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# User embracement and maternal characteristics associated with liquid offer to infants

## ABSTRACT

**OBJECTIVE:** To identify the maternal characteristics and welcoming actions towards mothers of infants aged less than six months associated with early liquid offer.

**METHODS:** Cross-sectional study performed in 2007, with a representative sample of mothers of infants aged less than six months ( $n=1,057$ ), users of Primary Health Care (PHC) Units, in the city of Rio de Janeiro, Southeastern Brazil. A multivariate logistic regression model was used to estimate the association between explanatory variables and liquid offer, with weighing and design effect and controlled for infant age.

**RESULTS:** Of all mothers, 32% did not receive the welcoming card in the maternity hospital, 47% did not receive guidance on breastfeeding at their first visit to the PHC unit after childbirth and 55% reported they had offered liquids to their infants. Women without at least six months of previous breastfeeding experience were more likely to offer liquids than those with such experience (OR=1.57; 95% CI: 1.16;2.13). Mothers who had not received guidance on breastfeeding at their first visit to the UBS after childbirth were 58% more likely to offer liquids than those who had received it. Liquid offer was positively associated with adolescence among women with a partner (OR=2.17; 95% CI: 1.10;4.30) and negatively associated with adolescence among those without a partner (OR=0.31; 95% CI: 0.11;0.85). Among women with less than eight years of education, those who had not received guidance on breastfeeding after childbirth were 1.8 times more likely to offer liquids than others who had received it.

**CONCLUSIONS:** Age, marital status and previous breastfeeding experience are maternal characteristics associated with liquid offer to infants aged less than six months. Receiving early guidance on breastfeeding could reduce liquid offer to infants.

**DESCRIPTORS:** Breast Feeding. Milk Substitutes. Drinking. Maternal Behavior. Infant Nutrition. User Embracement. Cross-Sectional Studies.

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## INTRODUCTION

Evidence that maternal milk supplementation with liquids (water, teas and juices) in the first six months of life is unnecessary and inadequate, because it leads to a reduction in total consumption of maternal milk<sup>2,15</sup> and an increase in the risk of morbid-mortality from diarrhea,<sup>14,19</sup> has existed for approximately two decades. In 1989, The World Health Organization (WHO) already

recommended that exclusive breastfeeding be maintained during the infant's first four to six months of life,<sup>20</sup> while the current recommendation is to maintain it until six months.<sup>21,a</sup>

In 1996, the proportion of mothers who introduced liquids into the diet of infants aged less than six months was high in Brazil. Among infants breastfed until they were one month of age, 25.7% received other liquids; while this value was 42.4% for infants aged from two to three months and 47.6% for those aged from four to five months.<sup>b</sup> In a study performed in Primary Health Care (PHC) units of the state of Rio de Janeiro, between 1999 and 2000, it was observed that 47.9% of mothers had offered water, tea or juice since the infant's first month of life.<sup>4</sup> In another study,<sup>6</sup> a median of 30 days of life was found for the offer of water and tea, in a city of the state of São Paulo, Southeastern Brazil. In the state of Pará, northern region, 62.9% of infants had already received water and tea in their first month of life.<sup>13</sup>

Early liquid offer, even if sporadic, has been found to be associated with the interruption of exclusive breastfeeding before six months.<sup>7</sup> It is possible that many mothers do not see these liquids as foods and attribute important functions to them in the infant's first months of life. The most frequent justifications to offer tea and water to infants are abdominal cramps, flatulence and thirst.<sup>13</sup>

In Brazil, pro-breastfeeding actions have been developed in the last two decades, such as the Iniciativa Hospital Amigo da Criança (IHAC – Baby-Friendly Hospital Initiative), on the federal level;<sup>16,c</sup> the Iniciativa Unidade Básica Amiga da Amamentação (IUBAAM – Breastfeeding-Friendly Primary Care Initiative), in the state of Rio de Janeiro;<sup>5,d</sup> and the Projeto Acolhimento Mãe-Bebê (Mother-Baby Welcoming Project), in the city of Rio de Janeiro.<sup>e</sup> This last strategy recommends that, at the moment of discharge from the maternity hospital, the mother receive guidance and a reference card for the first visit to the health unit. This visit must preferably occur in the infant's first week of life, so that the mother and infant have early access to breastfeeding support, among other activities.<sup>e</sup>

Thus, the objective of the present study was to identify the maternal socioeconomic and demographic factors and mother-infant welcoming actions associated with liquid offer (teas, water and juices).

## METHODS

This was a cross-sectional study with a sample of mothers of infants aged until six months who sought pediatric or child care consultations in Primary Health Care (PHC) units in the city of Rio de Janeiro, Southeastern Brazil, between June and September 2007.

Sample size was calculated based on a relative precision of 13% of the estimator and a 95% confidence level, resulting in a sample of 27 PHC units, with 40 interviews per unit. Selection of the PHC units and mothers was performed using two-stage cluster sampling. To obtain a geographically representative sample of the city of Rio de Janeiro, the PHC units were ordered according to the Euclidean distance, calculated from the geographic coordinates of the health establishments, in relation to the Centro Administrativo do Município do Rio de Janeiro (City of Rio de Janeiro Administrative Center). They were systematically selected, following a spiral shape, with a probability of selection proportional to the mean monthly number of consultations performed with infants aged until six months, in the first semester of 2005.<sup>11</sup> Secondary sampling units (mothers of infants aged until six months) were systematically selected, following the order they had left pediatric consultations. In this occasion, mothers were invited to participate in the research. Those who accepted to participate did not differ from others who refused it, in terms of age, level of education and infant age, according to Mann-Whitney nonparametric test ( $p < 0.05$ ). Sample losses were replaced.

The questionnaire applied to mothers was pre-tested and assessed in a pilot study, in three health units.

The field team responsible for the application of questionnaires to mothers was comprised of 24 interviewers and six supervisors, all properly qualified. Completed questionnaires were reviewed by the reviewers, supervisors and interviewers themselves, before being registered in a database by double data entry.

Infants aged between zero and 179 days were included in this study. HIV-positive mothers, for whom breastfeeding is contraindicated,<sup>f</sup> and Asian and indigenous women, who showed low representation in the sample, were excluded.

Independent variables used in a dichotomous way were as follows: maternal age, level of education, marital

<sup>a</sup> World Health Organization. The optimal duration of exclusive breastfeeding - report of an expert consultation. Geneva, Switzerland, 28-30 March 2001. Geneva; 2001.

<sup>b</sup> Sociedade Civil Bem-Estar Familiar no Brasil. Pesquisa Nacional sobre Demografia e Saúde 1996: relatório da pesquisa. Rio de Janeiro; 1997.

<sup>c</sup> Ministério da Saúde. Portaria SAS/MS Nº 756, de 16 de dezembro de 2004. Estabelece, na forma do Anexo desta Portaria, as normas para o processo de habilitação do Hospital Amigo da Criança integrante do Sistema Único de Saúde - SUS. *Diário Oficial União*. 17 dez. 2004;Seção1:99.

<sup>d</sup> Secretaria de Estado de Saúde do Rio de Janeiro. Resolução SES Nº 2.673 de 02 de março de 2005. Implanta a Iniciativa Unidade Básica Amiga da Amamentação no Estado do Rio de Janeiro e dá outras providências. *Diário Oficial Estado Rio de Janeiro*. 14 mar.2005:17-8.

<sup>e</sup> Prefeitura da Cidade do Rio de Janeiro. A saúde do Rio em transformação. Rio de Janeiro; 2006. (Coleção Estudos da Cidade, 219).

status, number of household members, previous breastfeeding experience for six months or more, receiving the mother-infant welcoming card in the maternity hospital, being informed about going to a PHC unit in the first week after child birth, having the first contact with the PHC unit in the infant's first week of life, receiving guidance on breastfeeding in the first visit to the PHC unit after child birth, and receiving guidance on breastfeeding in the PHC unit after child birth. "Infant age in days" was used as continuous variable. The "ethnic group", "maternal work" and "assets indicator" variables were defined as three categories.

The assets indicator<sup>18</sup> was calculated as follows:

$$AI = \sum_i (1 - fi)bi$$

*i* varies from 1 to 10 assets; *bi* equals to 1 or zero, respectively, in the presence or absence of the following: radio, fridge or freezer, DVD player or VCR, washing machine, microwave oven, fixed telephone line, computer, television, private car and air conditioning. The weight attributed to the presence of each item was the complement of the relative frequency (*fi*) of each item in the total sample; the less present an item, the greater the weight attributed to it. The value of the indicator of assets varied from zero to 4.8.

The dichotomous dependent variable analyzed was having received tea, water or juice until the interview date, and this information was obtained from the following question, "Since (baby name) left the maternity hospital, have you given him/her water, tea or juice?".

In the first stage of analysis, each sample unit was weighed by the inverse of its probability of selection. Values of weight obtained were subsequently standardized by multiplying each non-standardized weight by a *k* factor. This *k* factor was calculated by dividing the total sample size by the sum of non-standardized weights, as described by Sousa & Silva.<sup>17</sup>

The second stage was based on bivariate logistic regression models with weighting and design effect. The intensity of associations between the independent variables and the dependent variable in the bivariate analysis was measured by gross odds ratio (OR) estimates and 95% confidence intervals (95% CI). The presence of eight interactions was tested: maternal age with marital status; maternal age with work categories; maternal age with level of education; marital status with level of education; marital status with assets indicator; level of education with work categories; level of education with receiving guidance on breastfeeding in the first visit to the PHC unit after child birth; and level of education with receiving guidance on breastfeeding in the PHC unit after child birth.

In the third stage, multivariate logistic regression models were performed, with weighting and design effect and adjusted for infant age, with the variables and interactions significant at a 20% level in the bivariate analysis; variables and interactions significant at a 5% level were maintained in the final multivariate model.

After selection of the final multivariate model, estimates of adjusted OR and their respective 95% CI were calculated.

Analysis of the presence of influential points was performed to observe adequacy of the final multivariate model, using Cook's Distance plot, considering as influential observation those showing Cook's Distance value equal to one or higher.<sup>3</sup> Adjusted estimates of association and 95% CI were recalculated after exclusion of the most influential point. All analyses were performed with R software, version 2.7.0.

This research project was approved by the Escola Nacional de Saúde Pública Sergio Arouca – ENSP/FIOCRUZ (Oswaldo Cruz Foundation's National School of Public Health) (official opinion 132/06 – approved on March 7<sup>th</sup>, 2007) and the Secretaria Municipal de Saúde do Rio de Janeiro (City of Rio de Janeiro Department of Health) Research Ethics Committees (official opinion 74A/2007 – approved on June 18<sup>th</sup>, 2007).

## RESULTS

Among the 1,082 women interviewed, 1,057 met the sample selection criteria. Among infants who participated in the study, 34.5% (*n*=365) were younger than two months of age; 38.7% (*n*=409), between two and three months; and 26.8% (*n*=283), between four and five months. Mean maternal age was 25.8 years, with values varying between 12 and 44 years.

As observed in Table 1, 22.5% (*n*=238) of mothers were adolescents, 49.8% (*n*=526) were mixed and 22.1% (*n*=234) were black, 41.9% (*n*=443) had less than eight years of education and 14.9% (*n*=158) did not have a partner. Mothers, in their majority, had no paid work (65.1%), lived in households with four individuals or more (70.2%) and had an indicator of assets equal to or lower than two (72.7%). Almost 64% (*n*=675) of women had little or no previous breastfeeding experience for six months or more.

The proportion of liquid offer in the first six months of life was 55.5% (*n*=586); 38.4% (*n*=140) among those aged less than two months; 55.6% (*n*=227), between two and three months; and 77.3% (*n*=219), between four and five months.

When asked about access to mother-infant welcoming actions (Table 2), 31.8% (*n*=336) of mothers did

**Table 1.** Demographic and socioeconomic characteristics of mothers of infants aged less than six months, cared for in primary health care units. Municipality of Rio de Janeiro, Southeastern Brazil, 2007. (N=1,057)

Variable	n	%
Maternal age (years)		
< 20	238	22.5
≥ 20	819	77.5
Ethnic group		
Black	234	22.1
Mixed	526	49.8
White	297	28.1
Level of education (years)		
Less than 8	443	41.9
8 or more	614	58.1
Marital status		
Without a partner	158	14.9
With a partner	899	85.1
Work categories		
Without paid work	688	65.1
Informal work	146	13.8
Formal work	223	21.1
Assets indicator		
≤1	500	47.3
>1 and ≤2	269	25.4
>2	288	27.3
Number of household members		
2 to 3	315	29.8
4 or more	742	70.2
Previous breastfeeding experience for six months or more		
No	675	63.9
Yes	382	36.1

not receive the mother-infant welcoming card in the maternity hospital, 47.6% (n=503) did not take the child to the PHC unit in their first week of life, 47% (n=497) did not receive guidance on breastfeeding in their first visit to the PHC unit after child birth and 38.8% (n=410) affirmed they had not received any guidance on maternal breastfeeding in the PHC unit after child birth.

Table 3 shows that liquid offer to children was significantly associated with all welcoming actions and maternal characteristics at a 20% level, except for level of education, work categories, number of household members and being informed about going to a PHC unit in the infant's first week of life. In addition, there was an association between liquid offer and infant age on the interview date and interactions between: maternal age and marital status, maternal age and level of education, and guidance on maternal breastfeeding

**Table 2.** Mother-infant welcoming actions among mothers of infants aged less than six months in primary health care units. Municipality of Rio de Janeiro, Southeastern Brazil, 2007. (N=1,057)

Variable	n	%
Received the mother-infant welcoming card in the maternity hospital		
No	336	31.8
Yes	721	68.2
Was informed about going to a PHC unit in the infant's first week of life		
No	507	48.0
Yes	550	52.0
Had the first contact with the PHC unit in the infant's first week of life		
No	503	47.6
Yes	554	52.4
Received guidance on breastfeeding in the first visit to the PHC unit after child birth		
No	497	47.0
Yes	560	53.0
Received guidance on breastfeeding in the PHC unit after child birth		
No	410	38.8
Yes	647	61.2

PHC: Primary healthcare unit

in the PHC unit after child birth and level of education, significant at a 20% level.

The best model tested in the multivariate logistic regression analysis to explain liquid offer was the one that included the following variables: maternal age, marital status, previous breastfeeding experience, receiving guidance on breastfeeding in the first visit to the PHC unit after child birth, interaction between the "maternal age" and "marital status" categories, interaction between "guidance on breastfeeding in the PHC unit after child birth" and "level of education" and "infant age on the interview date", significant at a 5% level, and the main effects of the "guidance on breastfeeding in the PHC unit after child birth" and "level of education" variables.

In the adjusted analysis of factors associated with liquid offer (Table 4), it was observed that among women with a partner, adolescents were 2.17 times more likely to offer liquids than adults (OR=2.17; 95% CI: 1.10; 4.30), whereas, among women without a partner, the chance of adolescents offering liquids was about a third of that of adults (OR = 0.31; 95% CI: 0.11; 0.85).

Mothers without previous breastfeeding experience for at least six months were 57% more likely to offer liquids than those who had breastfed their last child for six months or more (OR= 1.57; 95% CI: 1.16; 2.13).

**Table 3.** Non-adjusted analysis of factors associated with offer of tea, water and juice in the first six months of life among users of primary health care units. Municipality of Rio de Janeiro, Southeastern Brazil, 2007. (N=1,057)

Variable	OR	95% CI
Maternal age (years)		
< 20	1.53*	1.12;2.10
≥ 20	1	
Ethnic group		
Black	1.18	0.78;1.79
Mixed	1.22*	0.91;1.62
White	1	
Level of education (years)		
Less than 8	1.01	0.75;1.35
8 or more	1	
Marital status		
Without a partner	1.98*	1.55;2.54
With a partner	1	
Work categories		
Without paid work	0.81	0.52;1.28
Informal work	1	
Formal work	0.85	0.49;1.45
Assets indicator		
≤1	1.14*	0.96;1.36
>1 and ≤2	1.00	0.73;1.37
>2	1	
Number of household members		
2 to 3	1.20	0.78;1.84
4 or more	1	
Previous breastfeeding experience for six months or more		
No	1.64*	1.29;2.08
Yes	1	
Received the mother-infant welcoming card in the maternity hospital		
No	1.27*	0.97;1.65
Yes	1	
Was informed about going to a PHC unit in the infant's first week of life		
No	1.04	0.86;1.26
Yes	1	
Had the first contact with the PHC unit in the infant's first week of life		
No	1.27*	1.04;1.54
Yes	1	
Received guidance on breastfeeding in the first visit to the PHC unit after child birth		
No	1.28*	0.93;1.75
Yes	1	
Received guidance on breastfeeding in the PHC unit after child birth		
No	1.34*	0.90;1.97
Yes	1	

\* p-value &lt;0.20; PHC: Primary healthcare unit

Among women with less than eight years of education, those who had not received guidance on breastfeeding in the PHC units after child birth were 1.8 times more likely to offer liquids than those who had not (OR= 1.80; 95% CI: 1.05; 3.09). This positive association between not receiving guidance on breastfeeding in the PHC unit after child birth and liquid offer was not observed for women with eight or more years of education.

Mothers who had not received guidance on breastfeeding in their first visit to the PHC unit after child birth were 58% more likely to offer liquids than those who had received it (OR= 1.58; 95% CI: 1.18; 2.12).

Based on Cook's Distance values (Figure), it is not possible to classify any observations as influent, thus indicating the adequacy of the multivariate model selected.

Table 4 shows the adjusted analysis of factors associated with liquid offer, with the exclusion of the most influential observation in the regression parameters, causing a change in the level of significance of the interaction between marital status and maternal age. This exclusion corresponded to a woman without a partner, who is an adult, with less than eight years of education and without breastfeeding experience, who had received guidance on breastfeeding in the PHC unit after child birth, although not in the first visit to this unit, and who had not offered liquids.

## DISCUSSION

The present study showed that there was a high early liquid offer for infants aged less than six months, users of the PHC units, in the city of Rio de Janeiro. The percentage of infants aged less than two months who had already received liquids was 38.4%. Yet, this value was approximately 10% lower than that found in 1999 and 2000, in a study performed in a PHC unit of the state of Rio de Janeiro, where the current status method was used,<sup>4</sup> and almost 25% lower than that found in a study performed in 1993 and 1995, in the state of Pará, Northern Brazil, which analyzed liquid offer from birth.<sup>13</sup>

Aarts et al<sup>1</sup> (2000), while studying the prevalence of infants who were exclusively breastfed, obtained from the current status method and that which assesses liquid offer from birth, found differences in the prevalences of this event higher than 40%. The reason for this very great difference was that mothers of infants who had not recorded having introduced water and tea in the 24-hour dietary recall, had offered these liquids to their infants in a certain moment of their lives.<sup>1</sup>

Findings from the present study lead to a reflection on the role of health services in the promotion of exclusive breastfeeding, once the level of implementation

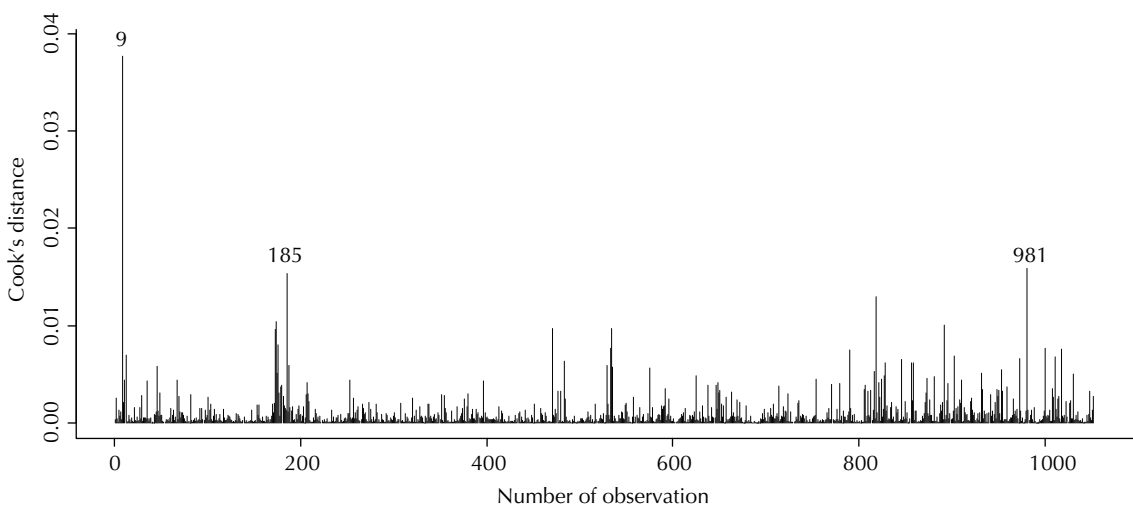
**Table 4.** Adjusted analysis of factors associated with offer of tea, water and juice in the first six months of life, among users of primary healthcare units. Municipality of Rio de Janeiro, Southeastern Brazil, 2007. (N=1,057)

Variable	Adjusted analysis (n = 1,057)		Adjusted analysis with the exclusion of the most influential observation (n = 1,056)	
	OR	95% CI	OR	95% CI
Women without a partner				
< 20 years	0.31	0.11;0.85	0.24	0.05;1.03
≥ 20 years	1		1	
Women with a partner				
< 20 years	2.17	1.10;4.30	2.12	1.12;4.00
≥ 20 years	1		1	
Previous breastfeeding experience for six months or more				
No	1.57	1.16;2.13	1.67	1.19;2.34
Yes	1		1	
Less than 8 years of education				
Without guidance on breastfeeding in the PHC unit after child birth	1.80	1.05;3.09	2.07	1.02;4.19
With guidance on breastfeeding in the PHC unit after child birth	1		1	
8 years or more of education				
Without guidance on breastfeeding in the PHC unit after child birth	0.99	0.63;1.54	1.03	0.63;1.70
With guidance on breastfeeding in the PHC unit after child birth	1		1	
With guidance on breastfeeding in the first visit to the PHC unit after child birth				
No	1.58	1.18;2.12	1.48	1.16;1.90
Yes	1		1	

PHC: Primary healthcare unit

of both the mother-infant welcoming strategy and the Breastfeeding-Friendly Primary Care Initiative, developed by the city of Rio de Janeiro, is still low. The low implementation of these strategies is evidenced by

the high proportion of mothers who had not received the mother-infant welcoming card at the moment of discharge from the maternity hospital, had not had the first contact with the PHC unit in the infant's first week

**Figure.** Cook's distance for the adjusted model. Municipality of Rio de Janeiro, Southeastern Brazil, 2007. (N=1,057)

of life, had not received guidance on breastfeeding in the first visit to the PHC unit after child birth and had not received any guidance on breastfeeding in the PHC unit after child birth.

The results found are concerning, because guidance on breastfeeding in the infant's first contact with the PHC unit and in a certain moment after child birth remained negatively associated with early liquid offer, the latter being significant among women with less than eight years of education exclusively. This fact showed the vulnerability of women with low level of education and the need to intensify guidance on exclusive breastfeeding, especially in this group.

It is suggested that the interaction found between the "maternal age" and "marital status" categories occurs due to the absence of emotional, social and economic support of a partner<sup>9</sup> among adult women without a partner, whereas, among adolescents, the family provides such support, especially when they cannot rely on the partner.<sup>10</sup> In contrast, among women with a partner, adolescence, with its period of crisis, change, re-adaptation to a new body and new attitudes towards life, in addition to personal, social and family changes caused by pregnancy<sup>10</sup> and a new marital status, would

increase vulnerability to early introduction of liquids. Frota & Marcopito<sup>8</sup> (2004) also observed an antagonistic effect of adolescence on breastfeeding practice at six months of age, according to marital status.

Among women without a partner, the loss of statistical significance of the negative association between being an adolescent and offering liquids, after the exclusion of the most influential observation, emphasizes the need for new studies with greater samples to better understand this relationship.

Although studies that investigate the negative association between previous breastfeeding experience and early liquid offer, as observed in the present study, were not found, it is possible that such association exists. Meyerink & Marquis<sup>12</sup> (2002) found an association between previous breastfeeding and both the beginning and duration of breastfeeding.

Findings from this study suggest that age, marital status and previous breastfeeding experience are maternal characteristics associated with liquid offer among children aged less than six months. In terms of mother-infant welcoming, receiving guidance on breastfeeding in the first visit to the PHC unit after child birth can

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