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Socioeconomic Status and Low Birth Weight, Shahroud 2017

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Abstract

Background: *Low birth weight (LBW) is one of the most important health indicators and a major cause of infant mortality. This study was conducted to investigate the effect of family socioeconomic status (SES) on LBW in Shahroud.*

Methods: *In this cross-sectional study, 4242 neonates were included in the study. The data gathering tool was used as a valid and reliable questionnaire. electronic records of the household's health profile were also employed to complete the data collection form. Determinants of household's SES were 10 economic factors, including household assets such as car ownership, computer and Internet access, microwave, cooking place, the number of residential house rooms, type of heating and cooling equipment, bathroom in the house, mother's history of foreign travel-tourism. In terms of the social factors, there were 4 variables: Father's education, mother's education, father's job and the number of children. The logistic regression model was adopted by controlling the confounding variables to investigate the effect of socioeconomic factors on LBW.*

Results: *Among the subjects, 312 (7.4 %) of them were LBW (CI 95%=6.6-8.1). The chance of low birth weight in neonates with the low socioeconomic group was 2.6 times more than high-class group (95% CI=3.47-2.01).*

Conclusions: *The quality of health services and the improvement of the socio-economic situation must be taken into account to reduce the inequity of LBW between poor and rich family neonates.*

Keywords: Neonate, Socioeconomic status, Low birth weight, Shahroud.
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Introduction

Neonatal health condition is a central factor in the evaluation of community health status, and LBW is an important indicator that influences the health of neonates. Babies weighing less than 2.500 grams are known as LBW who are prone to the risk of infant mortalities.[1]

It is also an important indicator of social determinants of health because it can indicate the quality of nutrition, access to pregnancy care, and the mother's social supports.[2,3] Studies have shown that LBW is closely linked to cardiovascular disease and stroke in adulthood[3] and underweight neonates have a lower average IQ and a higher risk of fatalities.[4,5] According to the studies of last ten years, the prevalence of LBW was 5% to 19% and demographic and socioeconomic factors were the most important determinants in Iran.[6]

Based on a report of the world health organization (WHO) in 2015, the prevalence of LBW was 15% in the world, and 95% of these neonates were born in less developed regions. The causes of underweight in developed countries are more common for reasons such as preterm birth before 37 weeks of gestation (prematurity), maternal smoking, high number of pregnancies and cesarean. In less developed areas, it is more related to the lack of weight gain during pregnancy due to the mother's poor nutrition.[7] As an important predictor of infectious diseases,[8,9] the socioeconomic status (SES) is effective on the mother's nutrition. SES can determine a person's access to the resources including goods, money, power, friendship, health care, leisure and education. This is related to a wide range of health consequences.[10]

Chen and his colleagues found that a decrease in SES was associated with an increased health risk in children.[11] In another research, Ashworth reported that the early differential growth patterns in the neonate are indirectly affected prenatally by socioeconomic status.[12] Another study demonstrated a clear graded association between income quintile and low birth weight in the United States with socioeconomic inequalities in low birth weight being more serious in the United States than the UK, Australia, and Canada.[13]

There is a link between low SES and the prevalence of health problems and even fatality. In low-income countries, about 14% of children weigh less than 2.500 grams.[14,15]

The effects of socio-economic changes on health needs to be investigated to help the health system to acquire efficient services to boost mother and children's health indicators.

Because of these socioeconomic changes in different periods, it is necessary to conduct cross-sectional studies on neonatal underweight. This study aimed to evaluate the effect of socioeconomic conditions on LBW in Shahroud in 2017.

Materials and Methods

In this cross-sectional study, 4242 registered live births were entered for the determination of study-specific objectives. After recording the initial specifications of births and basic data of households, all mothers were interviewed by phone or in-person, and data related to birth and SES of households were collected. Data collection and entry were performed for ten months.

A 52-item questionnaire was used for data collection. In the first part, the demographic variables including age, level of education, job, parental relationship, and household insurance status were recorded. In the second part, information about mother and child, including the age of marriage, place of birth,

age of the pregnancy, high risk of pregnancy, type of delivery, number of visits to the relevant unit to receive maternity care services and history of congenital anomalies as well as the current condition of the newborn weight, height and the head circumference of the neonate at birth were gathered based on the electronic household's file. The third part was devoted to the economic situation and household assets: Ownership of the house, area of residence, type of fuel and heating-cooling equipment, having a bathroom and kitchen, number of rooms, having a refrigerator, LCD or LED TV, washing machine and dishwasher, landline and mobile phone, vacuum cleaner, type of cooling device, internet access, and the family car.

Interviews and collection of information began by thirty trained experts from February 2016 until December 2017. The interviews were carried out in the health service provider's unit.

All newborns weighing less than 2.500 grams were considered as underweight neonates and entered the study. The electronic health record was consulted to record infant weight information.

Using the principal component analysis (PCA), the SES variable was created to construct the SES variable;[16] 24 variables related to socioeconomic status were used, including assets and home and education profile, then household, and parental occupation. Finally, 10 variables related to economic status and 4 variables related to social status were included in the final model and used to determine the economic and social status of households. Variables with a coefficient effect of less than 0.05 were excluded from the model.

The model variables were the following: 10 main economic variables (heating device, cooling device, kitchen, presence of a bathroom, the number of rooms in a residential house, a vehicle (vehicle with a price above 50 million Tomans in 2017), having a microwave, a history of mother's foreign travel-tourism, having a computer, internet access) and 4 main social variables (father's education, father's job, number of children and mother's education).

PCA is a method of reducing the number of variables that can be judged based on eigenvalue to obtain a compound variable of the data. Given that the study aims to build a socio-economic status index, the first component with the highest eigenvalue (3.93) has been selected.

Based on the model's coefficients presented for the first combination, the variable of SES was constructed (table 1).

Table 1. Coefficients of variables entered the model to determine the SES

Variables	Model's coefficients
Father's education	0.37
Father's occupation	0.34
Computer	0.34
Cooling system	0.34
Mother's education	0.33
Heater system	0.30
Microwave	0.30
Car	0.27
Internet	0.24
Rooms	0.22
History of mother's foreign travel	0.17
Numbers of children	-0.11
Kitchen	0.08
Bathroom	0.05

By combining these 14 variables based on the presented coefficients, a unique variable was created as SES and the population was divided into two groups with high and low SES.

A multivariate logistic regression model was employed to investigate the association of SES and LBW. In the logistic regression model, household or urban residence, history of maternal abortion, maternal age, history of congenital anomalies, the interval between pregnancies, parental relationship, the gender of births, high-risk pregnancies, body mass index and frequency of pregnancy care were introduced as confounders.

Data analysis was performed by $SPSS_{23}$ and $STATA_{14}$. The association between the independent and dependent variables in the logistic regression model was determined based on calculating the odds ratio (OR).

Results

According to our findings, 75.5% of households were in cities and 24.5% were in rural areas. A total of 80.6% of mothers had the ages of 18-35 and 19.4% were in the high-risk age group under 18 and over 35 years.

Based on the information obtained in this study, it was found that parental literacy in high school and diploma with 46.3% in mothers and 38.4% in fathers had the highest frequency and parental illiteracy in fathers and mothers was approximately 0.6% (table 2).

Table 2. Parent's education level, neonates, Shahroud 2017

Education	Father		Mother	
	Number	Percentage	Number	Percentage
Illiterate	27	0.6	24	0.6
Elementary	537	12.7	412	9.7
Middle	705	16.6	480	11.3
High school and diploma	1626	38.4	1966	46.3
Associate	425	10	349	8.3
B.A	713	16.8	854	20.1
M.A	179	4.2	141	3.3
Doctorate	30	0.7	16	0.4

Out of 4242 children, 312 (7.4%) were underweight and under 2500 grams

(95% CI: 6.6 - 8.1).

There were significant associations between abortion histories, type of delivery, congenital anomalies history in previous children, number of pregnancies, household size, high-risk pregnancies and LBW, which were included in the final model and whose effects on SES have been controlled. Among these variables, a positive history of congenital anomalies of previous children, abortion history, family size, number of pregnancies, and place of residence was significantly associated with underweight (table 3).

The study results showed that low SES increases the chance of LBW 2.64 times (95% CI: 3.47-2.01) (table 3).

Table 3. Factors affecting LBW in terms of multivariate regression, neonates, Shahroud,2017

Variables	OR	95% CI	Pvalue
Inhabitation			
−Urban	1		
−Rural	0.51	0.72-0.37	0.001<
−Cities with less than 20,000 populations	1.00	1.42-0.71	0.958
Abortion history			
−Yes	1		
−No	2.15	1.44-3.22	0.001<
Delivery type			
−NVD	1		
−C/S	1.66	1.28-2.14	0.001<
Congenital anomalies in previous children			
−No	1		
−Yes	2.62	1.10-6.26	0.029
Number of mother's Gravidity			
−First pregnancy	1		
−Second pregnancy	0.35	0.50-0.25	0.001<
−Third pregnancy	0.33	0.21-0.52	0.001<
−Fourth and more pregnancies	0.16	0.08-0.32	0.001<
−Numbers of household members	1.50	1.33-1.78	0.001<
High risk pregnancy			
−No	1		
−Yes	2.38	1.80-3.14	0.001<
SES			
−High	1		
−Low	2.64	2.01-3.47	0.001<

Discussion

In this study, it was found that the prevalence of LBW among children born in 2017 in the population covered by Shahroud university of medical sciences was 7.4%. In the study of Hemmatyar et al. in Tehran's Javaheri hospital, the underweight index was reported 7%[17] and in a similar study by Tutunchi and his colleagues in Tehran hospitals, the prevalence of underweight children was 8.6%.[18] In the study of Delaram and colleagues, a 7.3% low birth weight index was reported in Shahrekord women's hospital.[19] Eslami et al. reported a low birth weight in Yazd of 7.9%.[20] The results of a study by Sharifi showed that the prevalence of low birth weight in Iran's infants was 9%.[21] According to the accomplished studies, the prevalence of underweight condition was 7-8.6%, which is consistent with the result of the present study.

In 2012 WHO report, the index was reported 13% in Listed developed countries and in the Sub-Sahara Africa region, 9% in Latin America, 28% in South Asia, 6% in East Asia and the average prevalence of prematurity around the world have been reported 15%, making the weight loss index in Shahroud more favorable than the global average. These studies have clearly indicated the impact of socioeconomic factors on children's underweight condition.

A study in 2015 by Demelash et al. in South Africa found that low maternal SES factors and low birth weight were significantly associated.[22] The results of a research showed that there was a relation between race, ethnicity, concentrated poverty, and low birth weight disparities,[23] and studies by Peng Hoi and colleagues have shown that mothers with less than 9 years of education have had lower incidence of LBW.[24]

Mahmoudi and his colleagues demonstrated a significant relationship between socioeconomic factors and LBW, and among the socioeconomic factors (education, job, income, housing), maternal education had the highest relationship with birth weight.[6] The results obtained by Moini and his colleague on risk factors on LBW in the south of Iran have also shown that SES such as parental literacy status and household living in urban and rural areas affect low birth weight.[25] In terms of the impact of socioeconomic factors on being underweight and increasing the chance of 2.6 times, based on the results of the current study, the low birth weight in children belongs to the lower socioeconomic classes, which is consistent with earlier studies.

Since the society socio-economic situation in different periods is faced with changes in parents education level, employment, and unemployment status, also consequently changes in household income, it is recommended to study the effects of household's socioeconomic status on health, children's health in particular, with more emphasis on LBW in a given period of time. Also, further research can be conducted on how a low-income status affects the health of children and infants. In the Iranian society, as in other parts of the world, which is affected by Coronavirus (COVID-19) and has experienced a critical socio-economic situation, the effect of economic factors such as stagnation, unemployment and business failure can be investigated on the health condition of newborns.

An implication for the current study can be holding training sessions to increase life skills in primary caregivers (not just educating mothers) to improve psychological, economical, and social conditions during critical times, which positively affects the health of mothers and babies and prevents LBW. In addition, Governmental organizations and NGOs (Non-governmental organization) can identify poor families and financially and socially support them in order to prevent LBW,

which enhances the health conditions of the next generation, including the neonates.

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Conflict of Interest

The authors declare that they have no conflict of interest.

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