Socioeconomic Risk Factors for Preterm Birth in the state of Qatar: A Population-based Study

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Abstract. *Objectives:* To review the demographics and socioeconomic determinants of preterm birth (PTB) compared to term births among the Qatari population. *Methods:* This was a retrospective data analysis of 59,308 births. Data were retrieved from a Population-based Cohort Study. Data were gathered from the PEARL-Peristat maternal newborn registry for 2011, 2012, 2017, and 2018. We compared the preterm births group (delivery < 37 weeks) with the term group (delivery ≥ 37 weeks) regarding socioeconomic factors, including maternal nationality, religion, level of education, mother's occupation, family income, housing, consanguinity, early childbearing, high-risk pregnancy, smoking, assisted conception, antenatal care, and place of delivery. *Results:* The prevalence of preterm birth was 9%. There were more Saudi nations in the preterm group compared to term (33% vs. 28%, p-value < 0.001). There were more preterm births than term births among working mothers (40% vs. 35%), high-risk pregnancies (24% vs. 18%), those that has used assisted conception (18% vs. 3%), those without antenatal care (11% vs. 5.6%), and those delivered in a tertiary women hospital (88.5% vs. 84.5%) (all p-values < 0.001). There were more women living in villas (41% vs. 38%, p = 0.01) and more smokers (0.8% vs. 0.5%, p = 0.030) in the preterm group than in the term group. There were no differences between the two groups regarding religion, level of maternal education, family income, and early childbearing. *Conclusion:* In our population, we identified several factors associated with preterm births. (www.actabiomedica.it)

Keywords: QATAR, preterm birth, socioeconomic factors, Peristat Registry

Introduction

It is estimated that 5–18% of pregnancies end with preterm births (before 37 weeks of gestation) (1). Prematurity is considered the second leading cause of neonatal morbidity and mortality (2,3). Regardless of birth weight and/or gestational age, newborns are fragile, particularly when birth occurs before term. Preterm births are at risk of serious short-, medium-, and long-term consequences. Also, preterm infants are at risk of developing chronic non-communicable diseases in the short and long term. Compared with those infants born before the 37th week of pregnancy, infants born prematurely have a higher risk of serious disability and prenatal mortality and morbidity (4-6). It has been proposed that early implementation of preventive interventions among pregnant women who are at high risk for preterm birth (PTB) could substantially reduce the amount of morbidity and mortality among newborns (7).

Here, we aimed to determine the socioeconomic factors associated with preterm births. This study provides data on the extent of the problem in Qatar and the associated risk factors. Such data will help health personnel to screen for those factors during the follow-up of preterm infants.

Methods

This study was a retrospective data analysis of 59,308 births. We compared the socioeconomic factors (maternal nationality, religion, level of education, mother's occupation, family income, housing, consanguinity, early childbearing, high-risk pregnancy, smoking, assisted conception, antenatal care, and place of delivery) of the preterm (delivery < 37 weeks) and term (delivery ≥ 37 weeks) groups. The study included all newborns born in the state of Qatar, regardless of gender and gestational age.

Data processing and analysis: The data was retrieved from the PEARL-Peristat newborn-maternal registry developed for phase 1: 2011, 2012, and phase 2: 2017, and 2018. The Peristat registry was funded by the Qatar National Research Fund (QNRF). Statistical analysis included the Fisher and mid-p exact tests, chi-squares, odds ratio, and maximum likelihood odds ratio estimate. P-values < 0.05 were considered significant with 95% confidence interval. Quantitative determinants used an independent t-test to compare means among maternal and neonatal outcome categories using independent t-test Mann Whitney for skewed data.

The study was approved by the IRB of medical research center in Hamad medical corporation who granted waiver of consent to collect the patient electronic data.

Results

We enrolled 5430 children born preterm and 53878 born at full-term, respectively. The prevalence of preterm birth was 9%. There were more Qatari women in the preterm group than in the term group (33% (1796/5430) vs. 28% (15319/53878), p < 0.001). There were more working mothers in the preterm group than in the term group (40% (1664/4183) vs. 35% (15744/45099), p < 0.001). More women were living in villas in the preterm group than in the term group (41% (1350/3302) vs. 38% (14938/39018) p = 0.01). There were more high-risk pregnancies in the preterm group than in the term group (24.5% (1335/5441) vs. 18% (9790/54004), p < 0.001). There

were more smoking women in the preterm group than the term group (0.8% (35/4238) vs. 0.5% (258/46438), p = 0.030). There were more assisted conception pregnancies in the preterm groups than in the term group (18% (854/4705) vs. 3% (1362/42509), p < 0.001). There were more women with no antenatal care in the preterm than in the term group (11% (576/5351) vs. 5.6% (3055/53697), p < 0.001). There were more women with preterm births delivered in our tertiary women hospital than in other secondary hospitals (88.5% (4813/5436) vs. 84.5% (45582/53940), p < 0.001) (Table 1). There were no differences between the two groups regarding religion, level of maternal education, family income, consanguinity, early childbearing gravity, and nutrition status.

Discussion

Prematurity is a public health problem worldwide, which can compromise health in adulthood. Every year, there are 15 million (11.1%) preterm births of all births worldwide; the prevalence of associated factors varies from country to country (7,8). Sociodemographic and preconception/prenatal health factors affect preterm birth rates (9). Preterm birth (< 37 weeks of gestation) is one of the leading causes of neonatal morbidity and mortality and a significant public health burden (10,11). The Peristat registry records all preterm births in the state of Qatar. Because our hospital is a tertiary referral hospital with a Level III NICU, it has relatively more preterm births than other Qatari hospitals. The main objective of this study was to determine the factors associated with children born preterm in Qatar. We enrolled 5430 children born preterm and 53,878 born at full-term. The prevalence of preterm birth was 9%. There were more Qatari women in the preterm group than in the term group (p < 0.001). Differences among studies addressing preterm births are likely due to differences in sample size and socio-environmental factors (Table 2).

In western countries, the frequency of prematurity varies between 5 to 9% (12), while in Africa, it is estimated to be above 15% (13,14). In Cameroon, the preterm birth rate was 13% in 2010, but higher (26%) in tertiary maternity hospitals (15). The global preterm

Table 1. Significant Socio-economic factors.

Socio-demographic characteristics	Birth				p-value OR CI
	Preterm (5430)		Full-term (53878)		
	No.	%	No.	%	
Nationality					p< 0.0001
Qatari *	1796	10.5	15319	91.4	OR=0.8
Non-Qatari §	3634	8.6	38559	89.5	CI=0.75-0.85
Mother's occupation					p< 0.001*
Full-time worker§	1646	9.6	15556	90.4	OR=1.23
Part-time worker§	18	8.7	188	91.3	CI=1.15-1.31
Housewife*	2519	7.9	29355	92.1	
High risk pregnancy					p< 0.001*
Yes§	1335	12.0	9790	88.0	OR=1.47
No*	4106	8.5	44214	91.5	CI=1.37-1.578
Conception mode					p< 0.0001*
Assisted§	854	38.5	1362	61.5	OR=6.67
Spontaneous*	3851	8.6	41147	91.4	CI=6.11-7.34
Place of Delivery					p< 0.001*
Women's hospital*	4813	9.6	45582	90.4	OR=1.1
Other hospital§	623	6.9	8358	93.1	CI=1.299-1.544
Antenatal care (ANC)					p< 0.0001*
Yes*	4775	8.6	50642	91.4	OR=2.0
No§	576	15.9	3055	84.1	CI=1.82-2.196
Father's education					p= 0.03*
Illiterate & Elementary§	265	8.8	2749	91.2	OR=0.87
high school/University or above*	3037	7.8	36334	92.2	CI=0.76-0.998
Consanguinity					p= 0.017
Yes§	979	7.4	12290	92.6	OR=0.9
No*	2329	8.1	26592	91.9	CI=0.8-0.98
Gravidity					P< 0.0001
0-3*	3510	9.0	35419	91.0	OR=0.54
High gravidity (>3)	1927	9.4	18564	90.6	CI=0.51-0.58
Smoking					p= 0.030
Yes§	35	11.9	258	88.1	OR=1.48
No*	4239	8.4	46180	91.6	CI=1.03-2.1

Is the control § is the exposed.

birth rate has been estimated to be 10 to 11%, with data available from 107 and 184 countries published in two separate systematic reviews (16,17). Studies conducted in the United States and Australia have also reported similar estimates (9.62% and 8.6%, respectively) (18,19). In Nepal, the incidence of preterm births was 9.3 per 100 live births (8). In 2001–2005, A Spanish birth data were provided, of 1,878,718 newborns, from the National Statistical Bulletin, Spanish emigrants was considered the exposure variable. PTB and LBW prevalences were higher in Spanish vs. non-Spanish (7.9% and 3.2%). Compared with Spanish ones, the lowest risk of PTB was observed in North Africa (20).

In a cross-sectional study using data from 331,449 women who gave birth in Spain during 2015 (extracted from the Statistical Bulletin of births-National Institute Statistics), the preterm birth rate was 6.7%, and the low birth weight rate was 7.3% (21).

In our study, there were more high-risk pregnancies in the preterm group than in the term group (24.5% vs. 18%, p < 0.001). Also, there were more smoking women in the preterm group than in the term group (0.8% vs. 0.5%, p = 0.030). Socio-demographic variables typically associated and risky pregnancies (preterm birth and low birth weight) include maternal age ≤ 19 years and ≥ 35 years, an educational level be-

Table 2. Non-significant Socio-demographic factors.

Socio-demographic characteristics	Birth				p-value OR CI
	Preterm		Full-term		
	No.	%	No	%	
Religion					p=0.352
Muslim*	2680	10.0	25871	90.	OR=0.9
Christian &Others §	106	10.2	917	89.8	CI=0.7-1.3
Marital status					p= 0.66
Married*	4324	9.0	43641	91.0	OR=0.97
Single, Divorced& separated §	369	9.0	3817	91.0	CI=0.87-1.09
Mother's education					p= 0.39
Illiterate & Elementary §	348	7.9	3872	92.1	OR=1.05
high school &University or above*	3027	7.9	35442	92.1	CI=0.93-1.1
Father's occupation					p= 0.87
Full-time worker*	3205	7.8	37797	92.2	OR=0.98
Part-time &Unemployed §	72	8.1	1093	91.9	CI=0.79-1.22
Father's income					p= 0.93
Less than 10 thousand§	1281	7.7	15381	92.3	OR=1.0
>10 thousand*	1568	7.7	18883	92.3	CI=0.92-1.083
Type of house					P< 0.29
Shared house§	665	7.5	8161	92.5	OR=0.95
Apartment/Villa*	2637	7.9	30857	92.1	CI=0.87 to 1.041
Mother's income					p= 0.8
Less than 10 thousand§	592	8.2	6593	91.8	OR=1.02
>10 thousand	555	8.7	6353	91.3	CI=0.9-1.14
Early childbearing					p= 0.4
Mother < 20 yrs§	138	9.8	1276	91.2	OR=1.07
Mother 20+ yrs*	5303	9.1	52728	90.9	CI=0.9-1.2

The significance threshold was defined for P<0.05. 95% Confidence interval (CI) Odds ratio (OR). The odds ratio (OR), its standard error and 95% confidence interval are calculated according to Altman (26,27). Test of significance: the P–value is calculated according to Sheskin (28).

yond secondary studies, and single mothers (not having previous children and cesarean births) (22).

In our study, more women lived in villas in the preterm than in the term population (41% vs. 38%, p = 0.01), which might reflect the negative impact of a relaxed lifestyle in this population. The lack of antenatal care was evident in our report and is well documented in the literature as a risk factor (11% vs. 5.6%, p < 0.001) (23).

Mothers aged less than 20 years had a high risk of preterm birth. The mother's level of education was a significant predictor for preterm birth, and the risk of preterm births was also higher among mothers with education lower than the secondary level (20). In a recent Canadian study, the preterm birth rate was 9.7%, with less impact of maternal education status on birth outcomes. However, low maternal education increased the likelihood of LBW newborns (24). The seasonal variation of

PTB might differ in developing versus developed countries, although our data do not support this. In developed countries, the preterm birth rate peaks twice per year (once in the summer and again in winter) (25).

There were more risk factors in our study as to working mothers and assisted conception. We detected no differences between the two groups regarding religion, level of maternal education, family income, and early childbearing. Although this study is superior to similar reports from neighboring Gulf countries – because of its larger sample size and inclusion of all country deliveries and distracts (25-32) – our study has some limitations. First, we did not analyze some of the risk factors (e.g., previous medical history, previous preterm births, cervical length, body mass index, and infection during pregnancy). Nevertheless, this is the first study addressing the impact of socioeconomic factors on the maternal birth outcome in Qatar.

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Acknowledgments

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