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## Breastfeeding in Bolivia – information and attitudes

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### Abstract

**Background:** The main objective of the present study was to investigate the relationship between the attitudes of the mother and her family towards breastfeeding and the actual feeding pattern in a Bolivian population. A second objective was to study the relationship between breastfeeding information, specified according to source and timing, and feeding pattern.

**Methods:** Cross-sectional interviews with 420–502 Bolivian mothers with an infant less than or equal to 1 year of age. Duration of exclusive breastfeeding, use of prelacteal food and/or colostrum were the main outcome measures.

**Results:** The attitudes of the mother, her partner (the infant's father) and the infant's grandmother towards breastfeeding did not influence the infant feeding pattern. Women who had received breastfeeding information from health care personnel before birth or on the maternity ward breastfed exclusively for a longer duration (adjusted  $p = 0.0233$ ) and avoided prelacteal food to a greater extent (adjusted odds ratio (AOR) = 0.42; 95% confidence interval for adjusted odds ratio (95% CI AOR) = 0.23–0.72). Information from a doctor before birth or on the maternity ward was associated with less use of prelacteal food (AOR = 0.53; 95% CI AOR = 0.31–0.93), an increased use of colostrum (AOR = 3.30; 95% CI AOR = 1.16–9.37), but was not linked to the duration of exclusive breastfeeding ( $p = 0.1767$ ).

**Conclusion:** The current study indicates that breastfeeding information delivered by health care personnel in a non-trial setting may affect the infant feeding pattern including the use of prelacteal foods and colostrum. There was no evidence that the attitudes of the mother, or the infant's father or grandmother influenced actual feeding behavior. The lack of a "negative or neutral attitude" towards breastfeeding in the participants of the current study does, however, diminish the chances to link attitude to feeding behavior.

### Background

Hospital-based intervention programs, maternity ward practices, and the feeding preferences of health care providers (doctors, lactation counselors, nurses) may affect breastfeeding behavior [1–6]. Interventions to increase exclusive and any breastfeeding may also result in lower morbidity rates [5,7].

Observational results concerning the effect of information from health care personnel in a non-trial setting are more ambiguous [8,9]. In an early meta-analysis by Bernard-Bonnin and colleagues[10], nursing support without phone follow-up did not have a statistically significant effect on breastfeeding duration.

The infant's father and other relatives may also play important roles in supporting and favoring breastfeeding [9,11-13].

Several studies have looked at the content of infant feeding information from the perspective of medical professionals [14,15], but fewer studies have asked the mothers if and when they received breastfeeding information [16]. A literature search failed to identify any study that correlates information about breastfeeding in a non-trial setting with feeding patterns including the use of colostrum and prelacteal food.

In Bolivia, the exclusive breastfeeding rate in infants under 4 months of age was found to be above 50%, with 13.6 % of infants still being exclusively breastfed at 6-9 months of age [17]. In a second study, only 30% of infants in Bolivia had begun receiving solid foods by 4 months of age [18]. Although several studies have dealt with infant feeding and infant and maternal health [18-23], to the author's knowledge there are no data on the relationship between attitudes towards breastfeeding and information about breastfeeding and the actual breastfeeding pattern in this country.

The main objective of the present study was therefore to investigate the relationship between the attitudes of the mother and her family towards breastfeeding and the actual feeding pattern in a Bolivian population. A second objective was to study the relationship between breastfeeding information, specified according to source and timing, and feeding pattern.

**Methods**

**Study area**

This study took place in La Paz, Bolivia. The interviews were conducted in consultant rooms, waiting halls and maternity wards of four hospitals (Del Nino, 20 De Octubre, San Gabriel and Obrero).

**Study population**

Bolivian mothers with an infant ≤ 1 year of age were eligible for this cross-sectional study. The mothers lived in the La Paz urban area or in villages within a four-hour bus ride from the city.

This study was part of a larger study on infant feeding (n = 518 infants). Subjects interviewed about attitudes (n-max = 502) or about breastfeeding information (n-max 420) did not differ with regard to educational level, social class or ethnicity from the mothers in the larger study who were not asked about attitudes/breastfeeding information. The questions on breastfeeding information were added at a stage when a number of women already had

entered the study, hence the smaller number of mothers answering questions about breastfeeding information.

Ten women declined to participate, mainly because of insufficient ability to speak Spanish.

The mothers were between 13 and 45 years of age (mean 25.6 ± 5.9 (standard deviation; SD) years), and 62 of the total number were teenagers. Practically all the mothers were urban dwellers and the majority were Catholic (Table 1).

The mean age of the infants was 4.3 ± 3.6 (SD) months (median 4 months), with many infants below the age of one month (n = 163), and fewer aged 10 months (n = 21), 11 months (n = 10), or 12 months (n = 22).

**Interviews**

The author interviewed all the mothers and filled in the questionnaires in Spanish. No interpreter was used. The mothers were interviewed as they entered the hospital or in some cases while waiting for a visit with a doctor.

The mother's attitude to breastfeeding was evaluated by posing the question "What is your opinion about breastfeeding?". The mother was then offered five alternatives presented in a random order (very bad, bad, neutral, good, very good). When asked to describe the attitudes of their family, the interviewed mothers were offered four alternatives in random order (negative, indifferent, positive or "do not know").

**Table 1: Characteristics of Bolivian mothers interviewed about "attitudes towards breastfeeding"**

	%	%	%
Social class (n = 457/394)	Lower 32.8/33.0	Middle 58.4/59.1	Upper 8.8/7.9
Civil status (n = 490/413)	Married 57.8/57.6	Cohabiting 32.9/32.2	Single 9.4/10.2
Religion (n = 499/420)	Catholics 77.0/76.2	Non-Catholics 23.0/23.8	
Education (n = 500/419)	≤ 5 years 35.8/35.3	>5 years 64.2/64.7	
Place of residence (n = 498/417)	Urban 95.0/95.7	Rural 5.0/4.3	
Living with (n = 492/414)	Yes 85.4/85.3	No 14.6/14.7	
Literacy (n = 493/412)	Literate 94.9/94.9	Illiterate 5.1/5.1	
Gainful employment (n = 498/417)	Yes 29.1/28.3	No 70.9/71.7	
Ethnicity (n = 455/393)	Native 58.0/58.3	Latin 42.0/41.7	

**Table 2: Background data for women interviewed about attitudes towards breastfeeding**

Infants < 4 months, exclusively breastfed (%)	47.3
Infants = 6 months, exclusively breastfed (%)	17.2
Breastfeeding initiation rate (%)	98.2
Duration, any breastfeeding* (months) (Mean $\pm$ SD)	17.1 $\pm$ 8.6
Colostrum given (%)	94.3
Prelacteal food given (%)	16.9

\* Previous infant

Hence the attitudes of persons in the mother's social network were not determined directly, but were reported by the mother based on her perceptions of their attitudes. Information about breastfeeding was assessed by posing the question "Have you received information about the advantages of breastfeeding from a doctor, nurse, other family member, neighbor, television, radio or newspapers/magazines/books?" If the mother gave a positive answer regarding any of these sources, she was then asked if and when she had first received breastfeeding information from each source, and was given three alternatives: "before the birth of the child", "on the maternity ward" or "after leaving the maternity ward".

### Definitions

Exclusive breastfeeding was defined as not giving anything else besides breast milk at the time of the interview. The maximum intake of non-breast milk fluid in the past week that was allowed in this definition of exclusive breastfeeding was set at 3 cucharillas (teaspoons) or 1 cuchara (larger spoon) or 1/2 fluid ounce. Except for this amount of fluid and for prelacteal food, the absence of previous complementary foods (or more supplementary fluids than the above weekly amount) since birth was demanded for proof of exclusive breastfeeding. In those cases where the weekly intake of food/fluid could not be specified, the end of exclusive breastfeeding was set at the date of introduction of the food/fluid in question. The provision of vitamins did not preclude exclusive breastfeeding. Hence the definition of exclusive breastfeeding used in this study differs from that suggested by Labbok et al [24]. In all analyses of exclusive breastfeeding in the current paper, a "since birth" perspective has been used. "Any breastfeeding" included exclusive, predominant and partial breastfeeding [24].

Colostrum was defined as the breast milk produced in the first five days after delivery. Prelacteal food was defined as food given to the child before breastfeeding had been initiated.

### Ethics

The study was approved by the hospital directors of the four hospitals after they were informed about its content and objectives. All participants gave their informed consent. The interviews were conducted without the identities of the interviewed mothers being recorded or revealed.

### Statistics

The statistics program StatView 5.0 (SAS Institute Inc., Cary, NC, USA) was used for analysis of the data. The significance level was set at  $p < 0.05$ , with exceptions described below. In all regression analyses, the number of independent variables was lower than the number of individuals/10 as recommended by Altman [25].

Independent variables were dichotomized in order to generate odds ratios and hazard ratios. Mothers were divided according to median age (<25 yr. or  $\geq$  25 yr.; 251 vs. 251), educational level ( $\leq$  5 years of education vs. >5 years; 179 vs. 321) and religious affiliation (Catholics vs. non-Catholics; 384 vs. 115). Five years of education meant not having entered the "intermedio" stage of education (Bolivian education is divided according to the stages "basico" 5 years, "intermedio" 3 years, "medio" 4 years, and then university studies). Social class was assessed by the interviewer on the basis of the mother's answers to the socioeconomic questions, her language and appearance, the work of her partner and her area of residence (lower 150, middle 267, upper 40). The results of the social class assessment were based on an overall assessment, and not on a weighting of the variables. In the regression analyses, mothers from the middle and upper classes were analyzed together in comparison with lower class mothers. Mothers who failed to read a sentence out loud in Spanish (from daily life) were classified as illiterate (25/493). In this study Latin ethnicity indicates European ancestry ( $n = 191$ ), while native ethnicity is predominant in the indigenous population ( $n = 264$ ). A number of women were of mixed origin, but were nevertheless classified as either Latin or Native. Work was defined as gainful employment yielding an income (on a regular basis). Mothers were not asked to specify the duration of their work.

### Determinants of maternal attitudes towards breastfeeding

When studying determinants of maternal attitudes towards breastfeeding, univariate analyses of attitude vs. ten independent variables were first carried out (Table 3). All independent variables with a  $p < 0.20$  were included in a multivariate model (initial model, see Table 3). Elimination of non-significant variables was then undertaken using backward stepwise logistic regression until all remaining independent variables had a  $p < 0.05$  (Final model, see Table 3). In the initial model, educational level, but not literacy, was kept in the model, since the two variables were regarded as similar. The *backward* stepwise

**Table 3: Determinants of maternal attitude towards breastfeeding**

	Univariate	Initial model (n = 439)	Multivariate
	OR; 95% CI OR	OR; 95% CI OR	Final model (n = 452) OR; 95% CI OR
Latin Ethnicity	4.93; 3.30–7.37	3.91; 1.42–10.74	3.32; 2.14–5.13
Middle/upper social class	4.89; 3.11–7.68	2.34; 1.30–4.30	3.05; 1.86–5.02
>5 years of education	3.53; 2.37–5.25*	1.74; 0.99–3.07	
Catholic faith	1.48; 0.97–2.27	0.98; 0.49–1.96	
No previous breastfeeding	1.38; 0.96–1.97	1.28; 0.80–2.04	
Maternal age ≥ 25 years	1.42; 0.88–1.78	1.42; 0.90–2.28	
Literacy	2.96; 1.63–14.26*		
Urban living	1.52; 0.66–3.51		
Living with infant's father	1.65; 0.74–2.03		
Work	1.03; 0.67–1.45		

OR = Odds ratios 95% CI OR = 95% confidence interval for odds ratios. Odds ratios > 1 indicate that this subgroup of women more often reported breastfeeding to be "very good". \* In the initial model educational level was included and literacy was omitted, since these two variables were regarded as similar.

mode was used to avoid exclusion of non-significant variables that affected the model fitness [25].

**Factors associated with the timing of breastfeeding information**

For each source of information, odds ratios or hazard ratios were calculated for two circumstances: (A)"any breastfeeding information vs. no breastfeeding information" and (B)"breastfeeding information before birth vs. breastfeeding information after birth or no breastfeeding information" (women informed for the first time on the maternity ward were excluded in "B"). In the case of health-care-related information and doctor-mediated information, this paper also presents determinants for (C) "breastfeeding information given before birth or on the maternity ward vs. after the maternity ward or no information received". Eight independent variables were correlated with each information source (age of mother, urban/rural residence, religious affiliation, social class, ethnicity, educational level, work, living with the infant's father) (data in this section were obtained by means of univariate analyses). In order to minimize the risk of mass significance, a modified Bonferroni correction (n/number of comparisons) was applied to this section of the results, and only p-values < 0.00625 were regarded statistically significant [26]. Therefore, there are results with a 95% confidence interval for odds ratios (95% CI OR) not including 1.00 that are *not* presented.

A p-value of < 0.00625 was also used to assess statistical significance in the analyses of knowledge about breastfeeding.

**Feeding pattern**

In the multivariate analyses, logistic regression was calculated for the following outcome measures: use of pre-lacteal foods, giving colostrum, and on-demand feeding mode. Linear regression was used to assess the duration of any breastfeeding. Cox's proportional hazards method was used to evaluate the influence of various factors on the duration of exclusive breastfeeding [25,27]. If the child was still exclusively breastfed, his/her age was entered as the duration of exclusive breastfeeding and that value was censored in the Cox's proportional hazards model. In the regression analyses presented in Tables 4 and 7, confounders were specified before the analyses on the basis of unpublished data (work, ethnicity, residence and educational level (manuscript submitted)). For that reason social class was not included among the confounders.

Kaplan-Meier curves were used to define median duration of exclusive breastfeeding. Kaplan-Meier curves were also used to evaluate the relationship between exclusive breastfeeding duration, source and timing of breastfeeding information as well as attitudes towards breastfeeding, since Cox's regression may fail to detect clinically important, but statistically insignificant, relationships [27].

**Selection of independent variables**

The main purpose of the analyses in Tables 4 and 7 was to study the association between attitude/breastfeeding information and feeding pattern, and not to create predictive models for the feeding pattern (as opposed to the analyses of determinants of maternal attitude, see Table 3). Inclusion of non-significant variables in a regression model affects the adjusted difference (or AOR=Adjusted Odds Ratio) of other independent variables very little. The

**Table 4: Attitudes towards breastfeeding on the part of the mother, the infant's father and grandmother, and the mother's sister/ brother**

	Pre-lacteal	Adj Prelact	Colostrum	Adj Colostr	Excl Bf†	Adj Excl Bf†	Any Bf	Adj any Bf	On demand	Adj On demand
<b>Attitude in</b>										
<b>Mother*</b>	502 1.01; 0.63-1.62	448 1.04; 0.61-1.79	488 0.87; 0.35-2.14	436 0.98; 0.46-2.10	177/492 1.19; 0.95-1.48	156/439 1.05; 0.81-1.36	216 -1.02; - 3.34, 1.31	199 -0.03; - 2.60, 2.54	461 1.28; 0.70-2.34	413 0.94; 0.57-1.55
<b>Father #</b>	446 0.56; 0.21-1.45	401 0.58; 0.21-1.64	435 0.85; 0.11-6.62	391 0.48; 0.06-4.14	160/439 0.99; 0.58-1.69	144/394 0.89; 0.49-1.62	209 -0.35; - 5.00, 4.31	183 0.19; - 4.75, 5.13	408 0.26; 0.034- 1.95	369 0.27; 0.035- 2.18
<b>Grandmother #</b>	447 0.61; 0.29-1.31	400 0.67; 0.30-1.50	435 1.52; 0.43-5.36	389 0.96; 0.21-4.54	158/438 0.91, 0.61-1.36	139/391 0.86; 0.56-1.30	193 -1.05; - 5.02, 2.92	176 -0.68; - 4.78, 3.42	409 0.92; 0.37-2.28	367 1.17; 0.45-3.02
<b>Sister #</b>	447 1.00; 0.51-1.97	404 1.08; 0.52-2.21	435 2.57; 1.01- 6.50π	393 2.05; 0.74-5.68	151/438 0.83; 0.60-1.15	136/395 0.78; 0.55-1.09	197 0.97; - 2.24, 4.18	182 0.89; - 2.46, 4.25	412 0.99; 0.47-2.06	374 1.15; 0.53-2.49

Adj = Adjusted value. No crude values are presented. All values have been corrected for residence (urban vs. rural), ethnicity (Latin vs. non-Latin), work (work vs. no work of the mother), education ( $\leq 5$  years of education vs.  $>5$  years of education) Bf = Breastfeeding Excl = Exclusive, for definition see text. Odds/Hazard ratios with 95% confidence intervals are given for all outcome measures except for "any breastfeeding" where values indicate differences in duration in months. \* In all analyses of maternal attitude and feeding pattern, the attitudes "good" (n = 272) and "neutral" (n = 1) were collapsed into one group and then compared with "very good" (n = 229).# Reported attitudes towards breastfeeding have been dichotomized into "positive" vs. "indifferent, negative, the mother reported not knowing the attitude". † Indicates the number of censored/total observations. Hazard ratios  $> 1$  indicate longer exclusive breastfeeding duration (usually hazard ratios in survival analyses indicate an increased risk of "death", i.e. short time to endpoint, but in this case transformations have been carried out to make data easier to interpret for the reader.).  $\pi p = 0.0468$

**Table 5: Source and timing of initial breastfeeding information**

Information Source	Before birth N=	On MW* N=	After MW* N=	Never informed N=
Any source	386	12	11	11
Health care (doctor or nurse)	250	70	27	73
Doctor	238	63	27	91
Nurse	173	84	28	135
Family	280	12	26	102
Newspapers/magazines/ books	195	0	14	209
Television	303	1	28	88
Radio	262	0	20	138
Neighbor	150	2	21	247

\* MW = Maternity Ward

purpose of the analyses of feeding patterns was to present the AOR for one variable: attitude/information about breastfeeding. For that reason neither backward nor forward elimination of variables was carried out in these analyses; the AORs originate from the initial complete model.

In all analyses of maternal attitude and feeding pattern, the attitudes "good" (n = 272) and "neutral" (n = 1) were collapsed into one group and then compared with "very good" (n = 229).

**Table 6: Factors associated with the timing of breastfeeding information**

Source and time of information	>5 years education	Latin ethnicity	Middle/upper class	Other significant factor§(maternal characteristic)
Any source				
- Anytime	8.71; 1.86–40.86	NS	NS	Urban: 9.78; 2.35–40.59
- Before birth	7.01; 3.08–15.92*	5.80; 2.00–16.84*	7.62; 3.32–17.44*	Partner†: 3.68; 1.72–7.92*
- Before or maternity w. Health care personnel	4.25; 1.69–10.68	NS	4.43; 1.74–11.27	Urban: 6.05; 1.81–20.23 Partner †: 3.65; 1.46–9.13
- Anytime	NS	NS	NS	
- Before birth	2.37; 1.57–3.57*	NS	2.21; 1.69–4.01*	
- Before or maternity w. Doctor	2.14; 1.35–3.38	NS	2.27; 1.41–3.64*	
- Anytime	NS	NS	2.13; 1.31–3.46	
- Before birth	2.56; 1.69–3.86*	NS	2.85; 1.85–4.39*	Partner†: 2.25; 1.29–3.93
- Before or maternity w. Family member	2.26; 1.46–3.49*	NS	2.42; 1.54–3.80*	
- Anytime	3.15; 1.98–4.98*	2.87; 1.70–4.83*	3.76; 2.32–6.07*	
- Before birth	3.84; 2.49–5.90*	2.35; 1.50–3.68*	4.13; 2.64–6.47*	
Television				
- Anytime	2.46; 1.52–3.97*	NS	2.60; 1.58–4.26*	
- Before birth	3.21; 2.06–5.00*	NS	3.26; 2.06–5.28*	Urban: 4.40; 1.66–11.65
Newspaper/mag./books				
- Anytime	3.29; 2.15–5.04*	2.34; 1.55–3.54*	4.26; 2.70–6.72*	
- Before birth	3.07; 2.00–4.71*	2.18; 1.45–3.28*	3.65; 2.31–5.76*	≥ 25 yrs: 1.93; 1.31–2.85*

Educational level, ethnicity and social class are in separate columns since they were often associated with breastfeeding information. Data indicate odds ratios and 95% confidence intervals for odds ratios. §Only factors with  $p < 0.00625$  are presented, see below. NS = Not significant using correction for multiple comparisons (see text);  $p < 0.00625$ . Analyses were corrected for multiple comparisons since they were exploratory. \*  $p < 0.001$  † Living with the infant's father

## Results

### Background data

The median duration of exclusive breastfeeding was 3 months (Kaplan-Meier). Most mothers had given their infant colostrum, while 1 in every 6 infants had been given prelacteal foods (Table 2).

### Attitudes towards breastfeeding

#### Maternal attitudes towards breastfeeding

The mothers in this study ( $n = 502$ ) thought that breastfeeding was good ( $n = 272$ , 54.2 %) or very good ( $n = 229$ , 45.6 %). One mother regarded breastfeeding as neither good nor bad. Out of 230 women with earlier experience with breastfeeding, 96 claimed that breastfeeding was very good for their child (41.7%), as compared with 125/252 mothers (49.6%) who had not breastfed before ( $p > 0.05$ ).

Univariate analyses showed a positive correlation between reporting that breastfeeding was "very good" for the child and the following variables: more than five years of education ( $p < 0.0001$ ), Latin ethnicity ( $p < 0.0001$ ), middle/upper class background ( $p < 0.0001$ ), and literacy ( $p = 0.0019$ ) Table 3).

In a subsequent multivariate model there was a positive correlation between a very positive attitude towards breastfeeding and Latin ethnicity ( $p < 0.0001$ ; OR = 3.32; 95% CI OR = 2.14–5.13) and middle/upper social class ( $p < 0.0001$ ; OR = 3.05; 95% CI OR = 1.86–5.02) (Table 3).

#### Perceived attitude of family towards breastfeeding

According to the interviewed mothers, partners (the father of the infant) were most often positive towards breastfeeding (422/446, 94.6%). Three mothers reported that their partner was negative towards breastfeeding.

Out of 447 grandmothers, 406 were reported to be positive (90.8%) and 11 negative towards breastfeeding.

#### Attitude and feeding pattern

With the exception of a positive association between the attitude of the breastfeeding mother's sister/brother towards breastfeeding and the use of colostrum ( $p = 0.0468$ ; OR = 2.57, 95% CI OR = 1.01–6.50), there were no associations between the attitudes of the mother, grandmother, father and the studied outcomes (Table 4). The correlation between use of colostrum and the attitude of the mother's sister/brother disappeared when data were adjusted for place of residence, ethnicity, work and educational level.

**Table 7: Breastfeeding information and feeding pattern**

Information source	Prelac-teal**	Adj Prelacteal**	Colostrum	Adj Colostrum	Excl Bf††	Adj Excl Bf††	On demand	Adj On demand
<b>Any source</b>	0.24; 0.07–0.81*	0.27; 0.07–1.08	0.00; 0.00–∞	0.00; 0.00–∞	1.33; 0.66–2.70	1.33; 0.60–2.93	0.53; 0.07–4.20	0.70; 0.08–5.93
Before	0.40; 0.19–0.86*	0.44; 0.19–1.03	0.76; 0.10–5.97	0.61; 0.07–5.25	0.88; 0.56–1.39	0.88; 0.53–1.44	0.72; 0.24–2.13	0.79; 0.25–2.46
Before + maternity w.	0.22; 0.09–0.54†	0.23; 0.09–0.60#	1.20; 0.15–9.50	0.89; 0.10–8.03	1.00; 0.61–1.64	0.98; 0.58–1.68	0.84; 0.24–2.92	0.93; 0.25–3.39
Before vs. no	0.23; 0.07–0.78*	0.27; 0.07–1.09	0.00; 0.00–∞	0.00; 0.00–∞	1.32; 0.65–1.68	1.29; 0.58–2.86	NC	NC
<b>Doctor + Nurse</b>	0.58; 0.31–1.05	0.58; 0.31–1.09	1.65; 0.52–5.26	1.47; 0.44–4.91	1.28; 0.93–1.76	1.26; 0.90–1.76	0.86; 0.41–1.77	1.02; 0.48–2.16
Before	0.69; 0.42–1.15	0.72; 0.42–1.23	2.58; 0.92–7.26	2.51; 0.86–7.29	1.16; 0.91–1.49	1.17; 0.90–1.52	0.66; 0.38–1.16	0.78; 0.43–1.43
Before + maternity w.	0.42; 0.25–0.72#	0.42; 0.23–0.72#	2.62; 0.95–7.24	2.54; 0.89–7.23	1.47; 1.11–1.93#	1.40; 1.05–1.87*	1.06; 0.58–1.96	1.22; 0.64–2.33
Before vs. no	0.55; 0.29–1.03	0.57; 0.29–1.12	2.41; 0.66–8.78	2.07; 0.52–8.15	1.31; 0.94–1.82	1.26; 0.89–1.80	0.75; 0.36–1.58	0.90; 0.41–1.96
<b>Doctor</b>	0.69; 0.39–1.23	0.71; 0.39–1.30	2.97; 1.07–8.21*	2.67; 0.94–7.62	1.11; 0.82–1.50	1.09; 0.79–1.49	0.17; 0.01–2.91	1.01; 0.51–1.99
Before	0.74; 0.45–1.23	0.78; 0.46–1.34	3.06; 1.04–8.98*	2.94; 0.96–8.98	1.03; 0.81–1.32	1.04; 0.80–1.36	0.68; 0.39–1.18	0.82; 0.45–1.48
Before + maternity w.	0.52; 0.31–0.89*	0.53; 0.31–0.93*	3.48; 1.26–9.59*	3.30; 1.16–9.37*	1.25; 0.96–1.64	1.22; 0.92–1.62	1.06; 0.59–1.91	1.22; 0.66–2.27
Before vs. no	0.65; 0.36–1.20	0.58; 0.30–1.13	3.94; 1.22–12.78*	3.54; 1.03–12.02*	1.14; 0.82–1.52	1.08; 0.77–1.50	0.87; 0.40–1.55	0.91; 0.45–1.86
<b>Nurse</b>	0.62; 0.37–1.05	0.60; 0.35–1.02	0.97; 0.33–2.85	0.85; 0.2–82.59	1.12; 0.86–1.45	1.06; 0.80–1.39	0.87; 0.49–1.55	0.97; 0.53–1.78
Before	0.75; 0.45–1.27	0.74; 0.43–1.27	1.59; 0.54–4.66	1.55; 0.52–4.16	1.04; 0.81–1.33	1.04; 0.81–1.36	0.80; 0.47–1.35	0.79; 0.44–1.39
Before + maternity w.	0.56; 0.33–0.92*	0.54; 0.32–0.91*	1.24; 0.45–3.14	1.15; 0.41–3.21	1.20; 0.94–1.54	1.14; 0.88–1.49	1.08; 0.63–1.85	1.12; 0.63–1.99
Before vs. no	0.62; 0.35–1.11	0.59; 0.32–1.08	1.32; 0.37–4.64	1.24; 0.34–4.53	1.10; 0.83–1.46	1.06; 0.78–1.43	0.80; 0.43–1.50	0.87; 0.45–1.67
<b>Family</b>	0.82; 0.46–1.46	0.87; 0.47–1.61	0.43; 0.10–1.92	0.40; 0.08–1.88	0.98; 0.73–1.30	1.03; 0.75–1.41	0.82; 0.44–1.56	0.93; 0.47–1.86
Before	0.71; 0.42–1.20	0.71; 0.40–1.26	0.67; 0.21–2.12	0.61; 0.18–2.10	1.00; 0.77–1.29	0.90; 0.68–1.20	0.80; 0.45–1.42	0.71; 0.37–1.36
Before + maternity w.	0.70; 0.41–1.19	0.70; 0.39–1.24	0.75; 0.24–2.38	0.73; 0.21–2.51	1.01; 0.77–1.31	1.08; 0.81–1.45	0.92; 0.51–1.64	0.83; 0.43–1.61
Before vs. no	0.76; 0.43–1.37	0.79; 0.42–1.50	0.45; 0.10–2.04	0.40; 0.08–1.99	0.99; 0.74–1.32	1.09; 0.78–1.50	0.80; 0.42–1.54	0.87; 0.43–1.75
<b>Neighbor ##</b>	0.93; 0.56–1.56	0.81; 0.48–1.39	0.89; 0.33–2.44	0.86; 0.31–2.41	0.95; 0.74–1.22	0.97; 0.75–1.26	1.46; 0.84–2.55	1.37; 0.76–2.36
Before	0.74; 0.43–1.27	0.64; 0.36–1.12	1.23; 0.42–3.62	1.23; 0.41–3.64	0.90; 0.70–1.16	0.90; 0.69–1.18	1.44; 0.81–2.57	1.25; 0.69–2.28
Before vs. no	0.79; 0.45–1.38	0.68; 0.38–1.22	1.10; 0.36–3.36	1.09; 0.35–3.38	0.91; 0.70–1.18	0.93; 0.71–1.22	1.49; 0.83–2.67	1.32; 0.72–2.41
<b>TV ##</b>	0.39; 0.23–0.68†	0.42; 0.23–0.75#	1.60; 0.49–5.22	2.10; 0.70–6.26	0.81; 0.60–1.08	0.78; 0.56–1.06	0.57; 0.27–1.20	0.56; 0.25–1.26
Before	0.51; 0.30–0.85*	0.52; 0.30–0.91*	1.14; 0.36–3.59	1.46; 0.50–4.32	1.05; 0.80–1.37	1.10; 0.82–1.48	0.60; 0.32–1.11	0.56; 0.29–1.09
Before vs. no	0.40; 0.23–0.71#	0.43; 0.24–0.78#	2.13; 0.75–6.05	1.88; 0.63–5.66	0.84; 0.62–1.13	0.83; 0.60–1.14	0.58; 0.27–1.23	0.57; 0.25–1.30
<b>Radio##</b>	0.75; 0.44–1.26	0.74; 0.43–1.28	1.25; 0.44–3.52	1.35; 0.47–3.87	0.93; 0.72–1.20	0.86; 0.66–1.13	0.72; 0.40–1.30	0.77; 0.41–1.44
Before	0.78; 0.47–1.31	0.77; 0.46–1.32	1.00; 0.36–2.82	1.08; 0.38–3.08	0.94; 0.74–1.21	0.90; 0.70–1.18	0.79; 0.45–1.39	0.88; 0.48–1.59
Before vs. no	0.75; 0.44–1.27	0.74; 0.43–1.29	1.16; 0.41–3.26	1.25; 0.44–3.60	0.93; 0.72–1.21	0.87; 0.66–1.15	0.73; 0.40–1.33	0.80; 0.42–1.50

**Table 7: Breastfeeding information and feeding pattern (Continued)**

<b>Book/Mag##</b>	0.74; 0.45– 1.23	0.68; 0.39– 1.17	1.01; 0.37– 2.74	1.02; 0.35– 2.95	1.03; 0.81– 1.31	0.91; 0.69– 1.19	0.86; 0.50– 1.46	0.83; 0.46– 1.51
Before	0.71; 0.42– 1.19	0.64; 0.37– 1.12	1.14; 0.42– 3.12	1.18; 0.41– 3.42	1.03; 0.81– 1.32	0.94; 0.72– 1.23	0.91; 0.53– 1.54	0.89; 0.48– 1.64
Before vs. no	0.72; 0.42– 1.21	0.66; 0.38– 1.16	1.08; 0.38– 3.04	1.07; 0.36– 3.21	1.03; 0.81– 1.33	0.92; 0.70– 1.21	0.88; 0.51– 1.51	0.89; 0.50– 1.60

Adj = Adjusted value. Adjusted values have been corrected for residence (urban vs. rural), ethnicity (Latin vs. non-Latin), work (work vs. no work of the mother), education ( $\leq 5$  years of education vs.  $>5$  years of education) Bf = Breastfeeding Excl = Exclusive, for definition see text. NC = Not calculated: there were no "on-demand-fed infants" in the group "not informed at all". Only women who had never been informed about breastfeeding were included in the "no-group". When no "time" is specified in the column "information source", comparisons indicate relationships between "any information" and no information from the source in question. \*  $p < 0.05$ ; #  $p < 0.01$ ; †  $p < 0.001$  \*\* In calculations regarding prelacteal foods the reference category consists of "informed after birth or never informed", since information after the first few days of life would have no influence on this type of feeding behavior. ## No odds/hazard ratios or 95% confidence intervals for odds/hazard ratios have been calculated for the combination of "before birth of the infant or on the maternity ward", since the number of mothers receiving their initial information about breastfeeding on the maternity ward was  $\leq 2$ . †† Hazard ratios  $>1$  indicate longer exclusive breastfeeding duration (usually hazard ratios  $> 1$  in survival analyses indicate an increased risk of "death", i.e. short time to endpoint, but in this case transformations have been carried out to make data easier to interpret for the reader).

**Knowledge about breastfeeding**

The advantages of breastfeeding were well known, and 92.6% of the mothers (461/498) mentioned at least one advantage. Most frequently mentioned were nutrition (318/498, 63.9%), defense against infectious diseases (309/498, 62.0%), and practical aspects (73/498, 14.7%). Economic factors (35/498, 7.0%) and breastfeeding as a means of enhancing contact between mother and child were also pointed out (18/498, 3.6%).

Knowledge about advantages of breastfeeding were linked to educational level ( $>5$  years of education:  $p < 0.0001$ ; OR = 11.19, 95% CI OR = 4.57–27.41), middle or upper social class background ( $p < 0.0001$ , OR = 5.84; 95% CI OR = 2.71–12.58), and Latin ethnicity ( $p = 0.0004$ ; OR = 8.80, 95% CI 2.65–29.18). When including these factors and adding urban residence ( $p = 0.0265$ ; OR = 3.24, 95% CI OR = 1.15–9.17) in a regression analysis, only educational level remained statistically significant with regard to knowledge about breastfeeding advantages. Mothers with more than five years of education were more often able to mention at least one advantage of breastfeeding ( $p = 0.0009$ ; AOR = 6.91; 95% CI AOR = 2.21–21.60;  $n = 443$ ).

Mothers who were able to mention at least one advantage of breastfeeding had been informed about breastfeeding to a greater extent than other mothers (information from anyone, from a medical doctor, from neighbors, from television, from newspapers/magazines/books).

Most women did not report any disadvantages of breastfeeding (448/491, 91.2 %). However, fifteen mothers mentioned transmission of diseases (3.1 %) and eleven mothers (2.2%) said breastfeeding made it difficult for the mother to work outside the home.

**Breastfeeding information**

*Sources of breastfeeding information*

Irrespective of the source of information, 91.9 % (386/420) of the women had been informed about breastfeeding before the birth of their present child (Table 5). Eleven mothers (2.6%) had never received such information.

Out of 420 mothers, 250 (59.5 %) had received information about breastfeeding from either a *doctor or a nurse* before the birth of the infant. Seventy mothers were first informed on the maternity ward (16.7 %) and seventy-three mothers (17.4 %) had never been informed about breastfeeding.

Most mothers had been informed by a *doctor* before the birth of their child. The most common sources of information about breastfeeding before birth were television (303/420) and the family (280/420) (Table 5).

*Factors associated with the timing of breastfeeding information*

Mothers with more than five years of education, of Latin ethnicity or with a middle/upper class background were in general more often informed about breastfeeding (Table 6). This was true irrespective of the timing of information. Mothers living in urban areas and mothers living with the infant's father also reported having been informed about breastfeeding more often than other women. Adjusting for multiple comparisons, no independent variable correlated with breastfeeding information from a nurse, a neighbor or the radio.

*Mode of providing information*

The predominant mode of breastfeeding information provided by health care was verbal (313/418, 74.9 %), while 110 of 418 mothers had been informed through pamphlets (26.3%). Other channels of information included

films/videos (74/418, 17.7 %) and posters (33/418, 7.9%).

#### *Breastfeeding information and feeding pattern*

Information about breastfeeding, irrespective of source and time relationship to the birth, was associated with avoidance of prelacteal foods (Table 7). When adjusting for pre-specified confounders, use of prelacteal foods was less often reported by mothers who had received initial breastfeeding information before the infant's birth or on the maternity ward (vs. after birth or not having received any information at the time of the interview).

Breastfeeding information given before birth or on the maternity ward by either a doctor or a nurse was associated with an avoidance of prelacteal foods and a longer exclusive breastfeeding duration (Crude analysis: censored = 156/417; Adjusted analysis: censored = 143/384) (Table 7).

Doctor-mediated breastfeeding information given before birth or on the maternity ward was associated with giving colostrum and avoidance of prelacteal foods (Table 7). Televised breastfeeding information correlated with avoidance of prelacteal foods (Table 7).

## **Discussion**

Women who had received breastfeeding information from health care personnel before birth or on the maternity ward breastfed exclusively for a longer period of time and avoided prelacteal food to a greater extent. Use of prelacteal food was reduced by 50% and the chance of feeding the infant colostrum increased by more than 200% in women informed about breastfeeding by a doctor before birth or on the maternity ward.

#### **Strengths and weaknesses of the study**

All the interviews in this study were conducted by the author, and this should have ensured a consistent technique and interpretation of the answers. A number of interviews were interrupted, and certain questions were not answered by all women. The interruptions occurred at all four hospitals and were not limited to a certain socio-economic group. Nevertheless, bias cannot be excluded, and the results should be interpreted with caution. In the mid-1990s, 93% of infants in the urban areas of Bolivia received at least one vaccination [28]. Although the hospital visits of most infants were for the purpose of regular check-ups and vaccinations, a number of infants were seen because of illness. Hence, in the present study, bias in the sample cannot be excluded. There is a risk that the reasons for the visits were associated with feeding patterns [29]. Some mothers may also have been worried, and the fact that such feelings may have affected the reliability of their answers cannot be excluded.

The attitudes of the infant's father and grandmother and the mother's sisters/brothers were reported by the mother. These answers may have differed from the true opinions of the infant's father, grandmother, etc. [30]. However, it seems unlikely that such discrepancies have affected the results, since maternal feeding behavior is influenced by what the mother perceives as the attitude of her partner or of her own mother. Social class and ethnicity were assessed by the author. No weighting was used. The use of a formal index for social status, such as the Hollingshead (ISP) Index of Social Position, would have improved the study.

The intake of three teaspoons of fluid per week and the use of prelacteal food were allowed under the definition of exclusive breastfeeding in the present paper. An average of less than half a teaspoon a day of fluid would not be expected to contribute to the actual nutrition of the child and was hence accepted in the definition of exclusive breastfeeding. At the time of study, the WHO accepted drops and syrups in their definition of exclusive breastfeeding (page 3; [http://www.who.int/child-adolescent-health/New\\_Publications/NUTRITION/who\\_cdd\\_ser\\_91.14.PDF](http://www.who.int/child-adolescent-health/New_Publications/NUTRITION/who_cdd_ser_91.14.PDF)). It was the author's impression that prelacteal foods were seldom given for nutritional reasons, but rather as a matter of tradition.

This was a cross-sectional and retrospective study, not a clinical trial, and for that reason the content of breastfeeding information was not checked. In a recent study from the United States, the majority of pediatricians were unfamiliar with the content of the Baby Friendly Hospital Initiative [15], and two thirds of the doctors did not make specific recommendations on the duration of breastfeeding [15]. Any strategy aiming to decrease the use of prelacteal foods and to increase the use of colostrum and the duration of exclusive breastfeeding must take both the timing and the content of breastfeeding information into consideration. The mothers were asked at what stage they had first been informed about breastfeeding. This means that the extent to which mothers answering "before birth" had also received information on the maternity ward, or after leaving the maternity ward, is uncertain. The fact that duration of exclusive breastfeeding, use of colostrum, and avoidance of prelacteal food were linked to health-care-related "information before birth or on the maternity ward", but not to "before birth", may indicate that we should focus our efforts on informing mothers about breastfeeding on the maternity ward. Future studies may choose to approach the issue of timing in a different manner.

The same potential confounders were used in all regression analyses of the relationship between attitudes towards and information about breastfeeding and feeding

pattern. This was done in order to inhibit the risk of data torturing. This study was based on interview data. Feeding data have not been confirmed through direct observation or other validation, and there is an obvious risk of recall bias. However, the data on the rate of exclusive breastfeeding at various ages, for example, show a good correlation with those from the preceding Bolivian Demographic and Health Enquiry (Data not shown)[31].

### **Main findings**

Almost all mothers thought breastfeeding was good or very good. This is not surprising, since two thirds of the mothers spontaneously mentioned the nutritional and immunological properties of breast milk when asked if they knew of any advantages of breastfeeding. According to the mothers, in more than 90% of cases the infant's father and grandmother were both positive toward breastfeeding.

Latin ethnicity and middle/upper class mothers were three times more likely than other mothers to report that breastfeeding was "very good". This could either be due to better knowledge of breastfeeding advantages or to a different use of language. In this study both Latin origin and middle/upper class background were strongly linked to having been informed about breastfeeding by someone, and both variables correlated with mentioning advantages of breast milk. A third factor of seeming importance regarding access to information was level of education. Educational level was also the only remaining independent variable in a stepwise regression analysis of determinants for knowledge of breastfeeding advantages. In richer countries, a high educational level may translate into longer breastfeeding duration.

The data did not support a link between attitude of the mother and duration of exclusive breastfeeding. Maternal attitude has otherwise been shown to be an important predictor of the breastfeeding decision [32,33]. One reason for the surprising results may be that Latin ethnicity, although linked to a very positive attitude towards breastfeeding, has also been linked to a shorter duration of exclusive breastfeeding (unpublished data). In many developing countries affluent groups have lower breastfeeding rates [34]. A second reason could be the way "attitude" was defined in the present study. Losch and colleagues [35] describe "attitude" as "intention to breast-feed", while Scott and colleagues [36] define it as feeding preference. A third reason could be the measurement of maternal attitudes. A multiattribute utility questionnaire, such as the one used by Dungy et al., might have yielded different results [37].

No breastfeeding parameter correlated with the attitude of the infant's father or grandmother, and this is in contrast

to studies from other countries [9,12,36,38]. Almost all partners and grandmothers in this study were reported to be positive toward breastfeeding, and the lack of "negative or neutral attitudes" towards breastfeeding diminishes the chances to link attitude to feeding behavior. Lay support for breastfeeding probably results in a longer duration of exclusive breastfeeding [6]. It must, however, be emphasized that the cited meta-analysis by Sikorski and colleagues [6] was based on randomized and quasi-randomized trials in which even lay persons had undergone breastfeeding counseling/lactation management courses. Although partners and grandmothers in Bolivia may have an influence on feeding decisions because of their emotional importance to the mothers, it is unlikely that they will exert much effect through the transmission of facts. Hence, the results of the present study do not support Losch and colleagues [35] in their recommendation that information be targeted not only at mothers but also at other individuals such as fathers. Such measures may not influence infant feeding patterns in Bolivia.

Sixty-three percent of *the women* in the present study reported that health care personnel had informed them about breastfeeding. This figure offers a different perspective than studies reviewing the extent to which *medical professionals* claim to take up issues concerning breastfeeding with pregnant women [14,15].

The unequal distribution of health care-mediated information found among Bolivian women indicates a structural problem, especially since only information mediated by health care personnel (doctor or doctor/nurse) influenced the actual duration of exclusive breastfeeding, and the use of prelacteal food and colostrum. The correlation between professional information/support and exclusive breastfeeding duration is in line with a recent Cochrane report in which the relative risk for stopping exclusive breastfeeding before the final study assessment was significantly lower among women receiving professional support (95% CI relative risk = 0.69–0.89) [6].

The use of colostrum and avoidance of prelacteal foods are cornerstones in early infant nutrition and may be prerequisites for the establishment of future exclusive breastfeeding. Resources must be made available to enable health care personnel to inform all Bolivian women about breastfeeding. This is especially important in a poor area of the world where the prevalence of gastroenteritis is high [39]. Numerous studies have shown a protective effect of breastfeeding in relation to infectious diarrhea [5,40].

On the basis of this study it is reasonable to advocate that in Bolivia, breastfeeding information should be supplied before birth or perhaps even more importantly, on the

maternity ward. Intervention with antenatal breastfeeding support seems to have less effect on breastfeeding rates than trials offering only postnatal support [6]. In that context, the observation by Reiff and colleagues [8] that health care personnel may exert a stronger influence on mothers' infant-feeding practices with nonverbal teaching (the hospital "modeling" of infant formula products) than with verbal teaching is important. Breastfeeding promotion programs on a maternity ward setting should include more than just verbal information; e.g. rooming-in, breastfeeding assistance and talks during hospitalization. The maternity ward may also provide mothers with a place to exchange ideas and experiences among themselves as well as to solve breastfeeding problems.

### Conclusions

In conclusion, the results of this study indicate that breastfeeding information delivered by health care personnel in a non-trial setting may influence the infant feeding pattern including the use of prelacteal foods and colostrum. This study does not present any evidence indicating that the attitudes of the mother, or the infant's father or grandmother influence actual feeding behavior. However, this is a cross-sectional and retrospective study with a risk for recall bias, and data need to be confirmed in a longitudinal study in which the timing and content of the information are taken into consideration.

### List of abbreviations used

Adj, adjusted

AOR, adjusted odds ratio

Bf, breastfeeding

CI, confidence interval

Excl, exclusive

OR, odds ratio

SD, standard deviation

### Competing interests

None

### Authors' contributions

JFL is the sole author of this paper.

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