

PERCEIVED INSUFFICIENT MILK AS A BARRIER TO OPTIMAL INFANT FEEDING: EXAMPLES FROM BOLIVIA

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Summary. In its recently adopted Global Strategy on Infant and Young Child Feeding, the World Health Assembly called for urgent action in addressing the barriers to optimal feeding practices. This paper examines mothers' concerns about milk insufficiency as a major contributor to suboptimal infant feeding decisions, using survey data from periurban areas of two Bolivian cities. Mothers in the lowland modernizing city of Santa Cruz were more likely than mothers in the highland traditional city of Cochabamba to express concern about insufficient milk, and also less likely to feed their infants according to international recommendations. Furthermore, perceived milk insufficiency was particularly common among mothers of infants younger than 6 months of age – an age at which infants are particularly vulnerable to the adverse effects of breast-feeding cessation and complementary feeding initiation. The paper concludes with policy, programme and research recommendations to address the critical problem of perceived insufficient breast milk.

Introduction

In 2002 the World Health Assembly adopted a new Global Strategy on Infant and Young Child Feeding (WHO, 2002) that concluded: 'Although not every component is new, what is novel about the global strategy is its *integrated comprehensive approach* and the *degree of urgency* called for in implementing it [emphasis included in original text]' (p. 3). This urgency is echoed in a series of papers in the *Lancet* in 2003 calling for an action programme to address the 10 million deaths per year to children under the age of 5 years (Black *et al.*, 2003; Jones *et al.*, 2003; Bryce *et al.*, 2003; Victoria *et al.*, 2003; Bellagio Study Group on Child Survival, 2003). Included in this action programme, among the interventions listed as having been proven to reduce early

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childhood mortality, were exclusive breast-feeding for 0–5 months, breast-feeding for infants aged 6–11 months, and appropriate complementary feeding (Jones *et al.*, 2003). Yet the Global Strategy notes: 'No more than 35% of infants worldwide are exclusively breast-fed during the first four months of life; complementary feeding frequently begins too early or too late, and foods are often nutritionally inadequate and unsafe' (p. 4).

A recent review of global breast-feeding patterns found that maternal perceptions of inadequate milk supply are a major contributor to the gap between recommendations and practice (Obermeyer & Castle, 1997). The authors note that the 'biological manifestations [of insufficient milk] are driven by behavioural factors which vary in different social contexts' (Obermeyer & Castle, 1997, p. 40). More than two decades ago, in the seminal publication on this topic entitled 'The insufficient milk syndrome: A biocultural explanation', Gussler & Briesemeister (1980) argued that insufficient milk is not merely a convenient excuse for women who did not want to breast-feed, but rather a consequence of modern changes in infant feeding patterns.

One objective of the Global Strategy (WHO, 2002) is 'to raise awareness of the main problems affecting infant and young child feeding, identify approaches to their solution, and provide a framework of essential interventions' (p. 5). The present paper raises awareness of mothers' concerns about 'insufficient milk' as a major contributor to less-than-optimal infant feeding behaviour, using survey data from two recently settled, low-income, periurban areas in Bolivia as case studies. Such populations are particularly vulnerable because many of the women had moved from rural areas or smaller towns to the city, leaving behind social support networks and encountering greater availability of artificial milk and a more modern health system (Bender *et al.*, 1993; McCann *et al.*, 1994; Brockerhoff, 1995).

Study results go beyond simple tallies of 'insufficient milk' as a reason for various infant feeding decisions. The researchers addressed several other questions regarding perceived insufficient milk, including reasons why a mother thinks she does not have enough milk and what her response is to this perception. The paper concludes with policy, programme and research recommendations regarding insufficient milk as a key focus for improving infant feeding practices throughout the world.

Methods

Cross-sectional surveys were conducted in periurban districts of two Bolivian cities: Cochabamba (in 1991) and Santa Cruz (in 1994). Details of the methodology have been presented elsewhere (McCann *et al.*, 1999). Although the data from these surveys were collected a decade ago, infant feeding patterns have not changed dramatically, as evidenced by successive waves of Demographic and Health Surveys (DHS) in 1989, 1994 and 1998 (Gómez *et al.*, 1990; Sommerfelt *et al.*, 1991; Gutiérrez Sardán *et al.*, 1994, 1998; Zlidar *et al.*, 2003). Furthermore, it is unlikely that the underlying belief systems regarding perceived insufficient milk have changed during this period. Similarly, the 3-year difference between the fieldwork in the two cities has probably not had a major effect on the comparisons between the two sites.

In each community interviews were undertaken with about 400 women ($n=402$ in Cochabamba; $n=434$ in Santa Cruz) who had infants under the age of 18 months.

These interviews were carried out in Spanish by Bolivian fieldworkers who were trained to ensure that the mothers were comfortable responding in Spanish. In Cochabamba the interviewers were public health professionals, some of whom were physicians affiliated with the university of San Simon. In Santa Cruz, the lead interviewer was a census worker, who was assisted by students at Nur University, an institution founded to improve the well-being of the local population. The research was approved by the Institutional Review Board of the University of North Carolina School of Public Health; the participants signed a consent form before the interviews commenced.

The questionnaire was adapted from the data collection instrument used in the Demographic and Health Survey (DHS) conducted in Bolivia in 1989, with the addition of more detailed questions on various aspects of infant feeding. For questions about why the infant was not breast-fed, why breast-feeding had stopped, and why other liquids were given, there was a list of possible responses, including 'insufficient milk' (*poca leche* in Spanish) and an open-ended 'other' option. The question about why the respondent thought she did not always have enough milk was open-ended. The question asking a mother what she did in reaction to her perception of insufficient milk had pre-coded responses plus an open-ended 'other' response. Most, but not all, questions were asked in both cities. Infant feeding practices are summarized here using the current-status infant feeding indicators developed by WHO (McCann *et al.* 1994; Haggerty & Rutstein, 1999).

Cochabamba, located in the central highlands of Bolivia, represents a traditional, Amerindian culture. Two-thirds of the mothers included in the study had migrated to the city from rural areas (Table 1). At home, most mothers spoke both Spanish and an indigenous language (primarily Quechua, with a few Aymara speakers). Twelve per cent had not attended school, and fewer than half had been to school for 6 years or more. Only half reported that they could read easily, and 15% said that they could not read at all. For three-quarters of the mothers, a physician or nurse was the attendant at their most recent birth, while for 15% the attendant was the husband or other relative.

Santa Cruz, in the eastern lowlands of Bolivia, is a more modern city, dominated by mestizo culture and oriented to large-scale agriculture. As in Cochabamba, the study was conducted in periurban neighbourhoods inhabited by large proportions of recent migrants, but rural childhood residence was somewhat less common (Table 1). The majority had attended school for at least 6 years and stated that they could read easily. Most mothers reported that Spanish was the only language spoken at home. A physician or nurse was the attendant at the most recent birth for an even higher proportion of births than in Cochabamba, and having a family member as an attendant was rare.

Results

Cochabamba

Virtually all infants in Cochabamba (98.8%) were breast-fed initially. The most frequent reason stated by the mother for never breast-feeding the index infant was

Table 1. Percentage distribution of mothers' characteristics: Cochabamba and Santa Cruz, Bolivia

	Cochabamba (N=402)	Santa Cruz (N=434)
Mother's age (years)		
<20	10.7	19.7
20-29	85.3	58.3
30+	4.0	22.1
Mother's education		
None	11.7	1.2
1-5 years	42.2	31.3
6-12 years	46.1	67.5
Mother's self-reported literacy		
Does not read	14.8	4.1
Reads with difficulty	33.0	22.2
Reads easily	52.2	73.7
Language spoken at home		
Spanish only	19.0	94.2
Spanish and indigenous language	76.9	5.8
Indigenous language only	4.1	0.0
Mother's residence at age 12		
Urban	37.3	57.8
Rural	62.7	42.2
Birth attendant		
Physician or nurse	73.6	87.0
Traditional birth attendant	11.2	8.7
Other	15.2	4.3

'not enough milk' (given by four of the five non-breast-feeding mothers in Cochabamba).

Among infants younger than 4 months of age, only 2% were not currently breast-feeding. About half (47%) were receiving breast milk alone and one-third were receiving breast milk plus non-milk liquids (typically a herbal tea). Nineteen per cent were receiving other milk and 1% were receiving solid foods, in addition to breast milk. Among infants 6-9 months of age, most were receiving both breast milk and solids, but 12% were not being breast-fed. At 12-15 months, 77% were still breast-feeding.

'Insufficient milk' was given as the reason for cessation of breast-feeding by 16% of mothers in Cochabamba (Table 2). The most common reason was that the infant was 'old enough', reflecting the fact that infants in this city typically stopped breast-feeding at older ages.

Mothers were also asked why they had begun giving their infants other liquids (Table 3). Again, the most frequent answer was that the infant was old enough. Eight per cent said their reason was insufficient milk.

Table 2. Reasons for cessation of breast-feeding^a: Cochabamba and Santa Cruz, Bolivia

Reason	Cochabamba (N=64)		Santa Cruz (N=143)	
	<i>n</i>	%	<i>n</i>	%
Insufficient milk	10	15.6	35	24.5
Infant old enough	23	35.9	19	13.3
Infant rejected the breast	4	6.3	34	23.8
Mother pregnant again	10	15.6	9	6.3
Mother's work or school	9	14.1	8	5.6
Infant sick	5	7.8	10	7.0
Advice of doctor or nurse	4	6.3	4	2.8
Advice of family members	1	1.5	2	1.4
Mother sick	0	—	15	10.5
Other	3	4.7	7	4.9

^aMay be more than one response per woman. Number of respondents is the number who had stopped breast-feeding.

When mothers in Cochabamba were asked if they had always had enough milk, 15% of breast-feeding mothers said that they did not. The most common reply to the question of why the mother thought that she did not have enough milk was that the infant cried (Table 4). About 15% of mothers said that their own poor health or diet contributed to their observation that they did not have enough milk.

Mothers who thought they did not have enough milk took a variety of actions in response to this perception (Table 5). Most frequently, they gave their infants other liquids or solid food (48%). Eight per cent stopped breast-feeding, but a more common response was to breast-feed more often (17%).

One-third of mothers in Cochabamba reported that they had talked to a doctor or nurse about breast-feeding. When asked whether a doctor or nurse had encouraged them to use formula instead of breast milk, 22% answered affirmatively.

Mothers in Cochabamba were asked whether mother's milk, milk from cows or goats, or infant formula is best for infants, or if there is no difference among them; 92% said that breast milk was best.

Santa Cruz

Most infants in Santa Cruz were breast-fed initially (95.4%). Seven of the nineteen non-breast-feeding mothers gave 'not enough milk' as their reason for not breast-feeding; three said that the infant rejected the breast.

Among infants younger than 4 months of age, 9% were not currently breast-feeding. Only 16% were receiving breast milk alone. More than half (52%) of young breast-feeding infants were also being fed other milks, and 9% were receiving solid foods in addition to breast milk. While the majority of infants aged 6–9 months

Table 3. Reasons for giving other liquids^a: Cochabamba and Santa Cruz, Bolivia

Reason	Cochabamba (N=305)		Santa Cruz (N=393)	
	n	%	n	%
Infant old enough	190	61.9	97	24.7
Advice of doctor/nurse/ <i>partera</i> ^b	33	10.7	82	20.9
Insufficient milk	24	7.8	78	19.8
Advice of family/friends	36	11.7	24	6.1
Infant wanted other food	3	1.0	25	6.4
Mother's work or school	9	2.9	19	4.8
Infant diarrhoea	13	4.3	5	1.3
Infant refused breast	2	0.7	16	4.1
To get infant used to other food	0	—	16	4.1
For infant's health	0	—	9	2.3
Infant sick	0	—	4	1.0
Infant not gaining weight	1	0.3	0	—
Mother's pregnancy	0	—	1	0.3
Other	4	1.3	19	4.8

^aMay be more than one response per woman.

^bMidwife.

were receiving breast milk and solids, one-third were not breast-feeding. At age 12–15 months, only one-third were breast-feeding.

'Insufficient milk' was the most frequent reason for cessation of breast-feeding (25% of those who had stopped), closely followed by 'infant rejected the breast' (Table 2). 'Insufficient milk' was also a common response to the question of why other liquids were first given (Table 3). Slightly more frequent responses were that the infant was old enough and that medical personnel had advised it.

Mothers in Santa Cruz were asked whether powdered milk should be given to infants younger than 6 months; 50% said 'yes', 36% said 'no' and 14% said they did not know. When asked what problems babies could have when they drank powdered milk, half of the mothers said that infants could get sick and some of these specifically mentioned that the infants could get diarrhoea.

Three-quarters of mothers said that they had seen powdered milk for infants advertised on television. When asked 'What is the most important message in these ads?' most women answered that the powdered milk was good for the baby or that a specific brand was best; a few said that powdered milk is equal to or better than breast milk.

Discussion

International recommendations regarding breast-feeding are summarized in Table 6. These recommendations are not being followed for the majority of infants in the two

Table 4. Reasons for mother thinking she did not have enough milk^a: Cochabamba and Santa Cruz, Bolivia

Reason	Cochabamba (N=58)		Santa Cruz (N=134)	
	n	%	n	%
Reasons related to infant				
Infant cried	21	36.2	34	25.4
Infant hungry	3	5.2	8	6.0
Infant didn't want to suckle	0	—	7	5.2
Infant very big/old	0	—	4	3.0
Twins	2	3.4	1	0.7
Reasons related to mother				
Not enough milk came out	7	12.1	24	17.9
Mother not eating well	5	8.6	16	11.9
Mother's health	4	6.9	6	4.5
Breast tumour/abscess	1	1.7	1	0.7
Breasts not large enough	1	1.7	1	0.7
Breasts swollen/hurt/did not fill up	1	1.7	4	3.0
Mother was told she did not have enough	2	3.4	5	3.7
Don't know/other	11	19.0	26	19.4

^aMay be more than one response per woman.

Table 5. Mothers' actions in response to perception of insufficient milk^a: Cochabamba and Santa Cruz, Bolivia

Response	Cochabamba (N=48)		Santa Cruz (N=135)	
	n	%	n	%
Gave infant bottle/other food	23	47.9	48	35.6
Breast-fed more	8	16.7	49	36.3
Mother drank more liquids	12	25.0	23	17.0
Stopped breast-feeding	4	8.3	26	19.3
Talked with doctor/nurse	5	10.4	12	8.9
Took herbs	1	2.1	0	—
Other/unknown	13	27.1	5	3.7

^aMay be more than one response per woman.

communities studied here, in Bolivia as a whole (McCann *et al.*, 1994; Gutiérrez Sardán *et al.*, 1998; Haggerty & Rutstein, 1999; Zlider *et al.*, 2003) or throughout the world (Haggerty & Rutstein, 1999; Bryce *et al.*, 2003; Zlidar *et al.*, 2003). The authors

Table 6. International breast-feeding recommendations

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- Initiate breast-feeding within one hour of birth
 - Establish good breast-feeding skills
 - Breast-feed exclusively for the first 6 months
 - Practise frequent on-demand breast-feeding, including night feedings
 - Do not give bottles or pacifiers to breast-feeding infants
 - At 6 months of age, introduce complementary foods whilst continuing to breast-feed as often and as long as before
 - Continue breast-feeding for 2 years or longer
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Adapted from Piwoz *et al.* (2003).

argue in this paper, based on their findings and those of others, that a major contributor to this discrepancy is maternal perception of insufficient milk.

Furthermore, this study found that infants in the more modern lowland city of Santa Cruz were less likely than infants in the more traditional highland Cochabamba to be fed according to these recommendations. Infants in Santa Cruz were less likely to be breast-fed, at all ages. Young infants in Santa Cruz were much less likely to be receiving breast milk alone, and more likely to be receiving other milk and solid foods.

Mothers in Santa Cruz were also more likely to perceive that they did not have enough milk. This answer was more common in Santa Cruz than in Cochabamba to the questions of why they stopped breast-feeding and why they initiated complementary feeding. When asked specifically about whether they had always had enough milk, mothers in Santa Cruz were more than twice as likely to say that they sometimes thought their milk was insufficient. And when asked what actions they took in response to their perception of insufficient milk, mothers in Santa Cruz were more likely than mothers in Cochabamba to stop breast-feeding.

Perceived milk insufficiency was particularly common among mothers of infants younger than 6 months of age, when alternatives to breast-feeding are discouraged, and infants are most susceptible to the adverse effects of breast-feeding cessation. 'Insufficient milk' was more common as a response for infants who stopped breast-feeding or began receiving other liquids in the first 2–3 months (whereas the response 'infant old enough' increased with infants' age). Similarly, perceived breast milk insufficiency was a more common answer to these question in Santa Cruz, where typically breast-feeding stopped and complementary feeding began at earlier ages than in Cochabamba.

Although until recently international recommendations allowed for introduction of other foods beginning at 4 months (IOM, 1991; WHO/UNICEF, 1991; Obermeyer & Castle, 1997), policy recommendations now advise exclusive breast-feeding for the first 6 months of life (AAP, 1997; WHO, 2002; PAHO & WHO, 2003). According to the Global Strategy on Infant and Young Child Feeding (WHO, 2002), 'Infants are particularly vulnerable during the transition period when complementary feeding begins' (p. 6). Thus, the observation that maternal perception of insufficient milk leads to early initiation of complementary feeding merits particular attention.

Table 7. Recommendations for research, policy and practice related to perceived insufficient milk

Policy

- Focus breast-feeding interventions on urban residents, especially recent migrants
- Train health workers in optimal infant feeding practices
- Establish lay breast-feeding support networks
- Limit promotional activities of infant food companies
- Actively promote 'Breast is best' culture of breast-feeding

Practice

- Teach the importance of frequent, on-demand feeding
- Teach appropriate complementary feeding – timing and techniques
- Emphasize that almost all women can produce enough milk
- Monitor infant weight gain and elimination patterns
- If infant is truly not getting enough milk, advise changes in feeding behaviours
- Suggest ways to comfort a crying infant

Research

- Analyse existing data on 'insufficient milk'
 - Carry out formative research
 - Conduct intervention studies
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Presented below are policy, practice and research implications of this common maternal concern (Table 7).

Insufficient milk as a reason for infant feeding decisions

'Not enough milk' was the predominant reason for not breast-feeding both in Cochabamba and in Santa Cruz. In Bolivia as a whole, 'insufficient milk' was reported as the reason for not initiating breast-feeding by 24% of mothers in the 1989 DHS (Sommerfelt *et al.*, 1991). 'Insufficient milk' has also been noted as a common reason for not breast-feeding in Chile and Guatemala (WHO, 1981) (Table 8).

'Not enough milk' was also a frequent response when mothers in this Bolivian study were asked why they stopped breast-feeding. For Bolivia as a whole, 'insufficient milk' was the reason stated by 7.6% of mothers (Sommerfelt *et al.*, 1991); 'reached weaning age' was stated by 61.1%, reflecting the fact that these national data were based on children up to 5 years of age, in comparison with the 18-month upper limit in the present study. In several other Latin American countries, too, the perception of insufficient milk has been reported as a common reason for cessation of breast-feeding, particularly during the early months (Winikoff *et al.*, n.d.; WHO, 1981; Martines *et al.*, 1989; Segura-Millán *et al.*, 1994; McLennan, 2001) (Table 8). An earlier review by Forman (1984) also noted that milk insufficiency was cited more commonly for infants who stopped breast-feeding in the first 6 months.

'Not enough milk' was again a common reason for giving other liquids in both cities studied here, particularly in the early months, paralleling the rationale for cessation of breast-feeding. Similarly, in several other Latin American countries

Table 8. Key findings of other Latin American studies related to perceptions of insufficient milk

Author(s) & date	Location	Study design	Key findings
Cohen <i>et al.</i> (1994)	San Pedro Sula, Honduras	Randomized trial of complementary feeding initiation.	Among mothers otherwise eligible for randomization at 4 months but not exclusively breast-feeding, insufficient milk most common reason for other foods (Cohen <i>et al.</i> , 1994).
Pérez-Escamilla <i>et al.</i> (1995)	(Urban, low-income)	Follow-up until 6 months. Full-term infants weighing at least 2000 g.	Almost all of mothers randomized at 4 months complied with their assigned infant feeding method.
Cohen <i>et al.</i> (1995)		Groups assigned when infant was 4 months old and still exclusively breast-fed:	No difference in infant growth among the three feeding groups.
Cohen <i>et al.</i> (1999)		Continued exclusive breast-feeding ($n=50$); Complementary foods plus breast-feeding ($n=47$); Complementary foods plus maintenance of breast-feeding frequency ($n=44$).	Three-quarters of postpartum women thought that full breast-feeding was ideal. However, less than half intended to fully breast-feed and by 2 weeks postpartum only one-quarter were actually doing so (Pérez-Escamilla <i>et al.</i> , 1995). At hospital discharge, almost half reported concern about their milk supply. Mothers giving bottles were more likely to report insufficient milk.
Dewey <i>et al.</i> (1999)	Same as above	Randomized trial similar to above, except infants weighed 1500–2500 g and there were two intervention groups:	No differences in appetite or food acceptance at 9 and 12 months between infants who began receiving other foods at 4 versus 6 months (Cohen <i>et al.</i> , 1995).
Cohen <i>et al.</i> (1999)		Continued exclusive breast-feeding ($n=59$); Complementary foods plus maintenance of breast-feeding frequency ($n=60$).	In later focus group discussions, some mothers recalled that they had had problems with breast-feeding, including insufficient milk, but resolved these problems with assistance of study staff. Most mothers had relatives or friends who did not believe in exclusive breast-feeding (Cohen <i>et al.</i> , 1999). Among infants otherwise eligible for randomization at 4 months but not exclusively breast-fed, insufficient milk most common reason for other foods (Dewey <i>et al.</i> , 1999). Almost all of mothers randomized at 4 months complied with their assigned infant feeding method. Infant growth similar in the two feeding groups. About 20% of mothers reported that a relative or friend had advised them to give other foods in the first 4 months (Cohen <i>et al.</i> , 1999).

Table 8. Continued

Author(s) & date	Location	Study design	Key findings
Marques <i>et al.</i> (2001)	North-east Brazil (four towns)	Longitudinal study from birth to 12 months; enrolled in hospitals (<i>n</i> = 364).	<p>Mothers who gave other foods in the first 4 months had been less confident of their ability to exclusively breast-feed and received less support for exclusive breast-feeding from other people.</p> <p>When fieldworkers were asked about mothers' complaints, most common complaint was insufficient milk.</p> <p>Very few of the multiparous mothers had exclusively breast-fed a previous child for 6 months, in part because they believed breast milk did not fill up the infant.</p> <p>At delivery, 66% of mothers thought exclusive breast-feeding for 6 months would be difficult, primarily because of the perceived need of the infant for other foods.</p> <p>When beginning supplements, 40% of mothers reported recent breast-feeding problems, primarily related to quality/quantity of breast milk.</p> <p>Reasons for starting other milks: infant was hungry (53% overall; 67% among those supplementing in first month), milk had dried up, and infant cries a lot.</p>
Martines <i>et al.</i> (1989)	Pelotas, Brazil (Urban, low-income)	Longitudinal study from birth to 6 months; enrolled in hospitals (<i>n</i> = 406).	<p>As reason for cessation of breast-feeding, insufficient milk stated by 56% of mothers and unsatisfactory growth by 43%.</p> <p>As reason for starting supplements, insufficient milk given by 28% and unsatisfactory growth by 38%; both reasons highest in first 2 months.</p> <p>When asked why other women stopped breast-feeding earlier than desirable, insufficient milk was the most common reason.</p>
McLennan (2001)	Santo Domingo, Dominican Republic (Periurban, low-income)	Community-based survey of mothers with children under age 5 years (<i>n</i> = 220).	<p>Insufficient milk stated by 23% of mothers as reason why they stopped breast-feeding before 1 year and by 43% as reason why they thought other mothers stopped.</p> <p>One-quarter stopped before infant was 3 months old, but only 8% thought that breast-feeding typically stopped by 3 months.</p>

Table 8. Continued

Author(s) & date	Location	Study design	Key findings
Segura-Millán <i>et al.</i> (1994)	Hermosillo, Mexico (Urban, low-income)	Longitudinal study from birth to 4 months ($n=165$).	<p>Insufficient milk reported by 80% of mothers during first 4 months.</p> <p>Insufficient milk most frequent reason for cessation of breast-feeding and for giving formula.</p> <p>When asked why they thought their milk was insufficient, most mothers said the infants' crying; some responded that their breasts were empty or soft, and a few said the infants sucked their hands.</p> <p>When asked the cause of their insufficient milk, most women did not know; a few said low breast-feeding frequency or low maternal fluid intake.</p> <p>When asked what they did in response to perceived insufficient milk, most common action was to increase their own fluid intake, followed by giving formula; only 10% increased breast-feeding frequency.</p> <p>When asked what they would recommend to a friend who had insufficient milk, most again said to increase mother's fluid intake; only 2% said to breast-feed more often.</p> <p>Factors found in multivariate analysis to be associated with perceived insufficient milk: lack of confidence in breast-feeding, delayed onset of milk production, sore nipples, early introduction of formula to previous child.</p> <p>Half of women interviewed in hospital planned to introduce formula in first week; half of these indicated that concern about milk supply was the reason.</p>

Table 8. Continued

Author(s) & date	Location	Study design	Key findings
Wimikoff <i>et al.</i> (n.d.)	Bogota, Colombia (Low- and middle-income)	Community-based survey of mothers with children under 12 months (<i>n</i> = 711). Also, ethnographic research.	Insufficient milk stated as reason for cessation of breast-feeding by 58%. Insufficient milk stated as reason for giving other milk by 44%. When asked why they thought their milk was insufficient, half said milk never came in and one-quarter said infant cried. When asked what mothers can do to produce more breast milk, most said to increase fluid intake; only 4% said to breast-feed more often. Physicians and pharmacists gave advice to begin supplementation and to stop breast-feeding in cases of insufficient milk; midwives advised mothers to eat well and take care of themselves.
WHO (1981)	Santiago, Chile & Guatemala City, Guatemala (Urban high- and low-income, and rural)	Community-based survey of mothers with children under 24 months (<i>n</i> = 1034 in Chile; <i>n</i> = 1785 in Guatemala)	Insufficient milk most common reason for not initiating breast-feeding in both countries. In Chile, insufficient milk given as reason for cessation of breast-feeding by three-quarters of mothers. In Guatemala, insufficient milk given as reason for cessation of breast-feeding by 60% of higher-income mothers (median age of cessation < 2 months); among low-income and rural mothers, this reason given by 44% and 28% (median age at cessation 10 months and > 18 months, respectively).

perceived insufficient milk has been listed as a reason for complementary feeding (Winikoff *et al.*, n.d.; Martines *et al.*, 1989; Segura-Millán *et al.*, 1994; Cohen *et al.*, 1994; Dewey *et al.*, 1999; Marques *et al.*, 2001) (Table 8).

Policy implications

The new Global Strategy (WHO, 2002) builds upon the success of the Baby-Friendly Hospital Initiative (UNICEF, 2004a), the Innocenti Declaration (WHO/UNICEF, 1991) and the International Code of Marketing of Breast-milk Substitutes (UNICEF, 2004b). Still, there is little in global policy that directly addresses the perception of 'insufficient milk' to guide programme planners, physicians or nursing mothers. The findings presented here suggest some important directions for policy development (Table 7).

The Global Strategy on Infant and Young Child Feeding (WHO, 2002) emphasizes 'an emerging policy framework', which goes further than the earlier WHO and UNICEF efforts to emphasize the need for more comprehensive national policies and programmes focused on nutrition and child health. The Strategy states, 'it is time for governments, the international community and other concerned parties to renew their commitment to promoting the health and nutrition of infants and young children and to work together for this purpose' (p. 3). One of the Strategy's operational targets is 'to ensure that the health and other relevant sectors protect, promote and support exclusive breast-feeding for six months and continued breast-feeding up to two years and beyond, whilst providing women access to the support they require – in the family, community and workplace – to achieve this goal' (p. 10). The authors of the present paper contend that attention to insufficient milk is critical to the success of this effort.

Urban migration

The Global Strategy (WHO, 2002) notes: 'Rapid social and economic change only intensifies the difficulties that families face in properly feeding and caring for their children. Expanding urbanization results in more families that depend on informal or intermittent employment with uncertain incomes and few or no maternity benefits' (p. 4).

In most developing countries, infants living in urban areas are less likely to be breast-fed and their breast-feeding experience tends to be of shorter duration, compared with rural infants (McCann *et al.*, 1994; Obermeyer & Castle, 1997; Haggerty & Rutstein, 1999). Among young breast-feeding infants, those in cities are more likely to be receiving other foods, particularly cows' milk or formula. The comparisons between Cochabamba and Santa Cruz suggest that living in the more modern city of Santa Cruz is associated with greater maternal concern about insufficient milk and more adverse infant feeding practices.

Poor infant feeding practices are particularly common among recent urban migrants, such as the two Bolivian populations the authors surveyed. An earlier analysis of national DHS data by these researchers found, for example, that giving young Bolivian infants other milks in addition to breast milk was more common

among urban migrants (34%) than among mothers who had always lived in either the city (19%) or the countryside (10%) (McCann *et al.*, 1994). Similarly, the highest prevalence of bottle-feeding was among urban migrants (72%, compared with 60% of city-always and 27% of country-always residents). Also using data from DHS, Brockerhoff (1995) reported that throughout the world, and particularly in Latin America, children of recent migrants from rural to urban areas have a much higher mortality rate than children of urban natives. Among Bolivian children under the age of 5 years, the mortality of those who were born to urban migrants was 1.5 times that for children of parents who had always lived in the city.

Policy recommendations to increase optimal infant feeding must therefore focus on urban residents, particularly on recent poor immigrants to the city. The typical residential segregation of these migrants would facilitate such targeted interventions.

Influences of health workers

In the Bolivian studies reported here, advice from medical professionals was sometimes cited as the reason for cessation of breast-feeding and, more frequently, as the reason for giving other liquids. When mothers were asked directly whether a doctor or nurse had advised them to give formula instead of breast milk, a substantial minority said that they had received such advice. Medical professionals appeared to have a greater influence on complementation in Santa Cruz than in Cochabamba.

In Colombia, too, physicians and pharmacists reportedly gave advice to begin supplementation and to stop breast-feeding in cases of insufficient milk; in contrast, midwives tended to advise mothers to eat well and take care of themselves (Winikoff *et al.*, n.d.).

These observations support the assertion by Obermeyer & Castle (1997) that the 'medicalization' of infant feeding contributes to early complementary feeding. These authors suggest that: 'As women ... relate to the biomedical model of the clinic ... they may question their capacity to lactate successfully. Insufficient milk ... becomes a socially constructed model that articulates the precariousness of women's place' (p. 55).

Clearly there is an urgent need for education of all health workers regarding optimal infant feeding. This education should include not only policy guidelines but also practical advice about breast-feeding techniques and how to help mothers resolve problems such as perceived insufficient milk. The experience of the intervention studies on the timing of complementary feeding, conducted in Honduras, indicates that with proper support poor Latin American women can overcome their concerns about insufficient milk and exclusively breast-feed for the first 6 months (Cohen *et al.*, 1994; Dewey *et al.*, 1999) (Table 8). Cohen and colleagues (1999) report: 'The staff continuously worked with the women to teach them how to increase breast milk production through good positioning techniques, increased breast-feeding frequency (reminding women to wake the newborn infant for feeding), and awareness of infant urine output (to judge the adequacy of breast milk intake). When they followed the suggestions of the lactation counsellors their breast milk production improved.'

The 'Ten Steps to Successful Breast-feeding', promulgated by the WHO/UNICEF Baby-Friendly Hospital Initiative, provide suggestions about how to support breast-feeding (UNICEF, 2004a). Whilst the first nine steps describe in-hospital practices,

the tenth step says: 'Foster the establishment of breast-feeding support groups and refer mothers to them on discharge from the hospital or clinic'.

Further evidence of the value of breast-feeding support is reported in a recent systematic review of data from 20 breast-feeding intervention trials in ten countries, which found that both professional support and lay support were associated with increased duration of exclusive breast-feeding and of any breast-feeding (Sikorski *et al.*, 2002, 2003). Maternal concern about insufficient milk is one of the issues that can be addressed by such breast-feeding support. The review by Sikorski and colleagues included three controlled trials in Latin America – two in Brazil (Barros *et al.*, 1994; Leite *et al.*, 1998) and one in Mexico (Morrow *et al.*, 1999) – all of which showed benefits of breast-feeding support. Observational studies in Peru (Pugin *et al.*, 1996) and Brazil (Albernaz *et al.*, 1998; Braun *et al.*, 2003) have reported similar findings. Infant mortality reduction was also documented for several of the breast-feeding support programmes reviewed by Sikorski *et al.* (2002, 2003), including the randomized trial in Mexico (Morrow *et al.*, 1999).

Community norms

Advice from family and friends to begin complementary feeding was reported in both Cochabamba and Santa Cruz. In the Honduran randomized trials, too, breast-feeding mothers reported that they were encouraged by friends and relatives to give other foods to young infants (Table 8). Honduran women who continued exclusive breast-feeding for at least 4 months were more likely to have reported immediately postpartum that various relatives and friends were in favour of exclusive breast-feeding.

Several Latin American studies have reported that women do not expect to exclusively breast-feed for very long, and many of these mothers gave as their reason their concern about limited milk supply (Segura-Millán *et al.*, 1994; Pérez-Escamilla *et al.*, 1995; Marques *et al.*, 2001) (Table 8). Two other studies found that insufficient milk was frequently stated both as the reason the mothers themselves had discontinued breast-feeding and as the reason they thought other mothers in the community discontinued breast-feeding (Martines *et al.*, 1989; McLennan, 2001) (Table 8).

Thus, policy-makers should consider ways to encourage optimal infant feeding throughout the culture, with attention to concerns about insufficient breast milk. Information about the adequacy and desirability of exclusive breast-feeding for 6 months should be widely disseminated in the media and through child-care facilities, schools and other community channels, in order to create a culture that is supportive of this practice. Special attention should be paid to the influential role of fathers and grandmothers. In addition, employers must play a role in facilitating continued breast-feeding through maternity leave, day-care facilities and paid breast-feeding breaks. And, as mentioned above, breast-feeding support networks should be established in all locales in order to provide community support to families with infants, both on an individual basis and through mother-to-mother support groups.

Mothers clearly believe that breast milk is the superior food for infants, as reported by 92% of mothers in this study in Cochabamba. Similarly, when mothers in Bogota were asked about the best food for infants the age of their infants, 'breast

milk' was the response for 81% of mothers with infants 0–2 months, decreasing to 32% of mothers with infants 6–8 months (Winikoff *et al.*, n. d.).

Nonetheless, when mothers in Santa Cruz were asked whether powdered milk should be given to infants younger than 4 months, half agreed with this statement. Thus, there seems to be normative support for the predominant pattern of mixed feeding of young infants.

A small number of mothers in Cochabamba (but none in Santa Cruz) said that the reason they gave other liquids was to get the infant used to other foods. In Honduras, too, researchers have reported maternal concern that delaying the introduction of other foods would make it more difficult for the infant to accept these foods (Cohen *et al.*, 1995). However, their randomized trial of initiation of complementary feeding found no differences in appetite or food acceptance at 9 and 12 months of age between infants who began receiving other foods at 4 versus 6 months (Table 8).

Influence of the infant food industry

Promotional activities of companies that produce infant formula and other prepared infant foods can also create maternal anxiety about the sufficiency of breast milk (Obermeyer & Castle, 1997). In the Santa Cruz component of the present study, three-quarters of women reported that they had seen advertisements for powdered milk on television and most thought that the message of the advertisements was that powdered milk is good for infants. The International Code of Marketing of Breast-milk Substitutes should guide the monitoring of such practices.

Practice implications

The Global Strategy (WHO, 2002) states: 'Even though it is a natural act, breast-feeding is also a learned behaviour. Virtually all mothers can breast-feed provided they have accurate information, and support within their families and communities and from the health system' (pp. 5–6).

Best practices

The Institute of Medicine (1991) states 'the major determinant of milk production is the infant's demand for milk' (p. 5). They recommend that in the early weeks infants should breast-feed at least eight times per day (and may feed as often as fifteen or more times daily); after the first month, infants may suckle 5–12 times per day. The Global Strategy (WHO, 2002) states: 'Unrestricted exclusive breast-feeding results in ample milk production' (p. 5).

Information about optimal infant feeding practices is summarized in Table 6 and practice recommendations are given in Table 7. In order to ensure sufficient milk production, it is important that infants are fed frequently, during the night as well as during the day. At each feeding, the infant should suckle from both breasts, for at least 5 minutes each. Generally, feeding should be initiated whenever the infant appears to be hungry, and should continue until the infant stops nursing. Feeding

bottles and pacifiers should not be offered because they reduce the infant's interest in suckling at the breast and alter the infant's suckling technique. And complementary foods should be avoided until the infant is 6 months of age.

If a mother is concerned that her infant is not getting enough breast milk, health workers should first ascertain whether the infant is indeed getting enough. The most reliable indicators of insufficient milk are poor weight gain and patterns of elimination (passing only small amounts of concentrated urine, and infrequent urination and stooling) (WHO, 1996; AAP, 1997). If in fact the infant is not getting enough, then details of infant feeding practices, as well as the mother's confidence and physical condition, should be evaluated, and problems addressed. The importance of frequent breast-feeding should be stressed. Assistance with breast-feeding technique (e.g. proper positioning and attachment) may also be helpful. If the infant is receiving complementary foods, it may be advisable to encourage the mother to reduce the amount of complementary foods (particularly for infants younger than 6 months), to give them by cup rather than bottle, and to offer these other foods after a breast-feeding episode. Similarly, if the baby is using a pacifier, that practice should be stopped. If the baby is actually getting enough milk, the health worker should build the mother's confidence, by reassuring her of this fact and explaining the signals that made her think she did not have enough, as well as reiterate the advantages of (exclusive) breast-feeding.

Numerous studies (Barros *et al.*, 1994; Cohen *et al.*, 1994; Pugin *et al.*, 1996; Albernaz *et al.*, 1998; Leite *et al.*, 1998; Dewey *et al.*, 1999; Morrow *et al.*, 1999; Sikorski *et al.*, 2002, 2003; Braun *et al.*, 2003) have demonstrated that following this course of action can help most mothers to breast-feed successfully.

Evidence of milk sufficiency

When asked whether they had always had enough milk, a substantial minority of mothers in Santa Cruz and Cochabamba said 'no.' The most common reason for mothers' thinking that they did not have enough milk was that the infant cried. In Mexico and Colombia, too, mothers indicated that the infants' crying was their indicator for thinking that they did not have enough milk (Segura-Millán *et al.*, 1994; Winikoff *et al.*, n.d.) (Table 8).

Gussler & Briesemeister (1980) comment that crying and other infant behaviours were the predominant replies in the few studies that have asked why mothers feel their milk is inadequate. They state: "These mothers are both right and wrong. They are probably correct in interpreting the behaviour of their fussy infants as caused by hunger. They are incorrect that this necessarily indicates that something is inherently "wrong" with their milk or ability to lactate' (p. 151). They also point out that long intervals between scheduled feedings will result in an infant who is so hungry, and so distressed from crying, that breast-feeding will be difficult – further reinforcing the mother's belief that there is something "inherently "wrong"". The American Academy of Pediatrics (1997) supports this assertion; their policy statement says: 'Newborns should be nursed whenever they show signs of hunger, such as increased alertness or activity, mouthing, or rooting. Crying is a *late* indicator of hunger' (p. 1036). Mothers should be told that frequent crying associated with hunger may be due to a 'growth

spurt' and that responding with more frequent feeding for a few days will stimulate additional milk production to meet this need. It would also be helpful for mothers to know that there may be other reasons why infants cry, such as wet nappies, needing to be held and colic (AAP, 1997).

Few responses to any question asked in Cochabamba or Santa Cruz included infant weight gain, and none said anything about frequency of elimination. Among the Latin American studies in Table 8, only one (Martines *et al.*, 1989) included any mention by mothers of unsatisfactory growth in association with insufficient milk, cessation of breast-feeding and initiation of complementary feeding.

Responses to perceived milk insufficiency

When mothers in Bolivia thought that they did not have enough breast milk, the most frequent action was to give the infants other foods, whilst the second most common response was to breast-feed more frequently. The challenge for public health workers is to encourage mothers who think that they have insufficient milk to breast-feed more frequently, as a first response, in order to stimulate the milk supply. Questions about possible causes of perceived insufficient milk and actual or hypothetical actions in response to this problem in a Mexican study also indicated very little awareness of the effect of breast-feeding frequency on milk production (Segura-Millán *et al.*, 1994) (Table 8).

Maternal confidence in breast-feeding ability

The importance of maternal self-confidence in breast-feeding ability (the concept of 'self-efficacy') has been demonstrated to be an important factor in the perception of insufficient milk and the continuation of breast-feeding (Blyth *et al.*, 2002). Examples of this association from Honduras and Mexico are given in Table 8 (Segura-Millán *et al.*, 1994; Cohen *et al.*, 1999).

This conceptual model suggests that infant feeding behaviour could be improved by interventions that aim to enhance maternal confidence in breast-feeding ability. Assessment of mothers' breast-feeding self-efficacy (including previous infant feeding experience, as well as plans for feeding the new infant) could identify mothers who may need special breast-feeding support. Furthermore, in-hospital breast-feeding experience should receive positive reinforcement from health professionals, and practical advice should be given regarding possible future issues, such as when milk would replace colostrum and what actions to take if the mother becomes concerned about sufficiency of breast milk.

Mothers' health and breast-feeding

In both Bolivian communities, 15% of mothers gave their own poor health or inadequate diet as reasons why they believed they did not have enough milk. Yet research evidence indicates that maternal nutritional status has very little effect on the quantity or composition of breast milk and that all except perhaps the most malnourished mothers can breast-feed satisfactorily (IOM, 1991; WHO, 2002). One source of this evidence is the Honduran trials, which found that there was no overall effect of maternal body mass index on milk volume or infant breast milk energy

intake, once infant birth weight and milk energy density were controlled for (Pérez-Escamilla *et al.*, 1995). The fact that women nursing twins or triplets produce much higher volumes of milk than those nursing single infants suggests that the potential for milk production is considerably higher than the amount usually produced (IOM, 1991).

One note of caution is the issue of possible transmission of HIV through breast-feeding. Women who are HIV-positive should be counselled regarding possible alternative feeding options, which must be considered together with the other possible health risks that these alternatives pose (WHO, 2002; Piwoz *et al.*, 2003). A recent simulation analysis concluded that, under the conditions common in countries with high HIV prevalence, infants of HIV-positive mothers have a lower risk of mortality if they are breast-fed for 4–6 months, rather than artificially fed during this period (Ross & Labbok, 2004).

Research recommendations

Several lines of research regarding maternal perceptions of insufficient milk are recommended, as outlined in Table 7. Further analysis of existing data, such as data available through DHS, can provide an overview of the problem by using the questions on reasons for not breast-feeding and cessation of breast-feeding. Insufficient milk as a response to these questions can be examined for various socioeconomic and geographic groups. Similarly, patterns of infant feeding can be analysed to identify characteristics of mothers who are most likely to not initiate breast-feeding, to stop breast-feeding in the early months, and to initiate complementary feeding before 6 months, so that intervention programmes can target these women. Such analyses should utilize standard infant feeding indicators in order to permit cross-national comparisons (McCann *et al.*, 1994; Haggerty & Rutstein, 1999).

One research recommendation from the Expert Consultation on the Optimal Duration of Exclusive Breast-feeding (WHO, 2001) is to 'Identify biological and social constraints to exclusive breast-feeding to six months' (p. 2). Mothers' perceptions that they do not have enough milk are clearly a constraint that has both biological and social origins. What does it mean when mothers say they do not have enough milk? They may truly not be producing enough, but they could increase their milk supply if they breast-fed more often and did not give other foods. Alternatively, these women may actually be producing enough milk but say that they do not have enough, either because they would rather not breast-feed or because they lack confidence in their breast-feeding ability. Formative research is needed to investigate maternal perceptions of insufficient milk as a 'biological and social constraint' working against the recommendation to exclusively breast-feed for 6 months. Focus group discussions and other qualitative research can address this complex topic, in conjunction with quantitative research. Such a combination of research methodologies provides a much richer understanding than either approach alone (Bender *et al.*, 1997). This formative research should be carried out in diverse subgroups, in order to capture variations in the culture.

Finally, the authors encourage community-based intervention studies to document the effects of policies and programmes that include a focus on maternal perceptions

of insufficient milk. Ideally, such studies should be preceded by formative research that seeks to illuminate the subtleties of these maternal perceptions, such that this knowledge about maternal concerns can inform the design of the interventions. Interventions should be randomized whenever possible.

Conclusions

Breast-feeding has been shown to have a dramatic effect on infant health and survival (Black *et al.*, 2003; Jones *et al.*, 2003; Zlider *et al.*, 2003). WHO researchers (Betrán *et al.*, 2001) have calculated that if all Bolivian infants switched to exclusive breast-feeding during months 0–3 and partial breast-feeding for the remainder of the first year, 40% of deaths due to diarrhoeal disease and 35% of deaths due to acute respiratory infection could be prevented.

Complementary feeding and insufficient milk are inextricably linked. Actual or perceived insufficient milk can be a reason why a mother begins giving other foods, and true lack of sufficient milk can occur as a result of the infant having been given other foods.

'Insufficient milk' is particularly common in the first few months of life as the stated reason for cessation of breast-feeding and for giving other foods. It is thus a major contributor to the adverse infant feeding patterns found among young infants in the periurban areas of these two Bolivian cities. Therefore, it is a problem that should be given serious attention when talking about infant feeding with pregnant women and mothers of young infants. Women should be informed that if they think their breast-feeding infants are not getting enough milk, they should breast-feed more frequently in order to stimulate the milk supply. The fact that this response is reported by some women in both communities suggests that it is likely to be a familiar and acceptable idea. Mothers should also be taught how to evaluate whether their infants are indeed receiving sufficient milk – including adequate weight gain and frequent urination and stooling.

Obermeyer & Castle (1997) argue that optimizing the feeding of infants requires consideration of infant feeding in relation to the material and social context of women's lives. Thus, teaching mothers that 'breast is best', as many breast-feeding campaigns do, is not enough. Many mothers agree with this slogan, but they lack the confidence that they themselves are capable of breast-feeding exclusively; information about how to maintain a sufficient milk supply and support from both health professionals and the community are also required.

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