

Health Parameters Related to Maternal Education in Iranian Families With Young Children

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Abstract

Background: Status of maternal education has a direct association with the incidence of childhood mortality. Despite many collected data about maternal education in developing countries, similar studies in transitional countries are low.

Objectives: The overall aim of this study was to define the relationship between maternal education and a variety of health parameters in families with young children.

Methods: In this study, 1112 families were enrolled. Data relevant to the factors linked with health parameters was collected through face-to-face interviews with parents. The infants aged 6 - 24 months were brought to the out-patient clinics of Taleghani and Mofid children teaching hospitals, Tehran, Iran, for vaccinations, checkups, or minor childhood illnesses. According to level of education, the mothers were divided to two groups: those who had received formal education for at least nine years (group A) and those with less than nine years of education (group B).

Results: The rate of single child (68.33%, $P = 0.000$) and cesarean delivery (61.53%, $P = 0.000$) was significantly higher in educated mothers (> 9 years). Conversely, frequency of low birth weight infant (9.1%, $P = 0.021$) and hospitalization after the neonatal period (15.4%, $P = 0.024$), in families with low maternal education, was significantly increased. Overall, 28.9% of children were exposed to second-hand smoke (SHS), which in all cases, fathers were responsible for the exposure ($P = 0.00$). Maternal education was significantly associated with infants' exposure to SHS from their smoking fathers.

Conclusions: Our findings revealed the significant effect of maternal education on health parameters and indicated that low maternal education may increase the risk of mortality in infants.

Keywords: Health, Low Birth Weight Infant, Educational Status, Hospitalization, Breast Feeding, Secondhand Smoke

1. Background

The impact of female education on family health outcomes, especially on children's growth, health status and upbringing has long been the subject of heated controversy (1-3).

Numerous researchers from developing countries have reported that the level of maternal education has a powerful impact on child health care status and mortality and even minor improvements in the level of maternal education results in a decline in child mortality. It has been estimated that each one-year increment in mothers' education is equivalent to a 7 to 9% decrease in the mortality of their preschool children, exerting a lasting influence from early to late childhood (1, 4).

It has been found that girls with a higher education are more actively involved in decision-making about various healthcare issues (2). Better-informed mothers are familiar with the basic health care plans for their children, and they are actively involved in disease prevention programs,

especially timely vaccinations; also, they seek health care promptly in case of any problems (1, 2, 5).

On the other hand, some studies suggested that although child health is correlated with maternal education, a causal relationship has not been established. It is believed that the beneficial effect of maternal education could be explained by better socioeconomic status and improved housing conditions, including living in a geographic area that allows easier access to health facilities (6).

Most studies have either focused on the association of maternal education with different aspects of child health after the period of infancy and have either been carried out in the third world where healthcare is severely defective, or, low-income families have been selected for the study (1-6).

Although a few studies have been done in highly developed countries, we did not find similar studies from transitional countries (7). In this study, we assessed the relationship between maternal education and a variety of health

outcomes in infants under the age of 24 months, living in urban housing in the capital city of a Middle Eastern country.

2. Methods

We enrolled 1112 infants between the ages of 6 and 24 months referred to the out-patient clinics of Taleghani and Mofid children teaching hospitals affiliated to Shahid Beheshti University of Medical Sciences, Tehran, Iran. Children attended these clinics from all parts of Tehran for immunization, routine checkups, or minor childhood illnesses. Children, who had congenital anomalies, chronic illnesses or co-morbid conditions as well as children more than 24 months and less than 6 months of age were excluded. Parents accompanying the children were interviewed by trained members of the study team, and relevant data were documented on a pre-designed questionnaire. Children were also given a physical examination to document the body weight and exclude co-morbid conditions.

Data included age and gender of the infant, birth order, mode of delivery, birth weight, present weight, number of children in the family, mode of feeding for the first six months, exposure to second hand smoking, and history of hospitalization during the first six months of life.

Parental data included level of education and the mother's occupation, while fathers' education level was also recorded. In addition, smoking habits of both parents were documented.

Mothers' level of education was defined according to the years of formal schooling, and was divided to two categories: those who had received formal education for at least nine years (group A) and those with less than nine years of education (group B). Documented variables were compared in different groups.

All data was analyzed using SPSS Software version 16; categorical data was analyzed by chi-square test and analysis of variance was done for comparison of means between groups. A P value of $< 0.05\%$ was considered significant.

3. Results

Overall, 1112 infants qualified for this study. Of these, 551 (49.6%) were female. Furthermore, 685 families (61.6%), had only one child. All children had been born in hospitals and 612 (55%) were delivered through a cesarean section. A total of 67 (6%) infants had low birth weight (< 2.5 kg) and 20 (1.8%) infants had a birth weight of < 2 kg.

Out of the 735 children whose body weight was documented at first presentation, in 198 (26.9%) children the

weight was under the 10th percentile for age and in 146 (19.9%) under the 5th percentile.

A total of 28.9% of children had been exposed to second-hand smoke through parental smoking; fathers had been responsible for the exposure in all cases, with mothers in only four children. In 98 (8.8%) infants, breast-feeding had been stopped before three months of age and in 164 (14.7%), before six months. Mothers' characteristics: 158 mothers (14.2%) were under 21 years of age and 217 (19.5%) were above 30 years of age. One hundred and ninety-seven (17.7%) of the mothers were employed and the rest were housewives. Only 26 women were illiterate and 131 mothers had been educated in primary schools for one to five years. On the whole, 331 females, 29.8%, had received formal schooling for less than nine years and 267, (24%) had acquired higher education. Furthermore, 21.4% of fathers had been educated for less than nine years and 32.9% had studied at a university.

Three hundred and twenty-four (29.13%) of the infants had been hospitalized before the age of 6 months, 197 (17.7%) during the newborn period and 127 (11.4%) between the ages of one and six months; most common reasons for hospitalization during the latter period being gastrointestinal and respiratory illnesses (35.4% and 32.2%, respectively).

Findings revealed a higher frequency of younger mothers (under 21 years of age), which were exposed to second hand smoke at home, low birth weight infant and hospitalization after the neonatal period in households with low maternal education (under nine years) (Table 1).

Conversely, the ratio of cesarean deliveries, one-child families, and working mothers was significantly higher in families in which mothers had received ≥ 9 years of schooling (Table 1).

Mode of infant feeding up to six months and body weight at presentation was not related to the level of maternal education (Table 1).

4. Discussion

Despite the fact that over the last twenty years the level of female education has improved, a significant percentage of females remain uneducated in developing countries and the literacy rate is less than 50% of males living in the same situations, resulting in significant gender gaps in the literacy rates (8).

In our study only 2.3% of females were illiterate and in a minor proportion formal education had ceased after one to five years of schooling (11.8%). However, even in our study, disparity was seen between the levels of paternal and maternal education; a higher percentage of fathers had received college education; in contrast, a higher

Table 1. Comparison of Variables Between Mothers Educated < 9 Years With \geq 9 Years^a

Variable	Maternal Education, y (< 9) (N = 331)	Maternal Education, y (\geq 9) (N = 781)	P Value
Single-child	45.6	68.33	0.000
Cesarean Delivery	39.6	61.53	0.000
LBW	9.1	4.74	0.021
Newborn hospitalization	14.2	19.23	0.1179
Exposure to SHS	37	25.53	0.000
Breast discontinued < 6 months	15.1	14.61	0.964
Working mother	2.1	24.35	0.000
Father education, y (< 9)	56.7	6.45	0.000
Infant hospitalization between 1 - 6 month	15.4	9.74	0.024
SuSuboptimal body weight (< 10th percentile for age)	29.9	26	0.316

Abbreviations: LBW, low birth weight; SHS, second hand smoke.

^aValues are expressed as %.

percentage of mothers had been educated less than nine years.

We did not document the age at which the females in our study had gotten married but, the majority of mothers in our study were above 21 years of age in contrast to those in some developing countries, notably rural Bangladesh, where > 72% of first-time mothers were < 20 years of age (9). In our study, it was found that the mothers in the group, who had been educated for > 9 years were younger and more females in this group had two or more children, in contrast to the higher educated females, who, despite being older, had given birth to only one child.

The relationship between female's education and their fertility has been a matter of debate in different surveys; Goyal from India is of the opinion that females having completed five to nine years of schooling prefer to have fewer children and this preference is more marked in females with about 10 years of schooling. The author concludes that females need at least eight to ten years of formal education before they take active steps to reduce their fertility (4).

Other studies have also shown that less educated females enter marriage earlier than educated individuals, start having children sooner, and also have more children, with the reverse being true for highly educated females (9-12).

We also noticed a higher percentage of cesarean deliveries in highly educated mothers; this observation is in accordance with the findings of a Chinese study, which reported that with increasing rates of females in higher education during the last decade, the rate of cesarean sections, especially cesarean delivery on mother's request has increased as well (13). However, a study from Norway found

that during the past two decades, females with the lowest level of education had the highest risk for elective or emergency cesarean section (14).

Lui et al. also reported that increasing maternal education during the late 90s decreased the percentage of low birth weight at all educational levels, but this was more common in women educated for > nine years (15).

In a study by Victora et al. a strong relationship was revealed between maternal education and infant hospitalization and mortality that was partly independent of the socioeconomic status of the family (16). Also, a study in Nigeria found that maternal reading skills decrease child mortality, indicating the key role of literacy even in low-income countries (17).

Another study in Canada revealed a higher incidence of bronchiolitis-associated hospitalizations in communities where most mothers had not received post-secondary education versus localities with highly educated mothers (18).

A study in the Netherlands reported that 95.5% of highly educated mothers had initiated breast-feeding for their infants as compared to 73.1% of least educated mothers. Also, the educational background of mothers was a strong determinant of decisions for breastfeeding and also for the continuation of breast feeding up to two months (19). In contrast, we found no association between the level of maternal education and the rate of breast-feeding at three and six months.

Since almost all the mothers in our study were non-smokers, infants were not exposed to second hand smoke (SHS) from their mothers. A report from Greece reported smoking in parents of preschool children to be linked to paternal education, but not with maternal education (20).

We did not find any association between infant vacci-

nation and maternal education in this study; as national and international data have shown almost complete coverage for childhood immunization in our metropolitan area (21).

Nutritional status of the children, which is shown by weight for age or weight/ height, has been linked to the mother's educational level in some studies (3), but we found no significant difference in the mean weight for age between the two groups of infants.

Our survey was done on families that were seen at health clinics, which may not be a true representation of the general community. To minimize this difference, we only included children, who had no chronic health problems, and had come for routine checkups, vaccinations or minor ailments. Also, our sample does not represent families from small towns and rural areas and large national surveys are required to obtain a clear-cut picture for the whole country.

In conclusion, we found a significant relationship between the level of maternal education and the following health outcomes: mother's age on entry into motherhood, number of children, (family size), the mode of delivery, infant's birth weight, infant exposure to SHS, and infant hospitalization. Breast feeding rates were high at six months, but feeding practices were not influenced by maternal education.

These findings pinpoint aspects of family health that are linked with maternal education and underscore the need for providing formal education for young girls to achieve better health outcomes for the family, especially for their infants. The importance of our findings lies in the fact that female education is a major factor influencing family health not only in underdeveloped countries and poverty-stricken populations, but also in urban areas of a transitional country with adequate access to routine health care.

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Footnotes

Authors' Contribution: Study concept and design: Farideh Shiva; acquisition of data: Farideh Shiva; analysis and interpretation of data: Farideh Shiva; drafting of the manuscript: Anahita Sanaei Dashti; critical revision of the manuscript for important intellectual content: Farideh Shiva and Anahita Sanaei Dashti; study supervision: Farideh Shiva.

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References

- Huq MN, Tasnim T. Maternal education and child healthcare in Bangladesh. *Matern Child Health J*. 2008;**12**(1):43-51. doi: [10.1007/s10995-007-0303-3](https://doi.org/10.1007/s10995-007-0303-3). [PubMed: [18004651](https://pubmed.ncbi.nlm.nih.gov/18004651/)].
- Senarath U, Gunawardena NS. Women's autonomy in decision making for health care in South Asia. *Asia Pac J Public Health*. 2009;**21**(2):137-43. doi: [10.1177/1010539509331590](https://doi.org/10.1177/1010539509331590). [PubMed: [19190000](https://pubmed.ncbi.nlm.nih.gov/19190000/)].
- Wachs TD, Creed-Kanashiro H, Cueto S, Jacoby E. Maternal education and intelligence predict offspring diet and nutritional status. *J Nutr*. 2005;**135**(9):2179-86. [PubMed: [16140895](https://pubmed.ncbi.nlm.nih.gov/16140895/)].
- Low PS, Yip WC, Tay JS, Wong HB. Cerebrospinal fluid lactate-its diagnostic value in septic meningitis. *J Singapore Paediatr Soc*. 1986;**28**(3-4):243-6. [PubMed: [3599931](https://pubmed.ncbi.nlm.nih.gov/3599931/)].
- LeVine R, LeVine S, Schnell B. "Improve the women": Mass schooling, female literacy, and worldwide social change. *Harvard Educ Rev*. 2001;**71**(1):1-51.
- Desai S, Alva S. Maternal education and child health: is there a strong causal relationship? *Demography*. 1998;**35**(1):71-81. [PubMed: [9512911](https://pubmed.ncbi.nlm.nih.gov/9512911/)].
- Arntzen A, Mortensen L, Schnor O, Cnattingius S, Gissler M, Andersen AM. Neonatal and postneonatal mortality by maternal education-a population-based study of trends in the Nordic countries, 1981-2000. *Eur J Public Health*. 2008;**18**(3):245-51. doi: [10.1093/eurpub/ckm125](https://doi.org/10.1093/eurpub/ckm125). [PubMed: [18160387](https://pubmed.ncbi.nlm.nih.gov/18160387/)].
- Leinberger-Jabari A, Parker DL, Oberg C. Child labor, gender, and health. *Public Health Rep*. 2005;**120**(6):642-7. [PubMed: [16350334](https://pubmed.ncbi.nlm.nih.gov/16350334/)].
- Aminul Haque M, Sayem AM. Socioeconomic determinants of age at first birth in rural areas of Bangladesh. *Asia Pac J Public Health*. 2009;**21**(1):104-11. doi: [10.1177/1010539508329207](https://doi.org/10.1177/1010539508329207). [PubMed: [19124341](https://pubmed.ncbi.nlm.nih.gov/19124341/)].
- DeRose LF, Kravdal O. Educational reversals and first-birth timing in sub-Saharan Africa: a dynamic multilevel approach. *Demography*. 2007;**44**(1):59-77. [PubMed: [17461336](https://pubmed.ncbi.nlm.nih.gov/17461336/)].
- Hobcraft J. Women's education, child welfare and child survival: a review of the evidence. *Health Transit Rev*. 1993;**3**(2):159-75. [PubMed: [10146571](https://pubmed.ncbi.nlm.nih.gov/10146571/)].
- Choe MK, Thapa S, Mishra V. Early marriage and early motherhood in Nepal. *J Biosoc Sci*. 2005;**37**(2):143-62. [PubMed: [15768770](https://pubmed.ncbi.nlm.nih.gov/15768770/)].
- Zhang J, Liu Y, Meikle S, Zheng J, Sun W, Li Z. Cesarean delivery on maternal request in southeast China. *Obstet Gynecol*. 2008;**111**(5):1077-82. doi: [10.1097/AOG.0b013e31816e349e](https://doi.org/10.1097/AOG.0b013e31816e349e). [PubMed: [18448738](https://pubmed.ncbi.nlm.nih.gov/18448738/)].
- Tollanes MC, Thompson JM, Daltveit AK, Irgens LM. Cesarean section and maternal education; secular trends in Norway, 1967-2004. *Acta Obstet Gynecol Scand*. 2007;**86**(7):840-8. doi: [10.1080/00016340701417422](https://doi.org/10.1080/00016340701417422). [PubMed: [17611830](https://pubmed.ncbi.nlm.nih.gov/17611830/)].
- Liu Y, Liu J, Ye R, Ren A, Li S, Li Z. Association of education and the occurrence of low birthweight in rural southern China during the early and late 1990s. *Am J Public Health*. 2008;**98**(4):687-91. doi: [10.2105/AJPH.2006.088716](https://doi.org/10.2105/AJPH.2006.088716). [PubMed: [17761578](https://pubmed.ncbi.nlm.nih.gov/17761578/)].
- Victora CG, Huttly SR, Barros FC, Lombardi C, Vaughan JP. Maternal education in relation to early and late child health outcomes: findings from a Brazilian cohort study. *Soc Sci Med*. 1992;**34**(8):899-905. [PubMed: [1604379](https://pubmed.ncbi.nlm.nih.gov/1604379/)].
- Smith-Greenaway E. Maternal reading skills and child mortality in Nigeria: a reassessment of why education matters. *Demography*. 2013;**50**(5):1551-61. doi: [10.1007/s13524-013-0209-1](https://doi.org/10.1007/s13524-013-0209-1). [PubMed: [23592326](https://pubmed.ncbi.nlm.nih.gov/23592326/)].

18. Koehoorn M, Karr CJ, Demers PA, Lencar C, Tamburic L, Brauer M. Descriptive epidemiological features of bronchiolitis in a population-based cohort. *Pediatrics*. 2008;**122**(6):1196–203. doi: [10.1542/peds.2007-2231](https://doi.org/10.1542/peds.2007-2231). [PubMed: [19047234](https://pubmed.ncbi.nlm.nih.gov/19047234/)].
19. van Rossem L, Oenema A, Steegers EA, Moll HA, Jaddoe VW, Hofman A, et al. Are starting and continuing breastfeeding related to educational background? The generation R study. *Pediatrics*. 2009;**123**(6):e1017–27. doi: [10.1542/peds.2008-2663](https://doi.org/10.1542/peds.2008-2663). [PubMed: [19482734](https://pubmed.ncbi.nlm.nih.gov/19482734/)].
20. Vardavas CI, Athanasopoulos D, Balomenaki E, Niaounaki D, Linardakis MK, Kafatos AG. Smoking habits of Greek preschool children's parents. *BMC Public Health*. 2007;**7**:112. doi: [10.1186/1471-2458-7-112](https://doi.org/10.1186/1471-2458-7-112). [PubMed: [17570836](https://pubmed.ncbi.nlm.nih.gov/17570836/)].
21. WHO . Vaccine-preventable diseases monitoring system: global summary. Immunization profile - Iran. WHO-UNICEF Joint Reporting Form and WHO Regional offices; 2007.