

## The Association between Household Socioeconomic Status, Breastfeeding, and Infants' Anthropometric Indices

### Abstract

**Background:** The growth, learning, and contribution to active life in the communities are better in well-nourished children, and various factors influence infants' feeding. In this study, we assessed whether household socioeconomic status (SES) affects infants' length-for-age, weight-for-age (indicators of health and nutritional status) and breastfeeding (BF) (a necessity for optimal growth and health) status. **Methods:** In this cross-sectional study, 150 households with infants of 1–1.5 years old were interviewed on these variables: family size, dwelling ownership, duration of BF, exclusive BF (EBF) for 6 months, parents' age, parents' ethnicity, birth order, delivery type, and parents' education. Weight and length at 4 and 12 months were obtained from centers' records. To determine SES, we assessed total years of parents' education and household asset ownership by an index of nine owned assets. **Results:** The average of 4-month length in the low SES group was significantly lower than the two others ( $P < 0.05$ ). In middle socioeconomic group, duration of BF was significantly higher ( $19.5 \pm 7.3$  months vs.  $18.0 \pm 8.0$  months in low and  $17.5 \pm 7.9$  months in high SES groups) ( $P < 0.05$ ). Comparing illiterate mothers, university degree holders and university students were 73% less likely to not having EBF. Moreover, those with middle SES showed to be about 40% less likely to not having EBF. **Conclusions:** Nutritional status, duration of BF, and EBF might be determined by household SES and maternal education. Therefore, these findings can be used to decide how to focus on appropriate target groups in family education planning to improve children's development to its most possible.

**Keywords:** *Body weights and measures, breastfeeding, social class*

### Introduction

The nutritional status of children during the first 2 years of life plays an important role in their future social functions. The way an infant is fed is influenced by various factors.<sup>[1,2]</sup> The growth, learning, and participation in and contribution to communities are better in well-nourished children.<sup>[3]</sup> Any nutritional deficiency during growth and development would have long-term adverse effect on humans' lives.<sup>[4]</sup> Exclusive breastfeeding (EBF) has been established as a must for optimal growth in infants.<sup>[5]</sup>

Body height and weight are sensitive indicators of health and nutritional status as well as a mirror of the household social and economic prosperity.<sup>[6,7]</sup>

In Iran, improper child growth is more prevalent in households with lower income, education, and welfare.<sup>[8]</sup> Identification of associated factors helps to reduce child mortality and to develop the community.<sup>[9-11]</sup> In

this study, we aimed to assess the association between household socioeconomic status (SES) and body length and weight of infants at the ages of 4 and 12 months and the growth obtained between these two points. We also assessed the association between SES and infants' 6-month EBF.

### Methods

#### Ethical approval

The study procedures were approved by the Ethical Committee of Shahid Beheshti University of Medical Sciences, Tehran, Iran. All procedures performed in this study were in accordance with the ethical standards of Shahid Beheshti University of Medical Sciences and the 1975 Helsinki Declaration and its later amendments.

#### Study design

In this cross-sectional study, we recruited all the households with children of one to one and a ½ year old. The data for

Marjan Ajami,  
Morteza Abdollahi<sup>1</sup>,  
Forouzan Salehi<sup>2</sup>,  
Wilna  
Oldewage-Theron<sup>3</sup>,  
Yasaman  
Jamshidi-Naeini<sup>1</sup>

*Department of Food and Nutrition Policy and Planning Research, Faculty of Nutrition Sciences and Food Technology, National Nutrition and Food Technology Research Institute, Shahid Beheshti University of Medical Sciences, Tehran, Iran, <sup>1</sup>Social Determinants of Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran, <sup>2</sup>Department of Community Nutrition, Ministry of Health and Medical Education, Tehran, Iran, <sup>3</sup>Department of Nutritional Sciences, College of Human Sciences, Texas Tech University, Lubbock, Texas, USA*

#### Address for correspondence:

Yasaman Jamshidi-Naeini,  
Social Determinants of Health Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran.  
E-mail: [jamshidinaeini@yahoo.com](mailto:jamshidinaeini@yahoo.com)

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these households were recorded in five health centers over the past 2 years. This recruitment process left us with 150 household participants. The health centers were located in southern, northern, western, eastern, and central districts in Tehran where we recruited 32, 27, 20, 35, and 36 households, respectively. After selecting households, parents were invited to be interviewed by trained interviewers on the due dates.

After describing the procedures and method of the study, a written consent was obtained from participants. Participants were interviewed to collect the data on these variables: family size, how long lived in the current home, dwelling ownership, duration of breastfeeding, EBF for 6 months, maternal age, paternal age, child illness, maternal ethnicity, paternal ethnicity, birth order, delivery type, mother's education, and father's education. Weight and length at the ages of 4 and 12 months were obtained from centers' records.

Education level, income, and place of residence are considered to be the basics of social structure. To determine the SES of the participants, we assessed total years of parenteral education (sum of years of maternal and paternal education) and household asset ownership (as an indicator for household income)<sup>[12]</sup> by an index of nine owned assets: private property, car, side-by-side refrigerator, personal computer, laundry machine, light-emitting diode or liquid crystal display television, Persian rug, dishwasher, extra villa or house, and microwave oven. According to Daneshzad *et al.*,<sup>[12]</sup> if the household owned 3 or less of these items, they were considered with poor economic status, 4–6 items were considered as medium, and 7–9 were considered as good economic status. Those with total education years of less than 24 were considered with poor social status, 24–32 years were considered intermediate, and those with more than 32 years of education were considered with high social level. Finally, to assign each household an indicator for socioeconomic status, those for whom both social and economic status were at the same level were considered with the same status, and for whom the two category levels were different, we considered the lower if the family did not have private property or the higher if the family owned private property.<sup>[6,12]</sup>

### Statistical analysis

The collected data were statistically analyzed using SPSS 16.0 for Windows (SPSS Inc, Chicago, IL, United States). Quantitative data (weight, length, family size, how long lived in the current home, duration of breastfeeding, maternal age, and paternal age) were described by mean and standard deviation, and qualitative data were reported by absolute and relative frequencies. Statistical analyses were conducted on 150 infants whose parents completed socioeconomic questionnaires. To determine odds ratios and 95% confidence intervals for 6-month EBF in association with family size, mother's education, father's education, and household SES, logistic regression was used

to adjust the effect of how long lived in the current home, dwelling ownership, duration of breastfeeding, maternal age, paternal age, child illness, maternal ethnicity, paternal ethnicity, birth order, and delivery type.

Chi-square test was used to assess the relationship between EBF for 6 months and infant sex, dwelling ownership, mother ethnicity, and father ethnicity. We used one-way ANOVA test to determine whether there is a relationship between SES and weight at 4 months, length at 4 months, weight gain between the ages of 4 and 12 months, length growth between the ages of 4 and 12 months, and duration of breastfeeding. The significance level for all statistical tests was considered  $P < 0.05$ .

### Results

The distribution of some examined characteristics has been described in Table 1. The household SES was not associated with weight at 4 months, weight gain,

**Table 1: Distribution of some examined characteristics (n=150)**

Characteristics	n (%)
Sex	
Female	123 (49.8)
Male	124 (50.2)
Dwelling ownership	
Owning	77 (31.2)
Renting	109 (44.1)
Other	61 (24.7)
Exclusive BF for 6 months	
Yes	166 (67.2)
No	47 (30.0)
Mother's education	
Illiterate	5 (2)
Elementary or middle school	27 (10.9)
High school	99 (40.1)
University student, associated degree, bachelor	106 (49.2)
PhD, religious school	10 (4.0)
Father's education	
Illiterate	5 (2.0)
Elementary or middle school	45 (18.2)
High school	97 (39.2)
University student, associated degree, bachelor	81 (32.7)
PhD, religious school	19 (7.7)
Birth order	
1	153 (61.9)
2	82 (33.2)
3	10 (4.0)
4	1 (0.4)
5	1 (0.4)
SES	
Low	111 (44.9)
Middle	86 (34.8)
High	50 (20.2)

SES=Socioeconomic status, BF=Breastfeeding

and length growth [Table 2]. However, SES was a predictor of length at 4 months so that the average of participants' 4-month length in the low SES group was significantly lower than the two others ( $63.3 \pm 2.5$  cm vs.  $64.0 \pm 2.5$  cm in the high SES group and  $64.1 \pm 2.9$  in the middle SES group) ( $P < 0.05$ ). Moreover, SES was significantly associated with duration of breastfeeding, and in those with middle SES, duration of breastfeeding was significantly higher than the low and the high SES groups ( $19.5 \pm 7.3$  months vs.  $18.0 \pm 8.0$  months in low and  $17.5 \pm 7.9$  months in high SES groups) ( $P < 0.05$ ).

EBF did not show any significant association with these predictors [Table 3].

We also analyzed multivariable-adjusted associations of EBF for 6 months with household determinants. These determinants included family size, parents' education, and SES. The analysis demonstrated that compared to illiterate mothers, holders of associated degree, bachelors' degree, and university students are 73% less likely to not having 6-month EBF. Moreover, those with middle SES showed to be about 40% less likely to not having 6-month EBF [Table 4]. Family size and father's education did not show to be significantly associated with EBF.

## Discussion

In this cross-sectional study, the household SES was not associated with weight at 4 months, weight gain, and length growth. However, the average of participants' 4-month length in the low SES group was significantly lower than the two others. SES was significantly associated with duration of breastfeeding, and in those with middle SES, duration of breastfeeding was significantly higher than the low and the high SES groups. Holders of associated degree and bachelors' degree and university students were 73% less likely to not having 6-month EBF. Moreover, those with middle SES showed to be about 40% less likely to not having 6-month EBF.

SES was a predictor of length at 4 months. However, it did not show a significant relationship with length growth between 4 and 12 months.

In a cohort of children in the UK in the 1990s, differences in height during childhood by socioeconomic position were mostly due to differences in birth length.<sup>[13]</sup> This suggests that compared to birth length, height growth might be less

affected by SES factors, and birth length variations which may arise by maternal intrauterine characteristics, genetic, or epigenetic factors will result in height differences in later childhood. Maternal intrauterine characteristics that are affected by maternal behaviors seem to be of greater significance than genetic factors.<sup>[13,14]</sup> Moreover, social position of the family (determined by factors such as maternal education or SES) is itself related to the fuller development of genetic potential in terms of the height of a child.<sup>[6]</sup> The results of this cohort by Howe and others are similar to ours in growth rate not being affected by SES factors. Although we could not include birth measurements in our analysis, if assuming that SES factors might not influence the growth variations from birth till 4-month age significantly, then the length at 4 months would have been affected by maternal behaviors and the household SES.

Mothers at lower socioeconomic positions are less educated, take insufficient care during pregnancy, experience higher unemployment, and in general are characterized by factors that may result in reduced infant's weight.<sup>[15]</sup> Our study found limited evidence about the effect of household or maternal characteristics on infant weight or weight gain. Wright and others studied the influence of maternal socioeconomic factors on infant weight gain and faltering. They found that maternal responsiveness to meet infant feeding needs is the most significant factor on which infants are dependent. This rate of responsiveness may be associated with many factors including level of education and health awareness.<sup>[16]</sup> On the other hand, although we do not have access to birth weight of our infants which reflects maternal characteristics and genetic factors, improvements in living conditions and social supports such as nutrition assistance programs may have resulted in a reduction in weight differences at 4-month age between various socioeconomic levels.<sup>[17]</sup>

Growth is in its highest rate in infancy, and breastfeeding for 6 months is an essential for appropriate growth.<sup>[18]</sup> Therefore, as a growth predictor, we assessed the way infants were fed in relation to the household SES. Different social, psychological, emotional, and environmental factors contribute to the complex and multifactorial decision on whether an infant is breastfed or bottle-fed.<sup>[19]</sup> In the study by Ford and Labbok, it was reported that more educated woman are more likely to initiate and continue breastfeeding.<sup>[20]</sup>

**Table 2: The relationship between socioeconomic status with quantitative variables**

	SES (n=150)			P <sup>a</sup>
	Low SES	Middle SES	High SES	
Weight at 4-month age (g)	6883.33±816.46	6982.56±909.10	6829.00±818.04	0.092
Length at 4-month age (cm)	63.3±2.5	64.0±2.5	64.1±2.9	0.046*
Duration of BF (month)	18.01±8.06	19.553±7.34	17.552±7.9	0.029*
Weight gain (g)	2857.3±775.32	2726.7±725.49	2916.000±760.60	0.301
Length growth (cm)	13.1±2.22	12.7±1.97	12.570±1.57	0.261

<sup>a</sup>One-way ANOVA test. SES=Socioeconomic status, BF=Breastfeeding

**Table 3: The relationship between exclusive breastfeeding with categorical variables**

	Exclusive BF for 6 months		P (χ <sup>2</sup> )
	Yes (n)	No (n)	
Sex			
Male	82	37	0.521
Female	84	37	
Dwelling ownership			
Owning	45	30	0.078
Renting	79	27	
Other	42	17	
Mother's ethnicity			
Afghan	6	0	0.065
Turk	24	9	
Fars	72	24	
Lor	3	1	
Kurd	7	4	
Father's ethnicity			
Afghan	7	0	0.47
Turk	19	9	
Fars	69	21	
Lor	5	1	
Kurd	12	7	

BF=Breastfeeding

In our study, breastfeeding was initiated in all 150 participants. Therefore, we assessed the impacts' breastfeeding (BF) might have by the duration of BF and EBF for 6 months. In those with middle SES, duration of breastfeeding was significantly higher than the low and the high SES groups. Moreover, those with associated degree, bachelors' degree, and university students were less likely to not having 6-month EBF. The most important reasons for starting breastfeeding were assessed by Arora *et al.* and were reported to be benefits to the infant's health, naturalness, and enhancing mother–infant bonding. It seems that these given reasons for breastfeeding initiation need to be strengthened through education and might explain higher education of mothers who had an exclusive 6-month breastfeeding in this study.<sup>[2]</sup>

The level of paternal education did not show any relationship with the duration of breastfeeding, EBF for 6 months, length, or weight. One other study reported that infant's father and maternal grandmother had the most impact on infant's mother (71% of women were influenced by the infant's father and 29% by the maternal grandmother). The lack of fathers' influence in our study may reflect the low level of his information due to the lack of participation in discussions regarding the way the infant will be fed.<sup>[2]</sup>

Unfortunately, we did not have access to birth weight of our infants and therefore were not able to assess the relationship between SES factors and prenatal care and to assess whether SES factors are better reflected in

**Table 4: The association between 6-month exclusive breastfeeding with socioeconomic factors**

	OR (95% CI)	P <sup>a</sup>
Family size		
3	Reference	
4	0.56 (0.38-1.18)	0.20
5	0.52 (0.34-1.38)	0.83
6	0.95 (0.40-2.32)	0.39
Mother's education		
Illiterate	Reference	
Elementary or middle school	0.22 (0.02-1.39)	0.26
High school	0.18 (0.07-1.20)	0.55
University student, associated degree, bachelor	0.27 (0.18-0.51)	0.02*
PhD, religious school	0.81 (0.40-0.93)	0.07
Father's education		
Illiterate	Reference	
Elementary or middle school	0.38 (0.32-2.30)	0.96
High school	0.69 (0.07-1.20)	0.81
University student, associated degree, bachelor	0.77 (0.11-1.21)	0.62
PhD, religious school	0.94 (0.22-1.23)	0.15
SES		
Low	Reference	
Middle	0.59 (0.11-0.92)	0.052
High	1.05 (0.51-2.40)	0.087

<sup>a</sup>Logistic regression, adjusted for how long lived in the current home, dwelling ownership, duration of breastfeeding, maternal age, paternal age, child illness, maternal ethnicity, paternal ethnicity, birth order, delivery type. OR=Odds ratio, CI=Confidence interval, SES=Socioeconomic status

pre- or in post-natal care. It seems that parents of lower social and economic levels need more education on the importance of prenatal and infant care including BF to its optimal duration, and therefore, focus on appropriate target groups in maternal education planning is of great importance.

## Conclusions

Nutritional status, duration of BF, and EBF seem to be influenced by household SES and maternal education. Therefore, these findings can be used to decide how to focus on appropriate target groups in family education planning to improve development of children to its most possible level.

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## Conflicts of interest

There are no conflicts of interest.

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