

The relationship between breastfeeding and maternal education and family income

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Abstract

Aim. To assess the relationship between breastfeeding and maternal education and family income in Samara.

Methods. A survey was conducted among 174 mothers in the children's outpatient clinic, in which their children were assigned at the place of residence. Information on breastfeeding and its duration, mother's education, and family income were obtained by questionnaire and copying data from outpatient records. Pearson's chi-square, Mann–Whitney U test and logistic regression were used in the statistical processing of the data.

Results. There was a positive association of maternal education ($\chi^2=11.25$; $p=0.024$) and income ($\chi^2=11.5$; $p=0.022$) with breastfeeding practices. Higher education, compared with specialized secondary or secondary education, increased the likelihood of breastfeeding for more than 6 months with an odds ratio of 2.6 (95% confidence interval 1.18–5.73; $p=0.018$). The median (and its Q_1 – Q_3 quartiles) breastfeeding duration was 4.0 months (Q_1 – Q_3 2.0–14.0 months) for mothers with secondary or specialized secondary education and 12.0 months (Q_1 – Q_3 4.0–18.0 months; $p=0.012$) for mothers with higher education. It was found that 67.7% of women with incomes above the subsistence level per family member (\$150) breastfed for more than 7 months and only 43.9% of women with incomes below the subsistence level ($p=0.011$). The likelihood of breastfeeding for more than 6 months in household income above one minimum wage per family member compared with household income below increases with an odds ratio of 2.18 (95% confidence interval 1.03–4.60; $p=0.041$). There was no relationship between lactation cessation and maternal education or family income.

Conclusion. There is a positive relationship between mother's education and family income and the practice of breastfeeding.

Keywords: breastfeeding, lactation, income, education level, socioeconomic status.

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Background. Breastfeeding is an absolute priority in baby's nutrition, as it is optimal to feed babies in their first year of life. The value of the influence of breastfeeding on the growth and development of children is described in many scientific publications and guidelines of international and Russian authors [1,2].

The composition of breast milk is subject to dynamic changes depending on various factors, for example, the region of residence of the mother, duration of breastfeeding, and time of the day; moreover, it can change during one feeding. Breast milk can never be imitated completely. Macro- and mi-

cronutrient compositions of cow's milk differ significantly from the composition of human milk. In addition to the difference in the quantity and quality of proteins, carbohydrates, and lipids, one of the most striking differences is the significant amount of prebiotic oligosaccharides present in breast milk. At the moment, more than 130 oligosaccharides have been identified; their amount and quality in breast milk are as dynamic as all its other components [3].

Recent studies have presented that breast milk comprises more than 15 types of hormones and biologically active substances that control the baby's

metabolism, which have not yet been synthesized artificially. All nutrients in breast milk correspond to the characteristics of the digestive system, metabolism, as well as the functional capabilities of the baby's gastrointestinal tract, ensuring proper development in the first year of life [4].

The optimal composition of human milk forms such characteristics of fat, carbohydrate, mineral, and energy metabolism, which provide the most favorable conditions for the physical and intellectual development of the child, as well as social adaptation, and reduction of subsequent risk of atherosclerosis, hypertension, obesity, diabetes mellitus, leukemia, and chronic bowel diseases [5].

In 1940, Georgy Nestorovich Speransky wrote in his book *Young Child*: "Any deviations from natural nutrition immediately affect the child in the form of a number of disorders, such as weight loss, diarrhea, and other diseases. The mother's refusal to breastfeed can only be explained by ignorance. Harmful consequences of such mindlessness are reflected in increase in the morbidity and mortality of children. A mother must breastfeed even under the most difficult circumstances, and only severe diseases relieve her of this duty" [6].

Breastfeeding, as an obligatory basic condition for the formation of human health, influences the subsequent formation of essential social functions associated with the intellectual potential of the society, physical performance, and reproduction [7].

Despite the recommendations of the World Health Organization (WHO) on the need to maintain breastfeeding for 24 months, the average duration of breastfeeding worldwide is 8.7 months [1], and the frequency of exclusive breastfeeding for 6 months is significantly lower than the 2025 target value in most countries [8].

As breastfeeding is an important factor in determining a child's health, many scientific works have attempted to address the question of who of the mothers is prone to long-term breastfeeding and how the mother's educational and income status affects the duration of breastfeeding [9,10].

WHO has revealed that low income is a strong predictor of early breastfeeding cessation [11]. In low- and middle-income countries, exclusive breastfeeding rates are less than 40% in the first 6 months of a child's life. Moreover, in these countries, mothers with low socioeconomic status breastfeed longer than mothers with high socioeconomic status; however, this tendency is the opposite in high-income countries [12].

European mothers with low socioeconomic status have apparently less intent to initiate breastfeeding, and they terminate it earlier than mothers with high socioeconomic status [13,14]. However,

results of studies in different countries are contradictory. In Nepal [15] and the USA [16], studies have shown that a higher educational attainment of the mother is associated with advanced breastfeeding practices. At the same time, the mother's educational attainment serves as a more informative predictor of breastfeeding, but not its duration, than the profession [17].

In Europe, scientists have also revealed a correlation between breastfeeding and mothers' educational attainment. For example, researchers from Denmark reported that mothers with lower educational attainment tend to introduce complementary feeding too early than mothers with higher educational attainment [18], and breastfeeding cessations are increasing among mothers with low educational attainment. A similar tendency has been established in Norway [19], Lithuania [20], and Holland [21].

Such an association was not revealed in studies conducted in Ethiopia [22] and Bangladesh [23], where a negative association was noted between breastfeeding and educational attainment of the mothers.

Given such a pronounced inconsistency of studies worldwide, it is significant to clarify the frequency of early termination of breastfeeding in mothers with different levels of income and education in a typical Russian city, which will subsequently enable development of various educational programs for mothers with different levels of socioeconomic status as well as reduce inequalities in the health of their children [24,25].

This study aimed to assess the relationship of breastfeeding and its duration with the mother's educational attainment and the level of family income in Samara.

Materials and methods of research. The study included 174 mothers who brought their daughters (aged 3–6 years) for examination to an obstetrician-gynecologist at the children's polyclinic of the Samara Regional Children's Clinical Hospital in the period from 2018 to 2019. The study was approved by the Bioethics Committee at the Samara State Medical University (Protocol No. 208, dated 06/05/2018).

As part of the questioning of the children's legal representatives and the copying of data from the children's outpatient cards (Form No.112) over the period from the birth to the start of the study, information was obtained on the nature of feeding, duration of breastfeeding, educational attainment of the mothers, and level of family income in relation to subsistence wage for each family member (10,814 rubles per capita according to data for Quarter II of 2019, which is approximately \$ 150) [26].

Table 1. Duration of breastfeeding and educational attainment of mothers in Samara in 2019

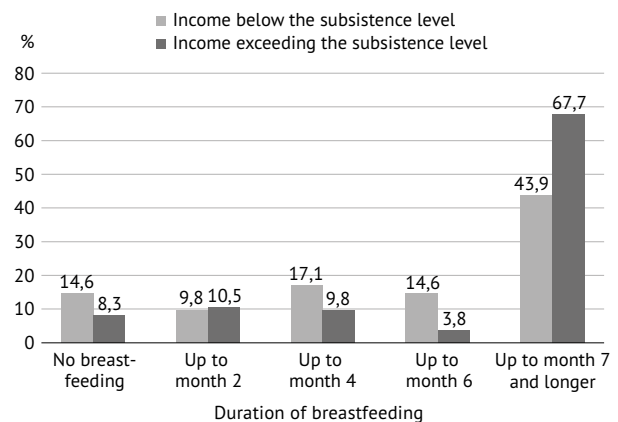
Breastfeeding (BF) and its duration	Educational attainment of the mother				p
	Secondary or vocational secondary		Higher		
	n	%	n	%	
No BF	5	14.3	12	8.6	0.490
BF up to month 2	6	17.1	12	8.6	0.243
BF up to month 4	8	22.9	12	8.6	0.039
BF up to month 6	2	5.7	9	6.5	0.823
BF up to month 7 and longer	14	40.0	94	67.6	0.005

Note: for the contingency table as a whole $\chi^2 = 11.26$; $p = 0.024$.

Statistical data processing was performed using IBM SPSS 25 package. Statistical significance of differences between nominal characteristics was determined using Pearson's χ^2 test, and the Yates correction was used in the case of a two-by-two contingency table. The duration of breastfeeding was compared using the Mann–Whitney test; descriptive statistics were presented as median and quartiles (Me (Q_1 – Q_3)). Multivariate logistic regression was used to establish the influence of educational attainment and income for each family member on the probability of the presence and duration of breastfeeding. Based on the simulation results, odds ratios (OR) and their 95% confidence intervals (CI) were presented. The results were considered significant at p lower than 0.05.

Results. In this study, 90.2% of the mothers breastfed their children; only 17 (9.8%) mothers refused to breastfeed their child, including 9 mothers without milk production, 2 mother's with illness, 2 mothers with ill children, 2 mothers with painful cracked nipples, and 2 mothers who cannot explain the reasons for refusing to breastfeed.

Regardless of the educational attainment, the majority of mothers breastfed their children, including 127 (91.4%) mothers with higher educational attainment and 30 (85.7%) mothers with secondary or vocational secondary education ($p = 0.491$). Among the respondents, 11 had secondary education and 24 had vocational secondary education; no differences were revealed between them in terms of the presence and duration of breastfeeding. Owing to the paucity of these categories, they were presented together. At the same time, the duration of breastfeeding depended on the educational attainment, namely, 4.0 (Q_1 – Q_3 , 2.0–14.0) months in mothers with secondary or vocational secondary education and 12.0 (Q_1 – Q_3 , 4.0–18.0) months in mothers with higher educational attainment ($p = 0.012$). Table 1 presents the duration of breastfeeding by months by mothers with different levels of education.

**Fig. 1.** Duration of breastfeeding (BF) depending on the level of family income in Samara in 2019.

We have established the influence of the level of income per family member on the duration of breastfeeding ($\chi^2 = 11.5$; $p = 0.022$; Fig. 1). Only 41 (23.6%) mothers had income per family member less than the subsistence level, and 133 (76.4%) mothers had income higher than one subsistence wage per family member. Moreover, 67.7% of mothers had an income above the subsistence level per family member, and only 43.9% of mothers with an income below the subsistence level breastfed their children for more than 7 months ($p = 0.011$; Fig. 1).

Using the multivariate logistic regression, we established that both these factors (educational attainment and income above the subsistence level per each family member) affect independently the probability of the presence of breastfeeding for more than >6 months (Table 2) with OR of 2.60 (95% CI 1.18–5.73) and 2.18 (95% CI 1.03–4.60), respectively.

In the analysis of reasons for cessation of breastfeeding, majority of the mothers refused to breastfeed because of low milk production (54.4%) or of the baby's refusal to be breastfed (17.7%; Fig. 2). No relationship was established between the educational attainment of the mother and family income ($\chi^2 = 8.75$; $p = 0.188$; and $\chi^2 = 6.67$; $p = 0.352$,

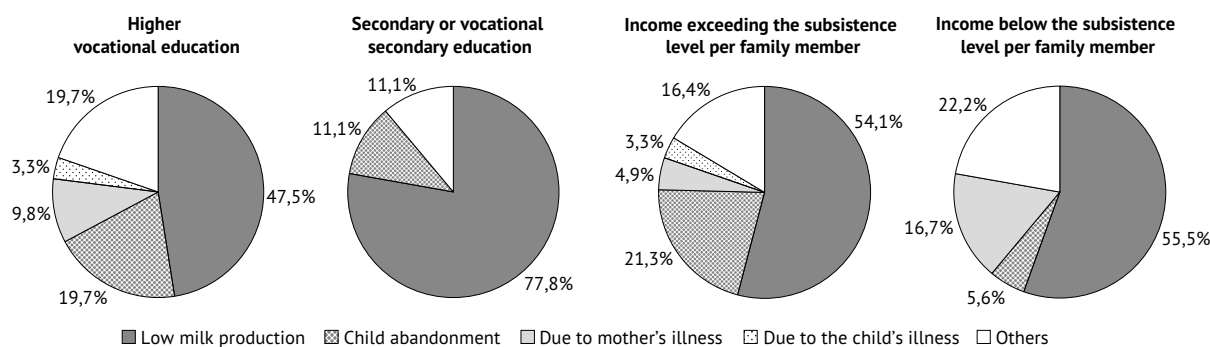


Table 2. Influence of the educational attainment and income per family member on the presence of breastfeeding for >6 months in Samara in 2019

Social factor	OR (95% CI)	P
Higher education versus vocational or secondary education	2.60 (1.18–5.73)	0.018
Income exceeding one subsistence wage per family member compared with income below the subsistence level	2.18 (1.03–4.60)	0.041

Note: OR, odds ratio; CI, confidence interval.

respectively). However, in a pairwise comparison, mothers with secondary or vocational secondary education (77.8%) more commonly stopped breastfeeding because of low milk production than mothers with higher educational attainment (47.5%; $p = 0.039$).

Discussion. In northern European countries, the rates of breastfeeding initiation are more than 90% [27], which coincided with the results of our study, where 90.23% of mothers breastfed their children in Samara.

In this study, the median duration of breastfeeding was 12.0 (Q₁–Q₃ 3.0–18.0) months, which coincided with the average duration of breastfeeding in Georgia, Moldova, and North Macedonia. However, in Turkey, the average duration of breastfeeding is longer (17 months), and in the UK, it is only 3 months [1,28]. At the same time, only 62% of mothers living in Samara were breastfeeding for more >6 months.

The relationship between the educational attainment of mothers and breastfeeding practice has been studied extensively [15,16,22,23]. In our study, as in European countries, the dependence of the duration of breastfeeding on the educational attainment of the mother has been established. Mothers with secondary and vocational secondary education stopped breastfeeding earlier (prior to month 6 in 60% of cases) than mothers with

Fig. 2. Reasons for breastfeeding cessation depending on the educational attainment of the mother and family income in Samara in 2019.

higher educational attainment (prior to month 6 in 32.4% of cases; $p = 0.005$). Our data coincided with those of studies in Denmark [18], Norway (7% of mothers with a low educational attainment and 22% of mothers with a high educational attainment breastfed for up to 6 months) [19], and Lithuania (20% of Lithuanian mothers with low educational attainment and 75% of mothers with higher educational attainment breastfed for the first 6 months) [20].

Moreover, in our study, the average duration of breastfeeding was 4.0 (2.0–14.0) months in mothers with secondary or vocational secondary education and 12.0 (4.0–18.0) months in mothers having higher educational attainment ($p = 0.012$). Higher education, compared with vocational secondary or secondary education, increased the probability of breastfeeding for longer than 6 months with OR of 2.6 (95% CI 1.18–5.73; $p = 0.018$).

WHO found that low income is a strong predictor of early breastfeeding cessation [11]. Our study revealed that mothers with higher incomes breastfeed longer. Thus, a family income above one subsistence wage (\$150) for each family member, compared with lower income, increases the probability of breastfeeding for more than 6 months with OR of 2.18 (95% CI 1.03–4.60; $p = 0.041$). Our findings coincided with data of studies in Europe, which established that mothers of low socioeconomic status apparently intent less to initiate breastfeeding, and they terminate it earlier than mothers with high socioeconomic status [13,14].

CONCLUSIONS

1. A positive relationship exists between mother’s educational attainment and family income and breastfeeding practice in Samara.
2. Higher education, compared with vocational secondary or secondary education, increased the probability of breastfeeding for more than 6 months with an OR of 2.6 (95% CI 1.18–5.73; $p = 0.018$).

3. A family income above one subsistence wage per each family member, compared with lower income, increases the probability of breastfeeding for more than 6 months with an OR of 2.18 (95% CI 1.03–4.60; $p = 0.041$).

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