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# The impact of the number of children in the family on the breastfeeding duration and vaccination coverage

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## Abstract

**Aim**. To assess the impact of the number of children in the family on breastfeeding duration and vaccination coverage.
**Methods**. 1724 mothers of 1-year old children were randomly chosen from seven children's polyclinics in St. Petersburg for an anonymous survey that was conducted by a specially designed form "Questionnaire of a mother of 1-year old children". The questionnaire comprised of 20 open-ended and closed-ended questions, and included questions about: (1) timing of the attachment to the breast in obstetric hospitals; (2) causes and timing of breastfeeding abandonment; (3) presence or absence of vaccinations in the first year of life according to the National preventive vaccination schedule; (4) and reasons for mothers refusing to vaccinate their children.
**Results**. The proportion of mothers who started artificial feeding in maternity wards immediately after the birth of the baby was the smallest among women for whom this baby was the first-born (3.4%), and the largest among families with many children (11.3%). On average, mothers with one child are breastfed until 7.36±0.11 months, with two children until 8.29±0.11 months, with three or more children until 8.78±0.10 months. By using one-way analysis of variance (ANOVA), it was shown the effect of the number of children in the family on the duration of breastfeeding (F=3.3). Correlation analysis revealed the negative relationship of the number of children in the family with the proportion of women who continued breastfeeding until 3 and 6 months ($r_{xy}$=–0.82 and $r_{xy}$=–0.88, respectively), and positive relationship with the proportion of mothers who continued to breastfeeding the baby after reaching a year ($r_{xy}$=0.89). 12.3% of children of one-child families were not vaccinated according to the National preventive vaccination schedule, 17.7% with two-child families, 28.1% in families with three or more children. It was revealed the significant cross-group effect of the number of children in the family to vaccination coverage (F=48.7). With an increase in the number of children in the family, vaccination coverage decreases, both in general ($r_{xy}$=–0.88) and against individual infections, including hepatitis B, diphtheria, whooping cough, tetanus, polio, measles and rubella ($r_{xy}$ from –0.80 to –0.90).
**Conclusion**. The number of children in a family impacts mothers' refusals of breastfeeding and vaccination; the more children in a family, the more prolonged breastfeeding, but less vaccination coverage due to the health status of children in the first year of life.
**Keywords**: breastfeeding, vaccination, questioning, mothers, children of the first year of life, causes of failure.

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## Background

Infancy is a period of rapid growth and development of the child's body which is fundamental for the normal development of speech, motor activity, thermoregulation, formation of the psyche, and other functions [1,2]. The conditions and lifestyle of the family determine the health of more than half the number of children in this age group, and it is largely due to the stereotype of its behavior [3]. The health status of a child in the first year of life will largely depend on the age and level of culture of the mother, the psychological climate of the family, its composition, housing conditions, medical activity of the parents, and the nature of feeding among others.

Rapid development of all body systems occurs during the first 12 months, so the child's nutrition during this period is of great importance [4]. Mother's milk is the gold standard for infant fee-

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ding during the first year of their life [5]. Rational natural feeding is the most important factor in primary prevention of childhood diseases, which provides a child with a long-term protection forming the basis of future health. In addition, child's body is protected from external environmental factors via vaccinations of infectious diseases according to the National calendar of preventive vaccinations [6–8]. Today, the problem of parents refusing to breastfeed and vaccinate their children is very acute and has a clearly expressed social aspect [9,10].

Since the health status of children, which includes their physical and neuropsychic development, largely depends on the following conditions that are an important topic for research: lifestyle and medical activity of the family and the assessment of the impact of the number of children in the family on the reasons for the mothers' refusal to breastfeed and vaccinate.

**The aim** of the study is to assess the impact of the number of children in the family on the duration of breastfeeding and vaccination coverage.

## Materials and methods

The study was conducted on the basis of seven children's clinics in St. Petersburg using a specially developed form "questionnaire for the mother of a child at the age of 1 year." An anonymous survey of 1724 mothers with 1-year-old children born in 2016–2017 was conducted using a random sample [11]. The distribution of women by the number of children in the family showed that 54.2% (935 mothers) of the cases were of families with one child, 35.7% (615 mothers) were of families with two children, 10.1% (174 mothers) were of families with three or more children. The average number of children in a family is 1.74 ± 0.09. The average age of the mothers who participated in the study was 30.6 ± 0.12 years. Mothers independently filled out a questionnaire after their children had been attended to by district pediatricians or specialist doctors during medical examinations provided by the order of the Ministry of Health for children reaching the age of 1 year [12]. The participants consented to filling out the questionnaire.

The "questionnaire for the mother of a child at the age of 1 year" included 20 closed and open questions. The following questions were included in the questionnaire:

– About the terms of applying to the breast in an obstetric hospital.

– About the reasons and terms of mothers' refusal to breast-feed.

– Whether or not the child has been vaccinated in the first year of life according to the National vaccination calendar.

– About the reasons for mothers' refusal to vaccinate children, etc.

The sample size considered for this study corresponded to an average accuracy of studies with a confidence factor of 2 which corresponded to a probability of 0.954. A total of 9878 children who underwent medical examinations when they reached the age of 1 year in accordance with the lists provided by children's clinics (departments) were taken into consideration. The 0.02 accuracy measurement indicated that the sample was reliable; furthermore, this study's error rate did not exceed 2.2%.

Mathematical data were processed using MS Office Excel 2010 electronic worksheets and PASW Statistics Software package. The relative values of frequency and distribution of qualitative indicators, arithmetic mean values of quantitative indicators, and their standard errors were calculated. The link between quantitative indicators was evaluated by using the parametric Pearson's criterion r, and between qualitative indicators was evaluated by using the nonparametric Pearson's criterion $\chi^2$. Differences between quantitative indicators in the groups were evaluated by calculating the Student's t-test for independent samples. A single-factor analysis of variance was used with the help of the Fischer criterion (F) to confirm the impact of the number of children in the family on the duration of breastfeeding and vaccination coverage. The null hypothesis was rejected at a significance level of $p < 0.05$, a confidence interval with 95% reliability.

## Results and discussion

The impact assessment of the number of children in the family on the duration of breastfeeding revealed that the mothers in families with a large number of children continued to breastfeed for longer durations. On average, mothers who had one child breastfed for up to 7.36±0.11 months, two children for up to 8.29±0.11 months, and three or more children for up to 8.78±0.10 months. The average duration of breastfeeding of mothers with one, two, and three or more children were significantly different ($t > 2$) from one each other.

Table 1 shows the lowest proportion of mothers who started false feeding immediately after the birth of a child in maternity organizations was among women who had this tendency after having their first child (3.4%), and the highest was among those with many children (11.3%).Among respondents with one child, the maximum proportion of refusals from breastfeeding was for 3 and 6 months of the child's life (23.8% and 33.8%, respectively), among mothers with two children for 6 and 12 months (28.9% and 24.9%, respectively), and for

**Table 1.** Distribution of mothers by duration of breastfeeding in the first year of a child's life depending on the number of children in the family, % (n)

| Duration of a breastfeeding | One child | Two children | Three children or more |
|---|---|---|---|
| With a false feeding from birth | 3.4 (32) | 10.5 (65) | 11.3 (20) |
| 3 months | 23.8 (222) | 9.8 (60) | 7.5 (13) |
| 6 months | 33.8 (316) | 28.9 (178) | 19.6 (34) |
| 9 months | 10.8 (101) | 9.1 (56) | 16.9 (29) |
| 12 months | 16.8 (157) | 24.9 (153) | 21.8 (38) |
| Continued to feed after 1 year | 11.4 (107) | 16.8 (103) | 22.9 (40) |
| Total | 100.0 (935) | 100.0 (615) | 100.0 (174) |

**Table 2.** Specific weight of individual reasons for the refusal of mothers to breastfeed in the first year of a child's life, depending on the number of children in the family, % (n)

| Reasons for refusing to breastfeed | One child | Two children | Three children or more |
|---|---|---|---|
| The lack of milk | 29.3 (274) | 36.4 (224) | 46.8 (81) |
| Rejection of the baby from the breast | 16.8 (157) | 8.8 (54) | 4.8 (8) |
| Mother's illness | 7.9 (74) | 2.1 (13) | 4.2 (7) |
| Child's illness | 6.2 (58) | 3.7 (23) | 9.7 (17) |
| Need to go to work/study | 3.8 (36) | 13.2 (81) | 8.5 (15) |
| The unwillingness of the mother to continue breastfeeding | 2.9 (27) | 23.9 (147) | 19.5 (34) |

mothers with many children for 12 months or more (21.8% and 22.9%, respectively).

A single-factor analysis of variance showed the influence of the number of children in the family on the duration of breastfeeding ($F = 3.3$; $p < 0.05$). The correlation analysis showed that with an increase in the number of children, there is a decrease in the proportion of women who continued to breastfeed until 3 and 6 months ($r_{xy} = -0.82$ and $r_{xy} = -0.88$, respectively). Subsequently, there is an increase in the proportion of mothers who immediately after the birth began false feeding and respondents who continued to breastfeed a child after the age of 1 year ($r_{xy} = 0.80$ and $r_{xy} = 0.89$, respectively).

This study analyzed the reasons why the mothers' were refusing to breastfeed. Evidently, lack of milk was the leading cause for women to stop breastfeeding their children regardless of the number of children in the family. However, in families with a large number of children, the proportion of mothers refusing to naturally feed their children also increased; particularly, for the 46.8% mothers with multiple children.

An assessment of the subjective reasons for women's refusal to breastfeed revealed that in families with one child, mothers most often stopped breastfeeding due to the child's refusal to be breastfed (16.8%), and mothers with two and three or more children stopped due to the mothers' unwillingness to continue breastfeeding (23.9% and 19.5%, respectively). A significant proportion of mothers with two children stopped breast-feeding because of the need to go to work/school (13.2%). Table 2 presents the reasons of why mothers with different numbers of children refuse to breastfeed.

The influence of the number of children in the family on the reasons for refusal to breastfeed using a correlation coefficient showed that families with a larger number of children showed that a lower percentage of refusals were due to the child refusing milk from the breast ($r_{xy} = -0.88$) and a higher percentage of refusals due to the lack of milk ($r_{xy} = 0.87$).

An analysis of the vaccination coverage of children in the first year showed that 87.7% of children in families with one child were vaccinated according to the National calendar of preventive vaccinations, 82.3% of children in families with two children, and 71.9% of children in families with three or more children. An inverse correlation was found between the indicators ($r_{xy} = -0.88$) on the analysis of the dependence of vaccination coverage on the number of children in the family. It was found that the families with a larger number of children typically had lower vaccination coverage.

Table 3 shows the assessment of vaccination coverage for individual diseases included in the National calendar. It was found that families raising

**Table 3.** Coverage of children with vaccination against certain diseases in the first year of a child's life depending on the number of children in the family, % (n)

| Disease | One child | Two children | Three children or more |
|---|---|---|---|
| Hepatitis B | 90.9 (850) | 87.9 (541) | 80.7 (140) |
| Tuberculosis | 93.4 (873) | 83.1 (511) | 85.9 (149) |
| Pneumococcal infection | 73.7 (689) | 59.8 (368) | 71.9 (125) |
| Diphtheria | 75.1 (702) | 67.4 (415) | 59.6 (104) |
| Pertussis | 70.4 (658) | 69.1 (425) | 59.6 (104) |
| Tetanus | 73.7 (689) | 65.8 (405) | 59.6 (104) |
| Polio | 66.9 (626) | 65.8 (405) | 57.8 (101) |
| Hemophilic infection | 45.6 (426) | 33.7 (207) | 38.5 (67) |
| Measles | 48.1 (450) | 47.3 (291) | 28.1 (47) |
| Rubella | 42.8 (400) | 42.3 (260) | 28.3 (49) |
| Mumps | 36.8 (344) | 42.9 (264) | 28.6 (50) |

one child had the highest coverage of vaccination against all infectious diseases with the exception of mumps. Large families have the lowest coverage of vaccination against hepatitis B, diphtheria, pertussis, tetanus, polio, measles, and rubella.

The impact assessment of the number of children in a family on vaccination coverage using the Fischer test showed that there were statistically significant differences between the groups ($F = 48.7$; $p < 0.001$). An assessment of the impact of the number of children in a family on vaccination coverage of certain diseases using a correlation coefficient revealed that the more children in a family, the higher the percentage of refusals from vaccination against hepatitis B ($r_{xy} = -0.87$), diphtheria ($r_{xy} = -0.90$), pertussis ($r_{xy} = -0.81$), tetanus ($r_{xy} = -0.89$), polio ($r_{xy} = -0.82$), measles ($r_{xy} = -0.80$), and rubella ($r_{xy} = -0.80$).

Medical withdrawal for the health of the child was found to be an objective reason for refusing to vaccinate children in the first year of life. The percentage of refusals from immunoprophylaxis of infectious diseases due to medical withdrawal was the lowest at 62.5% in families with one child, 69.8% in families with two children, and 71.4% in families with three or more children. A direct correlation was found between the indicators ($r_{xy} = 0.83$) on analyzing the dependence of the percentage of refusals from vaccination due to medical withdrawal on the number of children in the family.

Thus, it was found that the number of children in the family affects the reasons for mothers' refusal of vaccination. With the increase in the number of children in the family, the share of refusals for objective reasons increased and decreased for subjective reasons.

## CONCLUSION

1. The smallest proportion of mothers who started false feeding in obstetrics organizations immediately after the birth was found among women whose child was the first-born (3.4%), and the highest among large families (11.3%).

2. It was found that the greater the number of children in the family, the longer the mothers had to continue breastfeeding. Mothers with one child were found to be most frequently breastfeeding for up to 3 and 6 months, mothers with two children for up to 6 and 12 months, and mothers with many children continued to breastfeed until the child reached the age of 1 year or more.

3. The main reason of mothers refusing to breastfeed, regardless of the number of children in the family, was the objective reason—lack of milk. However, for respondents who were raising two or more children, the subjective reason associated with the mother's unwillingness to continue breastfeeding, in the order of importance, appears to be the second most common reason for refusing to breastfeed, and in single-child families it comes out on the last.

4. The percentage of refusals to breastfeed due to the lack of milk increases with an increase in the number of children in the family and decreases when the child refuses to drink from the breast.

5. The greater the number of children in a family, the lower the vaccination coverage in the first year of a child's life. Families with one child have the highest vaccination coverage for all diseases included in the National preventive vaccination calendar (with the exception of mumps), and families with multiple children have the lowest vaccination coverage for infections such as hepatitis B, diphtheria, pertussis, tetanus, polio, measles, and rubella.

6. Medical withdrawal for the health of the child was found to be an objective reason, the main reason for refusal of vaccination in the first year of life for mothers, regardless of the number of children in the family. The number of rejections for objective reasons increases with an increase in the number of children in the family and decreases for subjective reasons.

The participation of the authors A.V.A. was responsible for the collecting and analysis of the results; E.N.B. made the research; K.E.M. performed the analysis of the results and was a manager of the study; and Sh.D.H. conducted the research.

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