Socioeconomic Factors Affecting Exclusive Breastfeeding in the First 6 Months of Life

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Abstract

Introduction: Despite the numerous emphasis on the importance of exclusive breastfeeding for the first 6 months of life, but studies have indicated that it is low in Iran. In this study, we investigated the economic factors affecting exclusive breastfeeding in the first 6 months of life.

Methods: The study population included 6-12 months old children who were referred to Arak healthcare centers with their mothers for vaccination and healthcare. Sampling was performed according to Cochran formula. The questionnaires were completed by asking mothers and also visiting family documents. Kaplan-Meier survival analysis was used to investigate the relationship between exclusive breastfeeding and household socioeconomic variables. Adjusted and unadjusted odds ratios for factors affecting exclusive breastfeeding and also the relationship between household variables and breastfeeding were assessed using multivariate logistic regression.

Results: Exclusive breastfeeding decreased from 85.1% to 46.2% with increasing in age from 0 to 6 months. Working mothers, mothers with higher education and physical activity had breastfed higher than others their infants up to 6 months (p<0.05). There was no significant relationship between sex of child, household income, maternal BMI, pregnancy complications, previous abortion and type of delivery with exclusive breastfeeding (p>0.05).

Conclusion: In spite of high emphasis on the importance of exclusive breastfeeding in the first 6 months of life, but it has not been met. Findings from this study contribute to the growing body of research on the social determinants of breastfeeding.

Introduction

Breastfeeding is the best nutrition for almost all babies. The World Health Organization (WHO) has recommended Exclusive Breastfeeding (EBF) as the only infant food for at least 6 months (1). Breast milk not only provides the infant with the nutrients it needs but also has many beneficial effects on the cognition, behavior and mental health of the mother and infant (2). In addition to the infants, breastfeeding reduces the risk of ovarian and breast cancers in the mothers and brings many economic and environmental benefits to the community (3, 4).

Based on these and many other benefits for breastfeeding, WHO as well as the American Academy of Pediatrics has recommended that all children should be exclusively breastfed for the first 6 months of their life. However, it has been recommended that the child should be fed with breastfeeding and then complementary feeding from 6 months to 1 years old and complementary feeding and breastfeeding from 1 to 2 years of age (5-7).

Worldwide exclusive breastfeeding is at a low level as in the US only 75% of mothers start breastfeeding from the beginning, and worse than it is that 67% of mothers use infant formula as part of infant nutrition.
In Taiwan, EB is far below the standards recommended by the WHO, so that at the first month postpartum the EBF rate was 61.8%, at months 3 was 44% and at months 6 old was 24.3% (9, 10).

Generally, among low-and middle-income countries, only 37% of children 6 months and under are exclusively breastfed (11). Although the EBF has increased from 24.9% to 35.7% from 1993 to 2013, but this amount of increase is far below the target of the 56th WHO meeting namely at least 50% by 2025 (12). In spite of the improvement of many health care indicators as well as the implementation of breastfeeding promotion programs in Iran, only 53% of mothers exclusively have breastfed their infants up to 6 months (13, 14).

In spite of high emphasis on exclusive breastfeeding for up to 6 months, some mothers may not be able to meet these conditions due to problems in living conditions. Although physicians, midwives, and health professionals play an important role in promoting exclusive breastfeeding, but demographic and socioeconomic factors determine mother decision to be complied with EBF guidelines (15). To promote exclusive breastfeeding, it is necessary at the first to identify the factors that prevent exclusive breastfeeding for children up to 6 months of age. Numerous studies have shown that the determinants of breastfeeding are multi-dimensional including socioeconomic, cultural, social values and attitudes, political and legal orientations, women's working and employment conditions, health care services and individual factors (4, 16, 17).

In one hand, although many studies have been conducted on the status of exclusive breastfeeding in Iran, but few studies have assessed its relationship with socioeconomic status. In the other hand, there was no study in the Arak city, as the hub of industry and employment in Iran where many women work in their industries, to assess this issue. The factors affecting EBF have been well documented in the first 6 months of life, but there is little information on the status of Arak city in this regard. In addition, predictor and influencing factors on EBF vary from region to region, emphasizing the collection of specific data for each region (18, 19). The results of such studies will add to the scientific body of knowledge and understanding on EBP and facilitates planning and policy-making to promote EBF. Arak city due to being highly migrant and has many ethnicities, industrialized towns, companies and factories with high living costs has provided employment for many of parents. Given these issues, the present study was designed to examine the socioeconomic factors affecting EBF in the first 6 months of life.

**Methods**

**Study population and sampling**

The population of Arak city on the basis of 2017 national Iranian census was 658322. Since the population is specified, so Cochran formula was used to estimate the number of samples required. In order to obtain the maximum sample size, we set the p value to 0.5. By adding 20% for design effect and 15% for to those who provide incomplete information, the sample size was 517.
Sampling was performed through randomized clustering, so that each health center was considered as one cluster and after calculating the number of clusters, 5 centers were randomly selected. Samples were taken from each Arak city health center in proportion to its covered population; this way, the number of samples needed to enter the study was obtained. Among the mothers with children 6 month to 1 year, with the above mentioned conditions, the sample were taken according to the population covered by each center. Since these mothers have recently stopped exclusive breastfeeding, they have complete information about the quality and quantity of Their EBF.

Including and exclusion criteria

Inclusion criteria included mothers higher than 16 years of age, single gestational deliveries, unassisted conception, women who participated in education programs on the importance of EBF during pregnancy, and exclusion criteria included congenital abnormalities such as lips and cleft palate, or diseases such as mastectomies and mothers with mental illness.

Ethical issues

The participated women completed the consent form and the Ethical Committee of Arak University of Medical Sciences approved the study administration. The ethical code number IR.ARAKMU.REC.1398.233 was obtained from Arak University of Medical Sciences, Arak, Iran.

Questionnaire

The data were collected through questionnaire and visiting household healthcare record. The questionnaires were delivered to women with children from 6 months to 1 years old by a trained questioner. The questionnaire had questions about the level of breastfeeding, and economic, social and cultural status of the household. Parent's education levels were categorized by primary, secondary and university grades. Family income status was also categorized as less than 100, 100-300, 500-300 and higher than 500 US dollars. Of course, for measuring household financial informational, the approximate monthly costs and savings of households were also calculated to measure household financial status. The employment status of parents was divided by employer or manager, business or self-employed, employee, technical worker, simple worker. The completed questionnaires were entered into the final step of the study and if one person would not incline to participate, the next person was invited to participate in the interview.
Validity and reliability of the questionnaire

The methods of content validity (by a panel of faculty members of the Arak University of Medical Sciences), expert ideas, and literature review were used to assess the validity of the questionnaire. Test-retest method was used to confirm reliability. To do so, 10 participants were selected and questionnaires were distributed among them. This work was repeated again after 15 days. Accordingly, Cronbach's alpha coefficient obtained 83%, indicating high reliability of the questionnaire.

Statistical analysis

Descriptive statistics, mean and standard deviation (SD) are presented for the variables. The relationship between categorical variables is presented using X2. P-value is calculated based on two-tailed test and its value lower than 0.05 was considered significant. The relationship between household variables and lactation was assessed using two-way and multivariate logistic regression tests. EBF rate in the first to sixth month of birth was measured using Kaplan-Meier method. The statistical analyses were performed using STATA 13.1, Stata Corp, and College Station, TX, USA

Results

Table 1 illustrates the demographic characteristics of families with 6 months to 1-year-old children. In summary, the age group of 30 to 34 years has the highest and the age group of 35 years and higher has the lowest number of mothers. 48.2% of mothers had secondary education (middle and high school), 19.0% employed, 18.5% of children with birth weight less than 2500 gr, 26.8% of mothers with complications during pregnancy, 28.8% with the history of miscarriage, 38.1% of childbirths through cesarean delivery, 20.7% of the households with income lower than 100$ a month, 14.3% of mothers with physical activity lower than the recommended 150 minutes per week, 3.5 were cigarette smokers and 26.3% of them have worked during the last 3 months of pregnancy.
| Variable                        | Number | Percent |
|--------------------------------|--------|---------|
| Mother age                     |        |         |
| <25                            | 46     | 18.3    |
| 25-29                          | 74     | 29.6    |
| 30-34                          | 94     | 37.7    |
| ≥35                            | 36     | 14.4    |
| Mother education               |        |         |
| Primary                        | 28     | 11.1    |
| Secondary                      | 122    | 48.9    |
| University                     | 100    | 40      |
| Father education               |        |         |
| Primary                        | 53     | 21.2    |
| Secondary                      | 95     | 38.2    |
| University                     | 102    | 40.6    |
| Mother job                     |        |         |
| Employed                       | 49     | 19.6    |
| Income without working         | 33     | 13.2    |
| Unemployed                     | 168    | 67.2    |
| Father job                     |        |         |
| Employed                       | 212    | 84.8    |
| Income without working         | 16     | 6.3     |
| Unemployed                     | 22     | 8.9     |
| Child birth weight             |        |         |
| <2500                          | 46     | 18.5    |
| ≥2500                          | 204    | 81.5    |
| Number of other children       |        |         |
| 0                              | 61     | 24.3    |
| 1                              | 124    | 49.8    |
| >1                             | 65     | 25.9    |
| Complications during pregnancy |        |         |
| No                             | 183    | 73.2    |
| Yes                            | 67     | 26.8    |
| Miscarriage history            |        |         |
| No                             | 178    | 71.1    |
| Yes                            | 72     | 28.9    |
| Type of delivery               |        |         |
| Natural                        | 155    | 61.9    |
| Cesarean | 95 | 38.1 |
|----------|----|------|
| Monthly household income (USD) | | |
| <100 | 52 | 20.7 |
| 100-300 | 141 | 56.4 |
| 300-500 | 39 | 15.5 |
| >500 | 18 | 7.4 |
| Physical activity | | |
| <150 min/w | 36 | 14.3 |
| >150 min/w | 214 | 85.7 |
| Smoking in pregnancy | | |
| No | 241 | 96.5 |
| Yes | 9 | 3.5 |
| Employment at last 3 months of pregnancy (among employers) | | |
| No | 184 | 73.7 |
| Yes | 66 | 26.3 |

As table 2 indicates, the prevalence of EBF at hospital discharge was 85.1% which decreased to 46.2% at 6 months of age (p<0.05). In this study, there were mothers of different age groups, but the results showed that maternal age had no effect on exclusive breastfeeding. (p>0.05).
Table 2
Exclusive breast feeding in terms of maternal variables

| Variable                        | P-value | Percent | 3 month yes/total | P-value | Percent | 2 month yes/total | P-value | Percent | 1 month yes/total | P-value | Percent | Discharge yes/total | Variables |
|---------------------------------|---------|---------|-------------------|---------|---------|-------------------|---------|---------|-------------------|---------|---------|---------------------|-----------|
|                                 |         |         |                   |         |         |                   |         |         |                   |         |         |                     |           |
| 60.6                            | 312(517)| 70.8    | 366(517)          | 75.4    | 389(517) | 85.1              | 440(517)| EBF     |                   |         |         |                     |           |
| Age years                       |         |         |                   |         |         |                   |         |         |                   |         |         |                     |           |
| >0.0 5                          | 68.5    | 65(95)  | >0.0 5            | 76.8    | 73(95)  | >0.0 5            | 82.1    | 78(95)  | >0.0 5            | 89.1    | 85(95)  | <25                 |           |
|                                 | 64.6    | 98(153)|                   | 70.3    | 107(153)|                   | 86.6    | 132(153)|                   | 86.5    | 132(153)| 25-29               |           |
|                                 | 60.3    | 117(194)|                  | 74.9    | 145(194)|                  | 74.1    | 144(194)|                  | 80.4    | 156(194)| 30-34               |           |
|                                 | 59.4    | 44(75)  |                   | 65.1    | 49(75)  |                   | 70.1    | 53(75)  |                   | 82.7    | 62(75)  | ≥35                 |           |
| Complications in pregnancy      |         |         |                   |         |         |                   |         |         |                   |         |         |                     |           |
| >0.0 5                          | 59.1    | 223(378)| >0.0 5            | 70.2    | 265(378)| >0.0 5            | 76.1    | 288(378)| >0.0 5            | 88.6    | 335(378)| No                  |           |
|                                 | 61      | 85(139)|                   | 69.9    | 97(139)|                   | 73.1    | 102(139)|                   | 65.7    | 91(139)| Yes                 |           |
| Previous Miscarriage            |         |         |                   |         |         |                   |         |         |                   |         |         |                     |           |
| >0.0 5                          | 62.3    | 229(368)| >0.0 5            | 69.3    | 255(368)| >0.0 5            | 72.6    | 267(368)| >0.0 5            | 88.2    | 325(368)| No                  |           |
|                                 | 58.1    | 86(149)|                   | 71.0    | 106(149)|                   | 78.6    | 117(149)|                   | 84.3    | 125(149)| Yes                 |           |
| Type of delivery                |         |         |                   |         |         |                   |         |         |                   |         |         |                     |           |
| >0.0 5                          | 72.3    | 231(320)| >0.0 5            | 78.1    | 250(320)| >0.0 5            | 82.1    | 263(320)| >0.0 5            | 91.7    | 293(320)| Natural             |           |
|                                 | 56.8    | 112(197)|                   | 64.6    | 127(197)|                   | 68.9    | 136(197)|                   | 78.6    | 155(197)| Cesarean            |           |
| Education                       |         |         |                   |         |         |                   |         |         |                   |         |         |                     |           |
| 0.01                            | 60.1    | 35(8)   | 0.01              | 69.9    | 40(8)   | 0.01              | 74.1    | 43(8)   | 0.01              | 89.2    | 52(8)   | Primary             |           |
|                                 | 56.3    | 142(166)|                   | 66.1    | 166(190)|                   | 75.3    | 190(213)|                   | 84.6    | 213(213)| Sec                 |           |
| Physical activity | Physical activity | Physical activity | Physical activity | Physical activity |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| 0.00              | 59.2              | 0.00              | 78.0              | <15 min/w |
| 69.2              | 306(443)          | 85.1              | 377(443)          | 92.6 |
| 0.00              | 56(74)            | 0.00              | 52(74)            | 410(443) |
| 0.00              |                    | 0.00              |                    | >15 min/w |

| Pre-pregnancy BMI | Pre-pregnancy BMI | Pre-pregnancy BMI | Pre-pregnancy BMI | Pre-pregnancy BMI |
|-------------------|-------------------|-------------------|-------------------|-------------------|
| >0.0 5            | 62.9              | >0.0 5            | 69.5              | >0.0 5            |
| 61.3              | 188(307)          | 66.3              | 203(307)          | 88.2 |
| 57.9              | 57(99)            | 68.6              | 68(99)            | 90.2 |
| 57.1              | 20(35)            | 59.2              | 21(35)            | 76.6 |
| 0.00              | 64.3              | 0.00              | 79.2              | 89.1 |
| 29.8              | 6(19)             | 34.1              | 6(19)             | 41.4 |

| Smoking in Pregnancy | Smoking in Pregnancy | Smoking in Pregnancy | Smoking in Pregnancy | Smoking in Pregnancy |
|----------------------|----------------------|----------------------|----------------------|----------------------|
| 0.00                 | 64.3                 | 0.00                 | 79.2                 | 89.1 |
| 29.8                 | 6(19)                | 34.1                 | 6(19)                | 41.4 |

| Monthly household income (USD) | Monthly household income (USD) | Monthly household income (USD) | Monthly household income (USD) | Monthly household income (USD) |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| >0.0 5                         | 66.3 71(07)                  | >0.0 5                         | 70.1 79(07)                  | >0.0 5                         |
| 65.1 189(291)                  | 66.5 193(391)                | 79.2 230(291)                  | 80.3 234(291)                | 100-300 |
| 67.2 54(81)                    | 72.1 58(81)                  | 77.4 63(81)                    | 87.9 71(81)                  | 300-500 |
| 55.1 21(38)                    | 67.8 26(38)                  | 80.0 30(38)                    | 85.6 32(38)                  | >50 |
| <10 0                          | 88.1 94(07)                  | 90.2 100(07)                  | 92.6 410(443)                | >15 0 |

| Underweight                   | Normal weight               | Overweight                    | Obese                         |
|--------------------------------|-----------------------------|-------------------------------|-------------------------------|
| 61.3 188(307)                 | 66.3 203(307)               | 77.9 77(99)                   | 76.6 27(35)                   |
| 57.9 57(99)                   | 68.6 68(99)                 | 77.9 77(99)                   | 76.6 27(35)                   |
| 57.1 20(35)                   | 59.2 21(35)                 | 65.2 23(35)                   | 76.6 27(35)                   |
| 0.00                           | 64.3 320(498)               | 0.00                           | 79.2 394(498)                 | 0.00                           |
| 29.8                           | 6(19)                       | 34.1                           | 6(19)                         | 38.2                           |
| 38.2                           | 7(19)                       | 41.4                           | 8(19)                         | 444(498)                       |
| No                             | Yes                          |                                |                                |                                |
| Univesity                      | University                   |                                |                                |                                |
### Employment status at last month of pregnancy

| P-value | Percent 6 months (yes/total) | Percent 5 months (yes/total) | Percent 4 months (yes/total) | Variables |
|---------|-----------------------------|-----------------------------|-----------------------------|-----------|
| 0.00    | 68.3 313(459)               | 0.00 72.6 333(459)          | 0.00 82.1 377(459)          | Non-working |
|         | 57.3 33(58)                 | 66.3 38(58)                 | 73.8 43(58)                 | Working    |
| 0.00    | 67.5 329(488)               | 0.00 78.8 384(488)          | 0.00 81 395(488)            | Non-working |
|         | 49.8 14(29)                 | 54.6 16(29)                 | 66.5 19(29)                 | Working    |
| 0.00    | 66.1 319(482)               | 0.00 75.2 362(482)          | 0.00 82.1 396(482)          | Non-working |
|         | 49.2 17(35)                 | 59.8 21(35)                 | 69.5 24(35)                 | Working    |
| 0.00    | 64.3 310(482)               | 0.00 74.3 358(482)          | 0.00 71.6 (482)             | Non-working |
|         | 62.1 22(35)                 | 72.8 25(35)                 | 72.3 (35)                   | Working    |
| 0.00    | 63.6 311(482)               | 0.00 73.4 360(482)          | 0.00 80.2 403(482)          | Non-working |
|         | 61.2 23(35)                 | 72.7 26(35)                 | 71.7 (35)                   | Working    |
| 0.00    | 64.1 312(482)               | 0.00 74.4 359(482)          | 0.00 71.5 397(482)          | Non-working |
|         | 61.8 23(35)                 | 72.6 26(35)                 | 71.3 (35)                   | Working    |

### Employment status at first month of childbirth

### Employment status at third month of childbirth

### Employment status at sixth month of childbirth

### Age years

| Age years | Percent 5 years (yes/total) | Percent 10 years (yes/total) | Percent 15 years (yes/total) | Variables |
|-----------|-----------------------------|-----------------------------|-----------------------------|-----------|
| >0.0 5    | 43.9 42(95)                 | >0.0 5 46(95)               | >0.0 5 49(95)               | EBF at discharge |
|          | 48.2 75(153)                | 52.6 81(153)                | 58.5 89(153)                | 25-29     |
|          | 42.3 81(154)                | 44.3 86(154)                | 59.2 115(194)               | 30-34     |
| Complications in pregnancy | >0.0 5 | 50.0 | 189) 378( | >0.0 5 | 53.2 | 201) 378( | >0.0 5 | 56.9 | 215) 378( | No |
| | | 44.2 | 61)1 39( | | 47.5 | 66)1 39( | | 59.1 | 82)1 39( | Yes |
| Previous Miscarriage | >0.0 5 | 49.6 | 182) 368( | >0.0 5 | 52.6 | 194) 368( | >0.0 5 | 60.9 | 224) 368( | No |
| | | 41.2 | 61)1 49( | | 45.5 | 68)1 49( | | 56.3 | 84)1 49( | Yes |
| Type of delivery | >0.0 5 | 49.8 | 159) 320( | >0.0 5 | 55.1 | 176) 320( | >0.0 5 | 63.6 | 203) 320( | Natural |
| | | 44.3 | 87)1 97( | | 46.1 | 91)1 97( | | 54.3 | 107) 197( | Ces area n |
| Education | >0.0 5 | 50.3 | 29)5 8( | 0.00 | 44.2 | 26)5 8( | 0.01 | 61.3 | 35)5 8( | Primary |
| | | 51.2 | 129) 252( | | 53.1 | 134) 252( | | 55.0 | 139) 252( | Secondary |
| | | 51.3 | 106) 207( | | 59.0 | 122) 207( | | 69.3 | 143) 207( | University |
| Monthly household income (USD) | >0.0 5 | 44.3 | 47)1 07( | >0.0 5 | 50.3 | 54)1 07( | >0.0 5 | 56.3 | 60)1 07( | <10 0 |
| | | 47.1 | 137) 291( | | 51.2 | 149) 291( | | 59.1 | 172) 291( | 100-300 |
| | | 45.3 | 37)8 1( | | 56.8 | 46)8 1( | | 52.6 | 43)8 1( | 300-500 |
| | | 42.1 | 16)3 8( | | 47.1 | 18)3 8( | | 55.8 | 21)3 8( | >50 0 |
| Physical activity | 0.00 | 38.1 | 28)7 0.00 | 44.0 | 32)7 0.00 | 54.1 | 40)7 <15 |
| Pre-pregnancy BMI | Smoking in Pregnancy | Employment status at last month of pregnancy | Employment status at first month of childbirth | Employment status at third month of childbirth |
|-------------------|----------------------|---------------------------------------------|---------------------------------------------|---------------------------------------------|
| >0.0 5 44.1 33(7 3) | 0.00 54.1 269(498) | 0.00 53.1 244(459) | 0.00 49.3 240(488) | 0.00 51.3 247(482) |
| >0.0 5 51.1 39(7 3) | 0.00 55.3 275(498) | 0.00 50.1 230(459) | 0.00 52.0 254(488) | 0.00 54.3 262(482) |
| >0.0 5 55.1 42(7 3) | 0.00 62.1 309(498) | 0.00 63.2 290(459) | 0.00 64.1 313(488) | 0.00 61.3 295(482) |
| 44.1 33(7 3) | 0.00 65.0 | 0.00 66.0 | 0.00 67.0 | 0.00 68.0 |
| 51.1 39(7 3) | 0.00 69.0 | 0.00 70.0 | 0.00 71.0 | 0.00 72.0 |
| 55.1 42(7 3) | 0.00 73.0 | 0.00 74.0 | 0.00 75.0 | 0.00 76.0 |
| Normal weight | 0.00 77.0 | 0.00 78.0 | 0.00 79.0 | 0.00 80.0 |
| Underweight | 0.00 81.0 | 0.00 82.0 | 0.00 83.0 | 0.00 84.0 |
| Obese | 0.00 85.0 | 0.00 86.0 | 0.00 87.0 | 0.00 88.0 |
| Yes | 0.00 89.0 | 0.00 90.0 | 0.00 91.0 | 0.00 92.0 |
| No | 0.00 93.0 | 0.00 94.0 | 0.00 95.0 | 0.00 96.0 |
| Working | 0.00 97.0 | 0.00 98.0 | 0.00 99.0 | 0.00 100.0 |
| Non-working | 0.00 101.0 | 0.00 102.0 | 0.00 103.0 | 0.00 104.0 |

| 4) | 4) | 4) | 0 min /w |
|-----|-----|-----|---------|
| 55.3 24(4 3) | 59.2 262(443) | 62.3 276(443) | >15 0 min /w |

| 4) |
|-----|
| 0.00 |

| 4) |
|-----|
| 0.00 |

| 4) |
|-----|
| 0.00 |

| 4) |
|-----|
| 0.00 |

| 4) |
|-----|
| 0.00 |
|        | 42.9 | 15(3 5) | 44.1 | 15(3 5) | 47.2 | 16(3 5) | Working |
|--------|------|---------|------|---------|------|---------|---------|
| 0.00   | 46.8 | 215(459)| 0.00 | 56.1 | 257(459) | 0.00 | 62.1 | 285(459) | Non-working |
| 42.1   | 24(5 8) | 45.5 | 26(5 8) | 57.8 | 33(5 8) | Working |

Employment status at sixth month of childbirth

Also, EBF in mothers with higher education level was higher than other mothers in all months (first months to sixth month). Mothers with higher education levels have spent more time exclusively breastfeeding their children (p<0.05). Smoking mothers have spent less time breastfeeding their children (p<0.05).

One of the study variables was determination of the relationship between child sex and exclusive breastfeeding. Given that it is possible that mothers to less breastfed their child with unwanted sex, or in some societies where there may be more interest in the son child and girl children are less breastfed, so this variable was included in the study. However, the results indicated that EBF rates in mothers with son child had no difference with mothers with girls (p>0.05).

Another variable is the effect of monthly household income on EBF. The results indicated that higher-income families had not breastfed more than low-income ones (p<0.05). Physical activity was one of the most effective variables on EBF. The more physical activity, exclusive breastfeeding was more common (p<0.05). However, another variable with no effect on EBF was maternal body mass index (BMI). So that, there was no significant difference in breast-feeding between mothers with weigh lower than normal, normal, overweight, and obese (p>0.05). Maternal working status was among significant effective on EBF. So that maternal employment in the last month of pregnancy, and in the first, third and sixth month of childbirth were all had negative effect on EBF (p<0.05). Other variables that were not effective on EBF included complications in pregnancy, history of previous abortion and type of childbirth (p>0.05).

Figure 1 indicates the Kaplan and Meier survival rates for EBF during the first 6 months of birth. Accordingly, the lower number of mothers have breastfed their children by increasing age to 6 months (Pr>chi2= 0.00)

Figure 2 shows the Kaplan and Meier survival rates for the effect of maternal employment on EBF up to 6 months after birth. Totally, EBF has decreased in both groups of working and non-working women but this decrease in EBF was more severe in working mothers than others, so that fewer mothers have fed their infants with their breast from the beginning and more mothers have leaved EBF along the way and also fewer mothers have fed their infants at 6 months old (Pr>chi2 = 0.00).
Figure 3 shows the Kaplan and Meier survival rates for the effect of maternal literacy levels on EBF up to 6 months of birth. Accordingly, mothers with higher literate level have breastfed their infants more than others up to six months (Pr>chi2 = 0.00).

Figure 4 shows the Kaplan and Meier survival rates for the relationship between different races and the rate of EBF. Accordingly, the results indicate than difference in the duration of EBF was not significant in different races (Fars, Turk, Lor, and Kurd) (Pr>chi2 = 0.78).

Table 3 presents the results of multivariate logistic regression. In the adjusted model (adjusting for all variables listed in the table), women with physical activity more than 150 min/w were more than 42 times more likely to breastfed than those with less than 150 min/w physical activity (odds ratio [OR] = 2.03; 95% confidence interval [CI]: (1.44, 2.67)). Employed mothers were more likely to cease breastfeeding than unemployed mothers (OR = 2.01; 95% CI: 1.32, 2.51). Smokers were more likely to cease breastfeeding than nonsmokers (OR = 2.01; 95% CI: 1.65, 2.59).
### Table 3
Adjusted and unadjusted odds ratio for probability of stopping PBF at different levels of socioeconomic status

| variables                        | Unadjusted OR (95% CI) | Adjusted OR (95% Ci) |
|----------------------------------|-------------------------|----------------------|
| **Age (years)**                  |                         |                      |
| <25                              | 1                       | 1                    |
| 25-29                            | 0.96                    | 1.4 (1.11, 1.78)     |
| 30-34                            | 0.92 (0.40, 1.41)       | 0.99 (0.41, 1.35)    |
| ≥35                              | 1.3 (1.01, 1.61)        | 0.98 (0.61, 1.07)    |
| **Education**                    |                         |                      |
| Primary                          | 1                       | 1                    |
| Secondary                        | 0.9 (0.62, 1.44)        | 1.1 (0.85, 1.61)     |
| University                       | 1.02 (0.68, 1.35)       | 0.95 (0.61, 1.22)    |
| **Physical activity**            |                         |                      |
| <150 min/w                       | 2.01 (1.39, 2.65)       | 2.03 (1.44, 2.67)    |
| >150 min/w                       | 1                       | 1                    |
| **Employment**                   |                         |                      |
| No                               | 1                       | 1                    |
| Yes                              | 2.3 (1.77, 2.91)        | 2.01 (1.32, 2.51)    |
| **Smoking in pregnancy**         |                         |                      |
| No                               | 1                       | 1                    |
| Yes                              | 2.4 (1.85, 3.12)        | 2.2 (1.65, 2.59)     |
| **Monthly household income (USD)**|                     |                      |
| <100                             | 0.9 (0.66, 1.12)        | 0.99 (0.66, 1.12)    |
| 100-300                          | 0.86 (0.55, 1.00)       | 0.98 (0.61, 1.07)    |
| 300-500                          | 1.21 (0.85, 1.61)       | 1.14 (0.74, 1.55)    |
| >500                             | 1                       | 1                    |
| **Complications during pregnancy**|                     |                      |
| No                               | 1                       | 1                    |
| Yes                              | 1.04 (0.85, 1.35)       | 1.06 (1.92, 1.56)    |
| **Previous miscarriage**         |                         |                      |
| No                               | 1                       | 1                    |
| Yes                              | 1.1 (0.71, 1.55)        | 0.9 (0.62, 1.21)     |
| **Pre-pregnancy BMI**            |                         |                      |
| Underweight                      | 1.3 (0.90, 1.44)        | 1.2 (0.69, 1.35)     |
| Normal weight                    | 1                       | 1                    |
| Overweight                       | 0.9 (0.47, 1.12)        | 1.2 (0.81, 1.48)     |
| Obese                            | 0.9 (0.42, 1.10)        | 1.0 (0.66, 1.25)     |

**Discussion**
Based on the results, EBF has been decreasing from birth to 6 months. Mothers should exclusively breastfeed their infants up to 6 months of age. However, this study indicated a significant decreasing trend in this regard. It seems that despite the great emphasis of international organizations, the importance of this issue is not understood by mothers (5, 6).

This study showed that maternal age has no effect on EBF. In other words, mothers who were older than mothers who were younger did not differ in their EBF status. This suggests mothers of different age groups may have a different understanding of its importance of EBF. However, the results of various studies are inconsistent. For example, according to a study by Comlombo et al., as well as Kitano et al., older mothers are less likely to breastfeed than younger ones (20, 21). However, other studies have also shown that young mothers are at greater risk of stopping EBF (22, 23).

Generally, mothers who had higher literacy levels were also more likely to participate in pre-pregnancy, pregnancy, and lactation period classes and had higher health literacy too. According to Tang et al., EBF rates will increase with increase in mothers' literacy, however, they stated that the positive impact of high literacy on breastfeeding is higher in families with higher incomes (24). The importance of this issue is that future plans for the promotion of EBF should pay more attention to the promotion of maternal literacy.

According to the results, mothers who smoked had less time to breastfeed their infant. The negative impact of maternal smoking on infant growth and sleep and other infant conditions has been proven before (25, 26), however, this study indicated that smoker mothers generally cared less about their children's health and development. Breastfeeding trainings provided by health centers should give them the motivation to quit smoking, too. One of the issues that should be emphasized in this regard is reporting of the detrimental effects that smoking can have on child development.

Exclusive breastfeeding rates in mothers who had boy child had no difference with mothers who had girl. In this regard, Goyal and colleagues in India stated that boys were more likely to be exclusively breastfed than girls. They also showed that the girls born at subsequent births were also less breastfed at birth. This has even had a negative impact on their health and life (27).

A study by an Iranian researcher shows that child growth is more impaired in lower-income families (28), but the results of the current study indicated that higher income families had not breastfed their infant’s higher than low-income families. According to a study in Quebec Canada, low-income mothers breastfed their infants lower and for shorter periods (29).

Mothers who have more physical activity during pregnancy and after have more breastfeeding outcomes (30). This is in accordance with the current study results. According to the results, mothers weighing less than normal, normal, more than normal and obese had no significant difference in exclusive breastfeeding. The results showed that maternal employment in the last month of pregnancy, also in the first, third and sixth month of childbirth all were effective on the EBF and decreased it. The impact of maternal employment on breastfeeding rates is a proven fact. Working mothers have less time and
motivation to breastfeed their infant. The impact of formal jobs on breastfeeding is much worse than the informal ones. So that, Nkrumah study on 225 Ghanaian mothers indicated that there is a significant difference in the amount and frequency of EBF between mothers with formal employment compared to mothers with informal employment. Also mothers who have taken their children to workplace in comparison with mothers who have leaved them at the home have breastfed their children more times (31). Another study in the UK found that mothers who had part-time or self-employed jobs were more likely to breastfeed their infants than full-time mothers (32). The reason behind this place in the nature of their work, which more flexibility in their jobs allows them to feed their infant more.

The results of the study showed that women with higher education who were employed at the same time had less breastfeeding. This suggests that workplace support, although have promoted in recent years, is not sufficient to prevent breaking of EBF. Currently, numerous training sessions on the benefits of EBF in the first 6 months of life and its extension to 2 years of age by trained midwives throughout Iran are holding. Also, breastfeeding promoting programs are offered at child-friendly hospitals in Iran. On the basis of the accreditation and ranking standards, hospitals are obliged to perform these courses with the highest quality. Currently it is forbidden to advertise and display milk powder, pacifier and milk glass in public and private Iranian pharmacies. Milk production factories are also not allowed to advertise it. The departments of health and food and medicine supervise the proper implementation of this rules. After birth, EBF training courses for mothers are provided by health care providers. After delivering each service, mothers are requested to state their consent regarding the services delivered through the message system designed by the Ministry of Health. Utilization of the potential of healthcare volunteers to educate mothers about breastfeeding is among another proceeding performed by health centers around the country. These health volunteers have already received the necessary training in this area.

Other proceedings include strengthening breastfeeding counseling centers in all cities in the country, training specific breastfeeding counselors for each city and equipping them with the ministry of health. Implementation of compulsory rule of mother and baby skin contact for 1 hour after the birth by operating room and labor personnel is another ongoing measures in the country that moreover promoting EBF, improve mother-child emotional relationships, and reduce infants’ morbidity and mortality.

In order to encourage families to child bearing, increase employment and family income, it is necessary to create equity in EBF in the workplace. In this regard, increase in maternity leave from 6 months to 9 months has been approved and is being implemented. Also, insurances are committed to pay for maternal salaries in these 9 months. In order to fathers assist mothers in EBF, 15 days paid leave for them is also enacted. In Taiwan, pregnant women have to work until the time determined for child delivery and after it they can have 8 weeks maternity leave (33). Another important innovation in Iran healthcare system is designing and administering milk powder committee in which milk powder is delivered under strict items to mothers who for some reason cannot breastfeed their children on the basis of assessment their real need.

Study limitation
This study has a number of potential limitations. First, the information about EBP depends on the mother’s memory. Second, given that the questionnaires were completed with the presence of healthcare providers responsible for breastfeeding promotion, so there may be more over reporting. Third, this is a cross-sectional study. These type of studies are being accused in weaknesses to report causal relationships.

**Conclusion**

This study showed that there is a positive relationship between lifestyle, socioeconomic and cultural status and breast feeding in the first 6 months of life. Working in the final months of pregnancy and the first months of breastfeeding has a positive effect on stopping or reducing exclusive breastfeeding. Therefore, this study examines the issues around EBF and policymakers can use it to modify breastfeeding support programs.

Ministry of health in different countries perform extensive programs to promote EBF every year. However, one of the missing links in these programs is the promotion of maternal literacy, which is one of the most effective factors on EBF. Other measures include implementing full-term maternal leave programs for mothers up to at least 6 months after birth, creating a mother-friendly workplace for working mothers, and promoting the culture of breastfeeding promoting behaviors in outdoor environments. Since doing EBF for working mothers is along with different problems, so flexible working conditions should be considered.

Health policy makers and planners should determine the prerequisites to an infant-friendly work environment. These include flexible working hours, teleworking and work-site crèches for lactating mothers.

Smoking mothers should be strongly encouraged to quit smoking entirely, if possible, or at least give up smoking at the duration of lactation. Although the present study did not show a relationship between household income status and exclusive breastfeeding rates. However, it is necessary to provide nutritional support for mothers in low income families to ensure receiving all nutritional groups.

**Abbreviations**

EBF: Exclusive Breastfeeding; WHO: World Health Organization; SD: Standard Deviation; BMI: Maternal Body Mass Index; OR: Odds Ratio

**Declaration**

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Authors’ contributions

SA and JN wrote the manuscript and performed the statistical analyses. AE, PM, and ESM collected and supervised the data collection. SA and JN supervised the statistical analyses and revised the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and analyzed during the current study are publicly available upon a written application.

Ethics approval and consent to participate

The ethical code number “IR.ARAKMU.REC.1398.233” was obtained from Arak University of Medical Sciences, Arak, Iran.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Figures
Figure 1

Kaplan-Meier survival rates for EBF in the first 6 months of birth
Figure 2

Kaplan-Meier survival rate for the impact of maternal employment on EBF up to 6 months of birth
Figure 3

Kaplan-Meier survival rates for the effect of maternal literacy levels on EBF up to 6 months of birth
Figure 4

Kaplan-Meier survival rates for the effect of different races on EBF up to 6 months of birth