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Original Research

Socio-economic and medical determinants of low birth weight in Iran: 20 years after establishment of a primary healthcare network

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ARTICLE INFO

Article history:

Received 18 September 2009

Received in revised form

12 January 2010

Accepted 3 February 2010

Available online 12 March 2010

Keywords:

Low birth weight

Iran

Socio-economic

Medical

SUMMARY

Objective: Establishment of a primary healthcare network in Iran has provided free and universal access to primary health care. Although the health status of Iranians has improved since this network was established, the low-birthweight rate has not decreased. The objective of the present study was to describe socio-economic and medical factors related to low birth weight in the context of free and universal access to primary health care.

Design: Descriptive, hospital-based prospective study.

Methods: Data about socio-economic, reproductive and prenatal condition of 4510 live singleton births from June to October 2004 were gathered using a standard questionnaire by interview and record review. The effect of these conditions on birth weight was investigated using a logistic regression model.

Results: Of 4510 newborns, 305 (6.8%) were low birth weight. Among these low-birthweight newborns, there were 159 preterm and 146 term newborns. Mothers with a primary and secondary education [odds ratio (OR) 6.83, 95% confidence interval (CI) 2.35–7.34 and OR 4.81, 95%CI 1.95–6.37, respectively], who lived with farmer and unskilled worker husbands (OR 2.52, 95%CI 1.12–4.66 and OR 2.91, 95%CI 1.35–2.52, respectively), with a birth interval of 1 year or less (OR 3.54, 95%CI 1.80–5.95) and height less than 155 cm (OR 1.82, 95%CI 1.12–3.31) were more likely to have low-birthweight infants.

Conclusion: In the context of free and universal access to health care, it is recommended that policy makers should place more emphasis on education as it imparts knowledge and thus influences dietary habits and birth-spacing behaviour. This will lead to a better nutritional status, particularly in dealing with pregnancy, resulting in lower rates of low birth weight.

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doi:10.1016/j.puhe.2010.02.003

Introduction

The health status of Iranians has improved over the last two decades since the establishment of an extensive primary healthcare network. Approximately 98% of the population has access to local health services.¹ As a result, child and maternal mortality rates have fallen significantly, and life expectancy at birth has risen remarkably. Although this trend is encouraging, the current level of neonatal mortality remains unacceptably high. The neonatal mortality rate in Iran is 19 per 1000 live births. Thus, of the approximately 1,420,000 live births each year, nearly 27,000 do not survive.²

Low birth weight is the major determinant of infant mortality. Two-thirds of all infant deaths occur during the neonatal period. Infants with a low birth weight have a 40-fold increased risk of death over normal-birthweight infants, and infants with very low birth weights (≤ 1500 g) have a 200-fold greater risk of death.³ Low birth weight also contributes to morbidity. Neurological disability, chronic diseases, inhibited growth and cognitive development are more common in low-birthweight infants, resulting in more frequent hospitalizations and outpatient visits for these infants.^{4,5}

An increased rate of low birth weight has been noted in Iran.⁶ In spite of free and universal access to health care, indicators of socio-economic inequalities in health have been reported.⁷ Low birth weight is not a proxy for any single dimension of either maternal or perinatal health outcomes. Globally, the indicator is a good summary measure of a multifaceted public health problem that includes long-term maternal malnutrition, ill health, hard work and poor health care during pregnancy.⁸

The purpose of this study was to provide insight into the determinants of low birth weight in the context of universal and free access to primary health care in Iran.

Methods

This was a hospital-based prospective study on low birth weight in Zanjan. Zanjan, a province with a population of approximately 1 million, is located in the north-western region of Iran. All six maternity hospitals in the province participated in the study. Data included all live singleton births over a period of 5 months from June to October 2004. Hospital deliveries represent 98% of all births in Zanjan.

Following delivery, each woman was administered a structured pretested questionnaire by an interviewer. Information was collected about sociodemographic, reproductive, nutritional and prenatal factors. Sociodemographic factors included age, educational level of mother and father, occupations of mother and father, and area of residence (rural or urban). Reproductive factors included parity, birth interval and history of low-birthweight delivery. Nutritional factors included multivitamin and iron supplementation, and mother's weight and height. Prenatal factors included morbidity during pregnancy and adequacy of prenatal care. Smoking is extremely rare among Iranian women so it was not included as one of the potential predictors. Additional information was collected through review of prenatal care cards and hospital delivery records.

Registered midwives conducted interviews and record reviews after training in interviewing and field procedures. In maternity wards in Iran, newborn infants are weighed without clothing soon after birth using a standard calibrated scale, with a precision of 10 g, and their length and head circumference are measured and recorded on their individual birth certificate by a midwife. Gestational age was calculated from the ultrasound result in the first trimester or, if not available, by menstrual history. In Iran, all pregnant women are referred for their first prenatal ultrasound during the first trimester.

Mother's height was measured to the nearest centimetre using a wall scale. Mother's weight was considered as pre-pregnancy weight that was recorded on prenatal cards. In 889 cases, the prepregnancy weight was not recorded. Body mass index was subsequently calculated.

For quality control of data, at least one monitoring visit was scheduled per week for each hospital. During these visits, research team monitored interview, record review and measuring functions and provided information and guidance on data collection. They also reviewed completed questionnaires, and any incomplete data, discrepancies or errors discovered during this review were resolved with interviewers. After collection, data were checked, verified, edited and entered into Statistical Package for the Social Sciences (SPSS Inc, Chicago, IL, USA).

Preterm birth was defined as less than 37 weeks of completed gestation, and low birth weight was defined as less than 2500 g. Adequacy of prenatal care utilization was calculated using Kotelchuck's Adequacy of Prenatal Care Utilization Index.⁹ The birth interval was defined as the period from the current date of conception to the date of birth of the previous baby. Urine infection was diagnosed where asymptomatic bacteruria was present on culture of a midstream urine sample, or when a patient had been clinically diagnosed and treated. Vaginal infection was defined as a clinically diagnosed infection or any positive screening test and culture. Use of iron and multivitamin supplements during pregnancy was dichotomized into daily and not daily.

Statistical analysis was performed by describing socio-demographic, reproductive and prenatal characteristics of the mother and newborn. Univariate analysis was employed to evaluate the association between the independent variables and low birth weight (outcome variable). Multivariate logistic regression analysis was performed to obtain the magnitude of association between the independent variables and low birth weight adjusted by the covariates. Logistic regression results are reported as odds ratios and 95% confidence intervals (CI) along with P values.

Results

Out of 4510 newborns delivered at the hospitals during the study period, 305 were low birth weight. Overall, the low-birthweight rate was 6.8% (95%CI 6–7.5%). Among the low-birthweight newborns, there were 159 preterm and 146 term newborns.

The mean birth weight was 3145 g [interquartile range [25th–75th percentile] 2850–3452 g, median 3180 g] and mean

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