issues with the participants and encouraged mothers to go about their activities as naturally as possible.
6.6 Avenues for future research

This dissertation research provides an initial understanding how mothers conceptualize infant feeding and care in Quechua highland communities in the southern Andes. The findings can be used as a contextual basis for understanding future research on traditional knowledge and health and the ongoing examination of persistence and change of traditional knowledge. The study also provides empirical data on the relationship between a mother’s knowledge and infant growth outcomes. Future research can contribute to our understanding the contributions of traditional knowledge to infant health outcomes by examining not only infant growth but other indicators of health and nutritional status. In addition, the analysis could be repeated in other Andean communities or in other populations. Finally, an important avenue for future research is the relationship between different sources of social support available to mothers and caregivers and child health outcomes.
6.7 References

Abel, T.

Bourdieu, P.

Byg, A., Salick, J., and Law, W.

Calvet-Mir, L., Reyes-Garcia, V., Tanner, S., and TAPS study team

Cosminsky, M. and Scrimshaw, S.

Dettwyler, Katherine

Etkin N.L., Ross P.J., and Muazzamu I.

Froemming, S.

Giovanni, P., Reyes-Garcia, V., Waldstein, A., and Heinrich, M.
Graham, M.A.

Healey, S.

Hoa, N. P., Chuc, N.T.K., and Thorson, A.

Mathez-Stiefel, S., Vandebroek, I., and Rist, S.

2007  Ethnobotanical knowledge is associated with indices of child health in the Bolivian Amazon. PNAS 104(15):6134-6139.

Miller, Elizabeth

Muela, S.H., Muela Ribera, J., Mushi, A.K., and Tanner, M.
2002  Medical syncretism with reference to malaria in a Tanzanian community. Social Science and Medicine 55(3):403-413.

Paul, Benjamin D.
1955  Health, culture, and community. Russell Sage Foundation.

Pelto, P. J., and Pelto, G. H.

Piperata, Barbara
Reyes-Garcia, V.  

Scheper-Hughes, N.  

Tanner, S.  

Vandebroek, I., Van Damme, P., Van Puyvelde, L., Arrazola, S., and De Kimpe, N.  

Van Esterik, P. and Greiner T.  

Vitzthum, Virginia J.  

Zent, Standford  
APPENDICES

APPENDIX A
List of questions for semi-structured interviews with older mothers:

1. How old are you?
2. Where were you born?
   (If in community) Did you always live here?
   (If born somewhere else) How long did you live there and when did you move to community?
3. What should you eat while breastfeeding?
4. Should you eat more, less or the same while breastfeeding?
5. Are there foods, drinks or other things that are especially helpful in producing breast milk? (Ask what else until she says nothing else)
   (If she mentions *hak’achu*) Who did you learn from and how did you obtain the *haka’chu*?
   (if she does not mention the *hak’achu*) Have you heard about the *hak’achu*? for producing more milk?
6. Are there foods, mates or other things that you should not consume while you are breastfeeding? (ask what else until she says nothing else)
7. Should you drink water while you are breastfeeding? Why or why not?
8. Are there foods, drinks or other things that dry-up breast milk? (Ask what else until she says nothing else)
9. Where does breast milk come from? How is it formed in the body?
10. When should you start breastfeeding? (Prompt… immediately after birth, some hours after, a few days after. Why should you start then?)
11. Should one feed the baby colostrum? Why or why not?
12. When should you start feeding the baby foods or drinks? Why at that time?
13. What foods or drinks should you feed to babies first? (ask what else until she says nothing else)
14. How long should you breastfeed? When should you stop breastfeeding? Why?
15. How do you stop breastfeeding? Is it easy, difficult?
16. What can you do so that the milk dries-up when you stop breastfeeding?
17. If you are sick can you pass on the illness to your infant through breast milk?
18. If the mother is sad or mad should she continue to breastfeed? Why or why not?
19. What illnesses affect babies? (ask what else until she says nothing else)
   What causes x illness? (ask about each illness mentioned)
   How do you know whether a baby has X illness? (Ask about each illness mentioned)
   How do you cure x illness? (Ask about each illness mentioned)
20. How many children do you have?
21. How many boys? How many girls?
22. How many live now?
   (If some died) Why did he/she die?
23. Where were your children born? (Prompt at home, at the health post, at the health center in Pisac, hospital in Cusco, somewhere else?)
24. Who assisted you during birth? How did they assist you?
25. How long did you rest after birth?
26. What did you eat after birth?
27. Were your children born big, medium, or small size?
28. What was your diet like when you were pregnant?
   (If she ate little) Were your children small?
   (if she ate a lot) Were your children big?
   Does the amount of food that you eat while you are pregnant matter?
29. What do you think about the services at the health post and health center?
30. Do you think it is good to give birth at the health center in Pisac?
31. Are mothers now a days raising their children in the same way as mothers before, your mother or grandmother? Why or why not?
APPENDIX B

Survey

Date: __________
Surveyor/s: ______________

OBSERVATIONS
(To be completed by surveyor)

1. Home is in:
   - Lower Cuyo Grande
   - Middle Cuyo Grande
   - Perqa
   - Main Chawaytire
   - High Chawaytire
   - Uyucati

2. House has a latrine/bathroom

3. House has an improved stove

4. House has a separate kitchen

5. House has electricity

6. House has a garden

7. Number of rooms in the house ______

8. Interviewee speaks Spanish (none, some, good)
Tapukuykuna wawakuna ñuñuymanta, wawakuna mikhuna qoymanta, wawakunaq qhali kayninmanta, ñuñaq mamakunaq kawsayninmanta ima.
The survey has a series of question about breastfeeding, foods during breastfeeding and the health of babies as well as some general questions.

Kallaryninanchispaq imaymanata tapusaykichis.
To begin we ask some general questions.

9. *Hayk’aq paqariranki.* When were you born? ________________
   ¿What is the date of birth of your youngest child? ________________
   (Ask to see the ID of the youngest child)
   Sex of youngest child ______

10. *Maypin paqariranki.* Where were you born? ________________

11. *Hoq hawapichu tiyaranki.* Have you lived somewhere else?
   Yes_____   No_____

11.a (If, yes) *Maypinpas tiyaranki.* Where else did you live? (Repeat until she says nowhere else)
   __________________________________________________________

11.b *Hayk’a unaymi chay comunidadpi tiyaranki.* How long did you live there? (Repeat for each place mentioned)
   __________________________________________________________

12. *Hayk’an wawaykikuna.* How many children do you have? _____

13. *Hayk’an wawaykikuna wañupuranku.* Did any of your children pass away?_____

14. *Hayk’an qhari wawayki.* How many boys? _______

15. *Hayk’an warmi wawayki.* How many girls? _______

15.a *Hayk’a unaychayoqnan sulk’a wawayki.* How old is your youngest child? _______

15.b *Kuraq wawaykiri.* How old is your oldest child? _______

16. *Kayk’a wawayki wasiykipi paqariramunku.* How many of your children were born at home? _____
17. Kayk’a wawayki posta Cuyo Grandepi paqariramunku. How many of your children were born at the post in Cuyo Grande? ______

18. Kayk’a wawayki centro de salud Pisaqpi paqariramunku. How many of your children were born at the health center in Pisac? ______

19. Kayk’a wawayki hospital cusco pi paqariramunku. How many of your children were born at the hospital in Cusco? ______

20. Kayk’a wawayki hoq ladopi paqariramunku. How many of your children were born somewhere else? ______

21. Ima religionpin ininki. What is your religion?

   None
   Catholic
   Evangelical
   Other: _______________
22. *Ima gradokaman escuelaman riranki*. What school level have you completed?

First grade of primary
Second grade of primary
Third grade of primary
Fourth grade of primary
Fifth grade of primary
Sixth grade of primary
First grade of secondary
Second grade of secondary
Third grade of secondary
Fourth grade of secondary
Fifth grade of secondary
Sixth grade of secondary
Other: __________________

23. *Hayk’a runakuna wasiykipi tiyanchis, wawakunantin llaykichis*. How many people live in your house including infants and children?

________________
24. *Imakunatan tarpunki, llank’anki.* What do you cultivate?
(Ask about every item on list and then ask what else until she says nothing else)

- Doesn’t cultivate
- Potato
- Maiz
- Lisas
- Fava bean
- Oca
- Ańu (Mashwa)
- Oat
- Barley
- Wheat
- Quinoa
- Tarwi
- Alfalfa
- Grass
- Peas

Other: ________________________________
25. *Ima uywakunatan uywanki.* What animals do you raise?
(Ask about every item on the list and then ask what else until she says nothing else)

Does not raise animals

Cow

Sheep

Goat

Chicken

Guinea pig

Pig

Duck

Other: ________________________________

26. *Imapin llank’anki.* What do you work? (Ask about every item on the list and then ask what else until she says nothing else) *Hoqtari*

Does not work

Crops for sale

Raise animals for sale

Handicraft

Weaving

Store

On other’s fields

Other: ________________________________
27. *Sapa killa hayk'atan gananki.* What is your monthly income?

None

Less than 25 soles

between 25 to 50 soles

between 50 to 100 soles

between 100 to 200 soles

between 200 to 300 soles

More than 300 soles

28. *Imapin qosayki llank'an.* What does your husband work?

(Ask about every item on the list and then ask what else until she says nothing else) *Hoqtari*

Doesn’t work

Crops for sale

Raises animals for sale

Construction

Porterer on the Inca trail

Informal minning

Harvest in the lowlands

Making adobe

Handicraft

Taxi driver

Weaving

Public transport driver

Other: ____________________________
28. a. If her husband is not around *Hayk’a unayña qosay riranki*. How long ago did your husband leave? ________

29. *Sapa killa hayk’atan qosayki ganan*. What is your husband’s monthly income?

No income

Between 25 to 50 soles

Between 50 to 100 soles

Between 100 to 200 soles

Between 200 to 300 soles

More than 300 soles

30. *Hayk’an chakraykichis haqay wichaypi*. How many fields do you have in the higher part? _____

31. *Hayk’an chakraykichis chawpi*. How many fields do you have in the middle part? _____

32. *Hayk’an chakraykichis haqay uraypi*. How many field do you have in the lower part? _____

33. *Hayk’an chakraykichis yunkapi*. How many fields do you have in the lowlands? _____

Kay tapuykunaqa imaynatan ůnuñushanki otaq ůnuñuranki, imaynatan wawata uywashanki.
The following questions are about how you are breastfeeding or breastfed and how you are raising your youngest child

34. *Imachatan qayniwnchay sulk’a wawaykiman tutmantapi mikhuchiranki*. What did you feed your youngest child yesterday morning? (ask what else until she says nothing else)

__________________________________________________________
35. *Imachatan qayniwnchay sulk’a wawaykiman docenta p’unchaypi mikhuchiranki.* What did you feed your youngest child yesterday at midday? (ask what else until she says nothing else)

36. *Imachatan qayniwnchay sulk’a wawaykiman tardenpi mikhuchiranki.* What did you feed your youngest child yesterday afternoon? (ask what else until she says nothing else)

37. *Hoqtari, imachatan qayniwnchay sulk’a wawaykiman mikhuchiranki.* What else did you feed your youngest child yesterday? (ask what else until she says nothing else)

38. *Sulk’a wawaykita waltashankichu.* Did you swaddle or are you swaddling youru youngest child?
   Yes _____    No _____

38.a (If yes) *Kayk’a unaymi sulk’a wawaykita waltaranki.* For how long did you or will swaddle your child? ______________

39. *Hayk’aqmi sulk’a wawaykita ūnuuyta qallariranki.* When did you first breastfeed your infant?

   *Onqorukuspaykipacha* (Immediately after birth)

   *Wakin horakunatachu suyaranki ūnuñunaykipaq* (some hours after birth)

   *Huk p’unchaytachu suyaranki ūnuñunaykipaq* (1 day after birth)

   *Ishkay p’unchaytachu suyaranki ūnuñunaykipaq* (2 days after birth)

   Other: ______________
40. *Hayk’aqkama sulk’a wawaykita ńuńunki.* Until when did you or will you breastfeed your youngest child?

- Never breastfed
- 1 to 4 months
- 4 to 6 months
- 6 to 8 months
- 8 to 10 months
- 10 to 12 months
- 1 year and 6 months
- 2 years
- More than 2 years
- Other: _______________
41. *Hayk’aqmi qallarinki matechakunata otaq mikhunachakunata qoyta sulk’a wawaykiman.* When did you start to give liquids or foods to your youngest child?

From birth

Before 6 months

At 6 months

Other: ______________

Kay tapuykunaqa hawallaqtapi wawanchis ñuñusqanchismanta uywasqanchismanta íma

The following questions are about traditional practices related to child feeding and care.

42. *Yuyankichu… Ajota mikhuqtinchis ñuñunchis aswanta yapakamun*
   Do you think that… While we are breastfeeding eating garlic increases breast milk
      Yes___  No___

43. *Yuyankichu… Hak’achu caldota mikhuqtinchis ñuñunchis aswanta yapakamun*
   Do you think that… While we are breastfeeding Andean flicker bird soup increases breast milk
      Yes___  No___

44. *Yuyankichu… Caldokunata mikhuqtinchis ñuñunchis aswanta yapakamun*
   Do you think that… While we are breastfeeding soups increase breast milk
      Yes___  No___

45. *Yuyankichu… Cebollata mikhuqtinchis ñuñunchis aswanta yapakamun*
   Do you think that… While we are breastfeeding eating onion increases breast milk
      Yes___  No___

46. *Yuyankichu… K’airata mikhuqtinchis ñuñunchis aswanta yapakamun*
   Do you think that… While we are breastfeeding eating frog soup increases breast milk
      Yes___  No___

47. *Yuyankichu… Raqachata mikhuqtinchis ñuñunchis aswanta yapakamun*
   Do you think that… While we are breastfeeding eating *raqacha* increases breast milk
      Yes___  No___
48. **Yuyankichu…. ogorururta mikhuqtinchis ŷuñunchis aswanta yapakamun**
   Do you think that… While we are breastfeeding eating watercress increases breast milk
   Yes___ No___

49. **Yuyankichu… Quinuwata mikhuqtinchis ŷuñunchis aswanta yapakamun**
   Do you think that… While we are breastfeeding eating quinoa increases breast milk
   Yes___ No___

50. **Yuyankichu… Uywija sorgan mikhuqtinchis ŷuñunchis aswanta yapakamun**
   Do you think that… While we are breastfeeding eating sheep lung increases breast milk
   Yes___ No___

51. **Yuyankichu… Segundokunallata mikhuqtinchis ŷuñunchis aswanta yapakamun**
   Do you think that… While we are breastfeeding eating only main courses (segundos) increases breast milk
   Yes___ No___

52. **Yuyankichu… Wawa ŷuñuq warmikunaqa rocotota mikhunanchis q’oñi kasqan rayku**
   Do you think that… While we are breastfeeding one should eat roqoto (hot pepper) because it is ‘hot’
   Yes___ No___

53. **Yuyankichu… Qolla hisp’aywan maqchikuqtinchis ŷuñunchis ch’akipun**
   Do you think that… rubbing yourself with urine helps to dry up breast milk
   Yes___ No___

54. **Yuyankichu… Hinojo mateta uqyaqtinchis ŷuñunchis ch’akipun**
   Do you think that… Drinking fennel tea helps to dry-up breast milk
   Yes___ No___

55. **Yuyankichu… Chiri unuwan maqchikuqtinchis ŷuñunchis ch’akipun**
   Do you think that… Rubbing yourself with cold water helps to dry-up breast milk
   Yes___ No___

56. **Yuyankichu… Waka lecheta uqyaqtinchis ŷuñunchis ch’akipun**
   Do you think that… Drinking cow’s milk helps to dry-up milk
   Yes___ No___
57. Yuyankichu… Onqokusqanchis qhepata kachi mikhunata mikhuna
Do you think that… After birth one must eat foods with salt
Yes___ No___

58. Yuyankichu… Onqokusqanchis qhepata uwija aichata mikhuna
Do you think that… After birth one must eat lamb meat
Yes___ No___

59. Yuyankichu… Onqokusqanchis qhepata wawa waqanantaraq suyananchis ñuñunanchispaq
Do you think that… After birth you must wait until the baby cries to breastfeed
Yes___ No___

60. Yuyankichu… Qolla wawanchis punuqtin maykamapas puñunallanta suyananchis
Do you think that… After birth you must let the baby sleep the time that it wants
Yes___ No___

61. Yuyankichu… Onqokusqanchis qhepata wawachista armarunanchis chaymantataq walt’arunanchis
Do you think that… After birth you must bathe and swaddle the baby
Yes___ No___

62. Yuyankichu… Wawamanga soqta killachan ñawpaqtan matechakunata mikhunachakunata mallichinanchis allinta mikhunanpaq
Do you think that… Before 6 months you should have the baby taste liquids and foods so that it learns to eat well
Yes___ No___

63. Yuyankichu… Wawakunaqa manaraq paqarinmushaspa mamaq yawarnintan ch’ungan
Do you think that… The baby feeds from the mother’s blood before birth
Yes___ No___

64. Yuyankichu… Mamaq ñuñunqa hampin sorq’aninchispaq
Do you think that… Mother’s milk is medicine for lungs
Yes___ No___

65. Yuyankichu… Mamaq ñuñunqa hampin costadopaq
Do you think that… Mother’s milk is medicine for costado
Yes___ No___
66. Yuyankichu… Mamaq ñuñunqa hampin uhupaq
   Do you think that… Mother’s milk is medicine for cough
   Yes___ No___

67. Yuyankichu… Mamaq ñuñunqa hampin soqa wayrapaq
   Do you think that… Mother’s milk is a ‘hot’ medicine for bad wind
   Yes___ No___

68. Yuyankichu… Mamaq ñuñunqa hampin q’echa onqoypaq
   Do you think that… Mother’s milk is medicine for indigestion
   Yes___ No___

69. Yuyankichu… Mamaq ñuñuqa hampin ñawi onqoypaq
   Do you think that… Mother’s milk is medicine for eye infection
   Yes___ No___

70. Yuyankichu… Mamaq ñuñunqa hampin k’iripaq
   Do you think that… Mother’s milk is medicine for wounds
   Yes___ No___

71. Yuyankichu… Mamaq ñuñunqa frescon hampi ruphapakuypaq
   Do you think that… Mother’s milk is ‘cold’ medicine for fever
   Yes___ No___

72. Yuyanki… Mamaq ñuñunqa yawarmanta paqarimun
   Do you think that… Mother’s milk comes from our blood
   Yes___ No___

73. Yuyankichu… Mamaq ñuñun k’iriqkuqtinqa soq’an pujllomanta kanman
   Do you think that… If the mother has wounds on her breast she could have
   soqa pujllo
   Yes___ No___

74. Yuyankichu… Wawanchista Waltana kalpasapa kananpaq
   Do you think that… One should swaddle the baby so that it is strong
   Yes___ No___

75. Yuyankichu… Wawanchista llaqisqa ñuñuqtinchisqa onqorunmanmi
   Do you think that… If we breastfeed while sad the baby can get sick
   Yes___ No___

76. Yuyankichu… Sinchi ruphaypi kaqtinchis ñuñunchis q’oñirapun chayta
   ñuñuqtinchis wawanchis onqorunman
   Do you think that… If you sit long in the sun breast milk heats up and can
   make the baby sick
   Yes___ No___
77. Yuyankichu… Onqoq kaqtinchis wawanchista ūnūullasunmanmi
Do you think that… If we are pregnant we can continue to breastfeed our baby
Yes___ No___

78. Yuyankichu… Wawanchista hanuk’ananchis wata soqta killayaq mana hinaqa loco kanman
Do you think that… We should stop breastfeeding at a year and a half because otherwise they could be loco (crazy)
Yes___ No___

79. Yuyankichu… Wawa kisilluta hina q’echaqtinqa ūnūup’ayoqmi kashanman
Do you think that… If the baby has cheese-like diarrhea it is because it has ūnūup’a
Yes___ No___

80. Yuyankichu… Mamá mana allin mikhunata mikhuqtinqa wawachaq wiksannin nanan
Do you think that… If the mother eats something bad the baby can get colico
Yes___ No___

81. Yuyankichu… Onqoq kaqtinchis manan wawata ūnūunachu ayaurijwaq gorunman
Do you think that… If we breastfeed while pregnant the baby can get ayaurijwa
Yes___ No___

Kay tapuykunaqa enfermenakunaq nisqanman hina wawanchis ūnūuymananta uywaymanta ima
The following questions are about the recommendations of the nurses relating to breastfeeding and child care.

82. Yuyankichu… Ongorukuqtykipacha wawanchista ūnūuna
515Do you think that… One should breast immediately after birth
Yes___ No___

83. Yuyankichu… Sankhuqa ancha allinmi wawanchis ūnūunan mana onqonanpaq
Do you think that… Colostrum is good so that the baby does not get sick
Yes___ No___

84. Yuyankichu… Sankhuqa allin mikhuna wawakipaq
Do you think that… Colostrum is good food for the baby
Yes___ No___
85. Yuyankichu… Wawa mana allinta ūnūnuta ch’unqaqtinqa wiksachanmi punkirunman
   Do you think that… If the baby does not suckle the breast well it can get gases
   Yes___ No___

86. Yuyankichu… Wawa mana allinta ch’unqaqtinqa mamaq ūnūnunmi k’irirukunman
   Do you think that… If the baby does not suckle the breast well it can cause the mother to have wounds
   Yes___ No___

87. Yuyankichu… Wawa ūnūushaqtingqa manan puñunanchu
   Do you think that… You should not let the baby fall asleep while breastfeeding
   Yes___ No___

88. Yuyankichu… Chunkapisqayq minutosllapas sapanka ūnūnuta ūnūnuna
   Do you think that… We should breastfeed for at least 15 minutes on each breast
   Yes___ No___

89. Yuyankichu… Qolla wawa ishkay horas puñuqtinqa riqcharichinanchismi ūnūnunapaq
   Do you think that… If the newborn baby sleeps for more than two hours we should wake the baby to breastfeed
   Yes___ No___

90. Yuyankichu… Wawaqa ūnūunan sapanka ūnūunchis ch’usaqyanankaman
   Do you think that… The baby must drink from each breast until it is empty
   Yes___ No___

91. Yuyankichu… Sichus llaqisqa kanchis chayqá ūnūunchis pisillarapun
   Do you think that… If you are tense or worried you produce less milk
   Yes___ No___

92. Yuyankichu… Soqta killachankaman wawaqa mamaq ūnūullanta ūnūunan
   Do you think that… Until 6 months the baby should only receive mother’s milk
   Yes___ No___

93. Yuyankichu… Soqta killachankaman wawaq wiksachanqa manaraq mikhunata chaskinanchu
   Do you think that… Before 6 months the baby’s stomach is not ready to receive foods
   Yes___ No___
94. Yuyankichu... Soqta killachanta manaraq huntashaspa mikhuqtinga chhulli onqoy hap'irun
Do you think that... Babies that eat before 6 months get sick more often with colds
   Yes____ No____

95. Yuyankichu... Qolla wawaman hoq lechekunatapas qonan manan \n\n\nnuñullawanka saksanchu
Do you think that... You have to feed new born babies other milks because they do not get full from mother’s milk alone
   Yes____ No____

96. Yuyankichu... Waq lechekunaqa k’iskirapunmi wawakunata
Do you think that... Other milk can cause babies to have constipation
   Yes____ No____

97. Yuyankichu... Waq lechekunan aswan alimento mamaq \n\nnuñunmantaqa
Do you think that... Other milks that are not mother’s milk are more nutritious
   Yes____ No____

98. Yuyankichu... Wawa nuñuq warmiqa manan wiksayakunmanchu \n\ntawakillakama
Do you think that... Breastfeeding is a form of contraceptive until 4 months
   Yes____ No____

99. Yuyankichu... Mamaq \n\nnuñunmi aswan allingqa umayoq kananpaq \n\nwawanchispaq
Do you think that... Mother’s milk is the best thing for the baby’s intelligence
   Yes____ No____

100. Yuyankichu... Biberonqa wawaq wiksachantan punkichin
Do you think that... Babies that drink from baby bottles have more gas
   Yes____ No____

101. Yuyankichu... Mamaq \n\nnuñullanmi qhallichallata wawata uywan soxtan \n\nkillankama
Do you think that... Mother’s milk is the only thing that a baby needs for the first 6 months
   Yes____ No____

102. Yuyankichu... Pusaq killachanmantaqa alimentu mamaq \n\nnuñullanmi
Do you think that... After 8 months mother’s milk alone is enough nourishment for babies
   Yes____ No____
103. *Yuyankichu…* Postapi vitaminakuna qomusanqaku astawan mikhunayachin erqechakunata
   Do you think that… The vitamins given at the health post help to increase baby’s appetite
   Yes___  No___

104. *Yuyankichu…* Pusaq killachankumanta wawakunaqa huk p’unchaypi pisqa kutita mikhunan
   Do you think that… Starting at 8 months babies should eat 5 times a day
   Yes___  No___

105. *Yuyankichu…* Wawakunaqa pusaq killachankumanta runtuta, aychata kinsa kutita huk p’unchaypi mikhunan
   Do you think that… Starting at 8 months babies should eat animal products 3 times a day
   Yes___  No___

106. *Yuyankichu…* Igado aswan allin alimentoqa wawakunapaq kanman
   Do you think that… Liver is good nourishment for babies
   Yes___  No___

107. *Yuyankichu…* Arrozllata allin alimento mikhunan wawakunapaq
   Do you think that… Rice alone is good nourishment for babies
   Yes___  No___

108. *Yuyankichu…* Ñuñuq warmikunaqa huk p’unchaypi pisqan kutitan mikhunanchis
   Do you think that… While we are breastfeeding we should eat five times per day
   Yes___  No___

109. *Yuyankichu…* Papalla allin hunt’asqa alimentoyoq
   Do you think that… Potato alone is a complete meal
   Yes___  No___

110. *Yuyankichu…* Wawa aka k’iskiwan mana onqonanpaq arrozllata mikhuchina
    Do you think that… To prevent constipation the baby should eat only rice
    Yes___  No___

111. *Yuyankichu…* Wawa aka k’iskiwan mana onqonanpqa unuta uqyanan
    Do you think that… To prevent constipation the baby needs to drink water
    Yes___  No___
112.  *Yuyankichu… Wawata ŋũũunspanchisqa wiksayoq warmikunamanta aswanta mikhunanchis*
Do you think that… While we are breastfeeding we should eat more than when we were pregnant
Yes___  No___

113.  *Yuyankichu… Askha ŋũũuyoq kanapaq pisi kaldota upinanchis ichaqa askha segundota mikhunanchis*
Do you think that… To have more milk one should eat less broths and more *segundos* (main course dishes)
Yes___  No___

114.  *Yuyankichu… Wawata ishay watanyoŋkama ŋũũuyqa allinmi ichaqa wawa allinta mikhunan*
Do you think that… It is fine to continue breastfeeding after two years as long as the baby is eating well
Yes___  No___

115.  *Yuyankichu… Wawata ŋũũusqanchis pisillata aychata runtuta mikhunanchis*
Do you think that… While we are breastfeeding we should eat only a little meat, a little egg
Yes___  No___

116.  *Yuyankichu… Wawa waltayqa mana allinchu makichan chakichanmi chiriyaṃpun*
Do you think that… We should not swaddle a baby because its hands and feet are cold
Yes___  No___

117.  *Yuyankichu… Wawataqa waltanan allinta wiŋanpaq*
Do you think that… If we swaddle the baby grows well
Yes___  No___

118.  *Yuyankichu… Erqecha mana samayta atiqtingqa usqaylla postaman apana*
Do you think that… If a baby is having difficulties breathing one should bring the baby immediately to the post
Yes___  No___

119.  *Yuyankichu… Wawakunaqa huk kutillatan aychata, kesota runtuta mikhunan semanapi*
Do you think that… Babies should only eat animal products like meat, cheese, egg once a week
Yes___  No___
120.  **Yuyankichu… Wawa ruphapakuywan qaqtinqa hampi gorakunallawanga qhaliyanman**
Do you think that… If the baby has a fever the baby will get well with a medicinal plant treatment
Yes____  No____

121.  **Yuyankichu… Manan puñushaspaqa ñuñunachu wawan lechewan heq’eparunman**
Do you think that… If we breastfeed while the baby is sleeping the baby can suffocate
Yes____  No____

**Kay tapukuykunata llaqikuykunamantan takunanchispaq**
To finish, the following questions are about our worries

122.  **Imatan yuyanki… Wawaykikunaq educacionnin …. Do you thing that… your child’s education is…?**

<table>
<thead>
<tr>
<th>1. Good</th>
<th>2. More or less good</th>
<th>3. Not good</th>
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123.  **Imatan yuynaki… Posta medicapi imaynatan llank’anku … Do you think that… the medical attention you receive at the post in Cuyo Grande is…?**

<table>
<thead>
<tr>
<th>1. Good</th>
<th>2. More or less good</th>
<th>3. Not good</th>
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</table>

124.  **Yuyankichu familayki otaq khumpaykikuna yanapanasykipaq… Do you think that… if you needed it your family or friends would help you?**

<table>
<thead>
<tr>
<th>1. Yes</th>
<th>2. Maybe</th>
<th>3. No</th>
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<tbody>
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</table>
125. Kunan imakunapin participashanki. Currently you participate in …?

Vaso de leche
PRONAA
Asociación AgroRural
ATD 4to Mundo
Asociación de Tejedores
Asociaciones de Cuyes
Asociación ANDES
Other institutions or organizations: _____________________________

126. Yuyankichu gubiernoq yanapamusqankuna allin kananpaq. Do you think that governmental social support programs are effective?

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ANCHATA AÑAYCHAYKICHIS

THANK YOU VERY MUCH!
### APPENDIX C

**Observation sheet**

<table>
<thead>
<tr>
<th>ID mother</th>
<th>date:</th>
<th>start time:</th>
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<tbody>
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<table>
<thead>
<tr>
<th>who:</th>
<th>end time:</th>
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<tbody>
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<table>
<thead>
<tr>
<th>Time</th>
<th>place</th>
<th>food</th>
<th>baby</th>
<th>Quantity</th>
<th>who gave</th>
<th>food</th>
<th>quantity</th>
<th>who gave</th>
<th>medicine or mate</th>
<th>quantity</th>
<th>suckle begin</th>
<th>suckle end</th>
<th>activity baby</th>
<th>activity mother</th>
</tr>
</thead>
</table>