

## Original Article

# Association of Infant Exclusive Breast Feeding with Household Food Security and Maternal Mental Health

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## Abstract

**Background:** Exclusive breastfeeding (EBF) is emphasized by the World Health Organization (WHO) as the most desirable way of infant feeding in the first 6 months. EBF has beneficial health effects on mothers and infants. The aim of this study was to examine factors influencing EBF, with emphasis on household food security status and maternal mental health.

**Methods:** This cross-sectional study was carried out on 325 women referring to community health centers in west Tehran. Data were collected using questionnaires, including Edinburgh Postnatal Depression Scale (EPDS) and the USDA (US Department of Agriculture) 18-item questionnaire. The data was analyzed using both descriptive and analytical methods such as the chi-squared test, *t* test and logistic regression with SPSS 22.

**Results:** The prevalence of EBF was 82.5% (CI = 0.70, 0.94), 63.9% (CI = 0.57, 0.70) and 72.3% (CI = 0.62, 0.82) in 3-month, 3-6-month and 6-8-month-old infants, respectively. The results of this study showed a significant association between EBF and infant gender satisfaction ( $P < 0.001$ , OR = 4.85, CI = 2.12, 11.12), economic satisfaction score ( $P = 0.028$ , OR = 0.82, CI = 0.69, 0.98), infant birth weight ( $P = 0.013$ , OR = 0.99, CI = 0.99, 1.00) and unwanted pregnancy ( $P = 0.098$ , OR = 1.82, CI = 0.89, 3.70). However, we did not find any significant association between EBF and other variables such as household food security status, mother's postpartum depression, parents' education and age, type of delivery and pregnancy numbers.

**Conclusion:** Infant gender satisfaction, economic satisfaction, unwanted pregnancy and infant birth weight were the significant factors for predicting EBF in this study. Since EBF is important for infants and mothers' health, policy-makers should devise strategies to promote and encourage EBF in the society.

**Keywords:** Exclusive breast feeding, Food insecurity, Postpartum depression, Socio-economic, Unwanted pregnancy

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## Introduction

Exclusive breastfeeding (EBF) is emphasized by the World Health Organization (WHO) as the most desirable way of infant feeding in the first six months.<sup>1,2</sup> EBF is defined as providing only breast milk to the infants, without any other liquids or solids including water, except oral rehydration solution or drops/syrups of vitamins, minerals, or medicines.<sup>3</sup>

The health benefits of breastfeeding on infants lower morbidity and mortality from some diseases including sudden infant death syndrome, infections in the respiratory and gastrointestinal systems, and necrotizing enterocolitis.<sup>3</sup> Breastfeeding also has many health benefits for mothers, including reducing the risk of type 2 diabetes and malignancies such as breast and ovarian cancers.<sup>4</sup>

Various factors which may influence EBF status include maternal age, employment,<sup>5</sup> economic status,<sup>6</sup> maternal postpartum depression,<sup>7,8</sup> infant gender satisfaction,<sup>9</sup> and infant birth weight.<sup>10</sup> The effects may be culturally

different by ethnicity.<sup>11</sup> Also, there are differences between low-, middle- and high-income countries: only 37% of infants under 6 months are exclusively breastfed in low-income and middle-income countries. On the other hand, breastfeeding duration is mostly shorter in high-income countries.<sup>12</sup> In a systematic review carried out in Iran, the overall prevalence of EBF was estimated to be 49.1%,<sup>13</sup> requiring further attempts to improve the rate of EBF during the first six months.

By recognizing factors affecting EBF, policy-makers will be able to adopt effective strategies to improve EBF. Thus, the aim of this study was to assess important factors influencing EBF in Tehran, Iran.

## Patients and Methods

### Study Population, Design and Data Collection

This cross-sectional study was carried out from March to June 2014. The study population was composed of mothers, with no history of non-communicable diseases

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(including diabetes, cardiovascular disease, endocrine disease or cancers), who had referred to community health centers in west Tehran, 3–8 months after delivery, for infant vaccination. All participants consented to participating in the study.

In this study, 325 mothers were selected using a stratified sampling technique, from the 8 community health centers (each center as a stratum) of the total 16 centers. These centers were good representatives in terms of their geographic locations and demographic qualities. The number of mothers in each stratum was proportional to size, and they were selected through convenience sampling.

Demographic and socio-economic information (such as parents' age, occupational status, education, and economic satisfaction status) were collected via questionnaires. Since the mothers may have wished to avoid declaring their actual incomes, an economic satisfaction score was used instead. In this method, the mothers were asked to rate (subjectively) on a scale of 1 to 10, their satisfaction of their economic status in terms of meeting family needs.

Obstetric information included type of delivery, obstetric complications (such as gestational diabetes mellitus, pre-eclampsia and hypertension, anemia, nausea and vomiting, early contractions, and bleeding), history of pregnancy loss (miscarriage or stillbirth), pregnancy number and unwanted pregnancy. Also, information about infant gender satisfaction and infant birth weight were collected via questionnaires.

EBF was defined as feeding the infants only on mothers' milk without receiving other liquids and solid foods, except for vitamins, minerals, and medicine.<sup>3</sup> Therefore, mothers were asked to report the current feeding status for babies under 6 months, or their previous feeding status (from birth to 6 months) for infants over 6 months of age.

### Instruments

**A.** The onset of PPD is generally within 12 weeks after giving birth.<sup>14</sup> The Edinburgh Postnatal Depression Scale (EPDS) is the most common screening tool for PPD.<sup>15</sup> It is a 10-item, self-reported questionnaire, with a four-point scale ranging from 0 to 3 for measuring the severity of depression symptoms experienced within the past 7 days. The cut-off point for specifying PPD is 12/13 or higher.<sup>15</sup> In this study, the Persian version of EPDS was used, with a cut-off of 13 and 0.83 Cronbach's alpha reliability.<sup>8</sup>

**B.** In this study, the validated USDA (US Department of Agriculture) questionnaire was used for evaluating food security status.<sup>16</sup> This questionnaire contains 18 items, scored as follows: a score of 1 is assigned to the responses "most of the time correct", "sometimes correct" in questions 1 to 3 and 11 to 13, "almost every month", and "some months" in questions 5, 10, and 16, and "yes" in questions 4, 6 to 9, 14, 15, 17, and 18. Conversely, a score of 0 is assigned to the responses "is not correct", "does not know or avoids", "only once or twice a month", and "no". The final score is calculated based on the count of positive responses.

The score obtained from this questionnaire divides women into 4 groups: a. Food secure, b. Food insecure without hunger, c. Food insecure with moderate hunger, and d. Food insecure with severe hunger (Table 1).<sup>17</sup> The three food insecure groups were combined into a single food insecure group.

### Statistical Analysis

The association between EBF with qualitative and quantitative variables was evaluated with chi-square and *t* test, respectively using SPSS 22. Variables with a *P* value less than 0.05 were candidates to be entered into logistic regression. In the adjusted form, a significance level of 0.1 was acceptable.

### Results

The mean age of mothers was  $28.62 \pm 5.67$  (18–45) years, and the mean and median age of infants were  $160.04 \pm 49.35$  and 180 days, respectively. When collecting data, 242 (74.5%) of the infants were 6 months of age or younger, and 83 (25.5%) were older than 6 months. The majority of the mothers were housekeepers (86.5%) with a high-school diploma or higher (78.2%). Overall, the prevalence of EBF among infants was 68.3% (*N* = 222). The prevalence of EBF based on infant age is provided in Table 2.

The association between parents' age with EBF, assessed by independent-sample *T* test, was statistically significant (*P* < 0.05) (Table 3). The independent-sample *t* test also showed that the mean birth weight in EBF infants was significantly higher than in the non-EBF group (*P* < 0.001). The mean economic satisfaction score was also statistically higher in mothers of the EBF group (*P* < 0.001). However, the mean number of pregnancies was

**Table 1.** Classification of Household Food Security Status Based on Scores

Household Food Security Status	Number of Positive Responses	
	Households without Children Under 18 Years	Households with Children Under 18 Years
Food secure	0–2	0–2
Food insecurity without hunger	3–5	3–7
Food insecurity with moderate hunger	6–8	8–12
Food insecurity with sever hunger	9–10	13–18

**Table 2.** EBF Classification Until 6 Months, by Infant Age (months)

Infant Age Classification (months)	EBF		Total	Mean Difference	95% CI
	Yes No. (%)	No No. (%)			
3 months	33 (82.5)	7 (17.5)	40 (100)	0.82	0.70, 0.94
3–6 months	129 (63.9)	73 (36.1)	202 (100)	0.63	0.57, 0.70
6–8 months	60 (72.3)	23 (27.7)	83 (100)	0.72	0.62, 0.82
Total	222 (68.3)	103 (31.7)	325 (100)	0.68	0.63, 0.73

CI, confidence interval; EBF: exclusive breastfeeding.

**Table 3.** Association between EBF and Quantitative Variables among Studied Mothers.

Variables	Total Mean $\pm$ SD <sup>a</sup>	EBF Mean $\pm$ SD	Non-EBF Mean $\pm$ SD	P Value <sup>a</sup>	Mean Difference	95% CI
Mother's age	28.6 $\pm$ 5.6	27.9 $\pm$ 4.9	29.9 $\pm$ 6.8	0.009	-1.98	-3.46, -0.49
Father's age	33.1 $\pm$ 6.0	32.4 $\pm$ 5.0	34.7 $\pm$ 7.5	0.007	-2.26	-3.89, -0.62
Birth weight (g)	3176.8 $\pm$ 457.4	3247.9 $\pm$ 430.9	3022.7 $\pm$ 477.0	<0.001	225.25	120.22, 330.27
Pregnancy number	1.7 $\pm$ 0.9	1.6 $\pm$ 0.8	2.0 $\pm$ 1.0	0.004	-0.32	-0.54, -0.10
Economic satisfaction score	5.4 $\pm$ 1.7	5.7 $\pm$ 1.6	4.6 $\pm$ 1.78	<0.001	1.05	0.64, 1.45

SD, standard deviation; CI, confidence interval; EBF, exclusive breastfeeding.  
<sup>a</sup> *t* test.

lower in mothers of the EBF group ( $P < 0.05$ ) (Table 3).

The results of the study showed a significant association between EBF and qualitative variables, including type of delivery (NVD or caesarean), unwanted pregnancy, infant gender satisfaction, parents' educational level, household food security status, and mother's postpartum depression ( $P < 0.05$ ). Other variables, including parents' occupational status, obstetric complications, history of pregnancy loss (miscarriage or stillbirth), and infant gender, were not significant ( $P > 0.05$ ) (Table 4).

According to the results of the logistic regression analyses for significant factors ( $P < 0.05$ ) shown in Tables 3 and 4, the economic satisfaction score, infant gender satisfaction, unwanted pregnancy, and also infant birth weight, remained significant factors ( $P < 0.1$ ) (Table 5).

It should be noted that separate analysis was conducted on the subgroup of mothers with infants younger than 6 months, and similar results were obtained (the same variables remained statistically significant).

## Discussion

Based on the results of the current study, infant gender satisfaction, unwanted pregnancy, economic satisfaction and infant birth weight were predicting factors for EBF.

Infant gender is an important issue in some cultures.<sup>9</sup> In a study by Goyal et al, males were more probable to be exclusively breastfed.<sup>18</sup> In contrast, in a study conducted by Hörnell and colleagues, EBF was higher among girls (56.35%) compared to boys (50.60%).<sup>19</sup> In our study, there was not any significant association between EBF and infant gender, which is consistent with studies carried out in Ethiopia<sup>20</sup> and Sweden.<sup>21</sup> However, infant gender satisfaction was an important predictor of EBF in the current study, which is consistent with the Veeranki

study.<sup>9</sup> Gender dissatisfaction may also affect infant care-seeking.<sup>22</sup> According to the current study, we conclude that gender satisfaction is an important factor for predicting EBF, which may be effective through mother's passion or even family support for EBF.

Postpartum depression (PPD) is a critical mental health disorder,<sup>23</sup> that has negative short- and long-term consequences on child development.<sup>24</sup> Mothers with depressive symptoms have lower levels of breast-feeding.<sup>25</sup> A study conducted by Thome et al showed that EBF was reduced by mother's depressive symptoms,<sup>7</sup> but this was not seen in a study by Ghasemzadeh et al.<sup>26</sup> In general, the association between EBF and PPD is inconsistent in different studies; nevertheless, according to the current study, the prevalence of EBF was lower in depressed mothers, although it was not statistically significant in logistic regression, which may be due to the small sample size.

Socioeconomic status is another predictor for EBF.<sup>27</sup> In a study carried out by Saffari and colleagues, younger mothers with a lower level of socioeconomic status were more prone to non-EBF.<sup>5</sup> The results of the current study found that the mean economic satisfaction score was significantly higher in mothers in the EBF group. It should be noted that we assessed economic satisfaction because many families refuse to provide economic and financial details. In a study carried out in northern Iran, Veghari and colleagues found an inverse association between economic status and EBF.<sup>6</sup> A similar association has been also observed regarding low income and EBF.<sup>5,28</sup> Some barriers such as low social support or work management problems may be the reason in these families.<sup>28</sup> Regarding mothers' educational status and EBF, the results of our study showed a positive association between maternal

**Table 4.** Association between EBF and Qualitative Variables among Studied Mothers.

Variables	Total % (No.)	EBF % (No.)	Non-EBF % (No.)	P Value <sup>a</sup>	OR	95% CI
Mother's occupational status						
Employment	44 (13.5)	26 (11.7)	18 (17.5)	0.158	1.59	0.83, 3.06
Housekeepers	281 (86.5)	196 (88.3)	85 (82.5)			
Total	325 (100)	222 (100)	103 (100)			
Father's occupational Status						
Self-employed	219 (68)	174 (66.5)	37 (35.9)	0.394	1.25	0.74, 2.08
Government employee	103 (32)	74 (33.5)	66 (64.1)			
Total	322 (100)	221 (100)	101 (100)			
Education level of mother						
Under high school diploma	71 (21.8)	34 (15.3)	37 (17.6)	<0.001	0.32	0.18, 0.55
High school diploma or higher	254 (78.2)	188 (84.7)	66 (64.1)			
Total	325 (100)	222 (100)	103 (100)			
Education level of father						
Under high school diploma	83 (25.5)	47 (21.2)	36 (35)	0.008	0.50	0.29, 0.83
High school diploma or higher	242 (74.5)	175 (78.8)	67 (65)			
Total	325 (100)	222 (100)	103 (100)			
Obstetric complications						
Yes	130 (40)	83 (34.7)	47 (45.6)	0.158	1.40	0.87, 2.25
No	195 (60)	139 (62.6)	56 (54.4)			
Total	325 (100)	222 (100)	103 (100)			
Type of delivery						
NVD	72 (22.2)	57 (25.7)	15 (14.6)	0.025	2.02	1.08, 3.78
Caesarean	253 (77.8)	165 (74.3)	88 (85.4)			
Total	325 (100)	222 (100)	103 (100)			
History of pregnancy loss						
Yes	68 (20.9)	42 (18.9)	26 (25.2)	0.192	1.44	0.82, 2.52
No	257 (79.1)	180 (81.1)	77 (74.8)			
Total	325 (100)	222 (100)	103 (100)			
Infant gender						
Girl	169 (52.3)	117 (52.7)	52 (51.5)	0.839	1.05	0.65, 1.68
Boy	154 (47.7)	105 (47.3)	49 (48.5)			
Total	323 (100)	222 (100)	101 (100)			
Infant gender satisfaction						
Yes	278 (86.3)	209 (94.6)	69 (68.3)	<0.001	8.07	3.94, 16.54
No	44 (13.7)	12 (5.4)	32 (31.7)			
Total	322 (100)	221 (100)	101 (100)			
Unwanted pregnancy						
Yes	67 (20.6)	30 (13.5)	37 (35.9)	<0.001	3.58	2.05, 6.26
No	258 (79.4)	192 (86.5)	66 (64.1)			
Total	325 (100)	222 (100)	103 (100)			
Mother postpartum depression						
Yes	115 (35.4)	67 (30.2)	48 (46.6)	0.004	2.01	3.26
No	210 (64.6)	155 (69.8)	55 (53.4)			
Total	325 (100)	210 (100)	103 (100)			
Household food security status						
Food-secure	214 (65.8)	159 (71.6)	55 (53.4)	0.001	2.20	1.35, 3.57
Food-insecure	111 (34.2)	63 (28.4)	48 (46.6)			
Total	325 (100)	222 (100)	103 (100)			

OR, odds ratio; CI, confidence interval; NVD, normal vaginal delivery; EBF, exclusive breastfeeding.

<sup>a</sup> Chi-square test.

educational level and EBF, although it was not statistically significant. This finding is consistent with the Tashakori study,<sup>8</sup> but a significant association has been reported in some other studies.<sup>29,30</sup> Increasing maternal educational level may improve EBF through enhancement of mother's

knowledge and awareness. In the Veeranki study, which was conducted in rural Mysore of India, mothers with no educational level had higher EBF than mothers with primary or higher education.<sup>9</sup> This mentioned study was conducted in a rural region, so these observed

Table 5. Final Logistic Regression Model for EBF

Variables (Category)	P Value	OR	95 % CI	
			Lower	Upper
Mother's age	0.245	1.05	0.96	1.16
Father's age	0.638	0.97	0.89	1.07
Maternal education (Diploma or higher)	0.112	2.01	0.85	4.75
Paternal education (Diploma or higher)	0.390	0.69	0.30	1.59
Infant gender satisfaction (Yes)	<0.001	4.85	2.12	11.12
Pregnancy number	0.405	1.17	0.80	1.71
Unwanted pregnancy (No)	0.098	1.82	0.89	3.70
Type of delivery (caesarean)	0.160	1.66	0.81	3.40
Mother postpartum depression (No)	0.753	1.10	0.59	2.04
Infant Birth weight	0.013	0.99	0.99	1.00
Economic satisfaction score	0.028	0.82	0.69	0.98
Household food security status (Food secure)	0.292	1.41	0.74	2.69

OR, odds ratio; CI, confidence interval; EBF, exclusive breastfeeding.

Note: table is based on results of binary logistic regression (only for significant situations based on table 3 and 4).

contradictions may relate to differences among rural and urban life styles.

Household food security is defined as the accessibility of enough, safe and good-quality food for all individuals at all times to meet their dietary requirements to support a healthy and productive life.<sup>31</sup> In a study conducted by Esfahani and colleagues, the prevalence of malnutrition was higher in infants with consumption of semi-solid foods and when breastfeeding was not the predominant feeding practice in the first six months in food insecure households.<sup>32</sup> In this study, although the prevalence of EBF was higher among mothers from food-secure households compared to the food-insecure, the difference was not statistically significant. In a study conducted in the Canadian Inuit population, no association was reported between EBF and household food security status.<sup>33</sup> Similarly, Rachel and colleagues did not find any association between feeding practices and food insecurity.<sup>34</sup> In other studies, the prevalence of breastfeeding has been higher in food-secure groups although EBF was not assessed.<sup>35,36</sup>

In conclusion, infant gender satisfaction, unwanted pregnancy, economic satisfaction and infant birth weight were significant factors for predicting EBF in the current study. Since EBF is important for infant and mother health, policy-makers should devise strategies to promote and encourage EBF in the society and address possible risks factors. Health professionals in Health Community Centers in Iran can perform effectively in educating and motivating mothers and their households.

### Limitation

In the current study, lack of significant association between

some variable may have been related to the small sample size. So, future surveys are recommended with larger sample sizes.

### Authors' Contribution

NE carried out the design of the study, participated in gathering the data, carried out analyzing the data and prepared the manuscript. NK critically reviewed the manuscript, applied comments and finalized the manuscript. RZ and MN participated in the design of the study, and NM participated in gathering the data. All authors have read and approved the content of the manuscript.

### Conflict of Interest Disclosures

None to be declared.

### Ethical Statement

The protocol was approved by the Research Council and Ethical Committee of Qazvin University of Medical Sciences (No: D.44.21039).

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