The Open Public Health Journal

Content list available at: https://openpublichealthjournal.com

RESEARCH ARTICLE

Evaluation of Preterm Birth and its Associated Risk Factors in Southeast Iran in 2020: A Glance to Social and Care Factors

Reza Faryabi[1], Mehran Nikvarz[2], Mahdieh Ardaneh[3], Rasoul Raesi[4], Salman Daneshi[5,*] and Vahid Mashayekhi Mazar[6]

[1]*Department of Health Education and Promotion, Department of Public Health, School of Health, Jiroft University of Medical Sciences, Jiroft, Iran*
[2]*Department of Pediatrics, School of Medicine, Jiroft University of Medical Sciences, Jiroft, Iran*
[3]*Department of Epidemiology, School of Health, Tehran University of Medical Sciences, Tehran, Iran*
[4]*Department of Health Services Management, Mashhad University of Medical Sciences, Mashhad, Iran*
[5]*Department of Public Health, School of Health, Jiroft University of Medical Sciences, Jiroft, Iran*
[6]*Deputy of Health, Jiroft University of Medical University, Jiroft, Iran*

Abstract:

Aims:

This study aimed to assess pregnancy health care and the incidence of PTB in the south of Kerman province.

Background:

For the plan and management of prevention programs effectively, it is important to consider the incidence and trend of preterm births (PTB).

Methods:

In this cross-sectional (descriptive and analytical) study, the national code of mothers of premature infants was extracted by reporting from the national system of the Ministry of Health. The data collection tool was a researcher-made checklist. Data analysis was carried out by SPSS version 20 software and the significance level was <0.05.

Results and Discussion:

A total of 554 premature infants were examined, and 55% of them were boys. The gender of the infant and the number of cares received ($p<0.01$), the level of education of the mother and father ($p < 0.001$), the mother's occupation ($p < 0.01$), the father's occupation ($p < 0.001$), monthly income and participation in preparatory classes of childbirth ($p<0.01$), place of residence ($p<0.05$), appropriateness of receiving care with pregnancy age ($p<0.001$) had statistically significant relationship with the number of care received.

Conclusion:

This study showed potential risk factors associated with preterm delivery and subsequent management to prevent preterm delivery in low-risk and high-risk women with singleton or multiple pregnancies. A history of premature birth is the most important risk factor for premature birth in the next pregnancy.

Keywords: Incidence, Process evaluation, Health care, Premature babies, Southeast Iran, Preterm Birth.

Article History	Received: March 24, 2023	Revised: July 11, 2023	Accepted: July 25, 2023

1. INTRODUCTION

The prevalence of PTB in 184 countries has been estimated by the World Health Organization (WHO) between 5 and 18%. PTB is increasing in almost all countries. About one-third of infant deaths are directly attributable to prematurity, preventing the achievement of the Third Sustainable Development Goals (SDG)-3 (Good Health and Well-being) [1, 2].

More than three-quarters of all PTBs occur in Africa and Asia. Additionally, 15.5% of all children are born with low birth weight (LBW), defined as a birth weight of fewer than 2500 grams, and 95.6% of these children are born in low-income countries [3]. For the prevention of PTB, prenatal care should follow the recommended protocols, and more attention is needed on multiparous women and unplanned pregnancies. A history of PTB is the most important risk factor for PTB in

* Address correspondence to this author at the Department of Public Health, School of Health, Jiroft University of Medical Sciences, Jiroft, Iran;
Tel: 03443318337; E-mail: salmandaneshi008@gmail.com

the next pregnancy. General risk factors with a much smaller effect include ethnicity, low socioeconomic status, maternal weight, smoking, and periodontal status [4].

A study in the United States found that nearly 1 in 10 babies are PTBs, and PTB and LBW infants are at higher risk for vaccine-preventable infections and related complications [5]. The infant mortality rate (IMR) is used as a standard index for the development of educational and social health care in a country [6] and undoubtedly, the first step in reducing the mortality rate and improving the level of this index is to identify the causes and risk factors of death and mortality [7]. Many studies have been conducted in this field and PTB and LBW were found to be among the most common causes of infant mortality [8 - 12].

Although many studies have considered multiple pregnancies as a risk factor for increased infant mortality, Cande *et al*. (2004) reported that despite the increase in preterm births among twin pregnancies, no increased risk of any kind, even in their mortality rate, due to obstetric interventions has been reported [13]. Fallahian *et al*. demonstrated that infant mortality increased 7.5 times in the group of pregnant mothers suffering from hypertension [12]. While Chen *et al*. (2006) stated that blood pressure caused by pregnancy is associated with a decrease in the mortality of premature babies [14].

Preeclampsia, a common disorder during pregnancy related to high blood pressure, can have significant effects on both the mother and the baby. It is characterized by new-onset hypertension after 20 weeks of gestation, along with maternal or placental dysfunction or proteinuria. Preeclampsia can impact the blood supply to the placenta, leading to poor fetal growth and an increased risk of preterm labor. It is associated with 12% of babies born small for gestational age and one-fifth of premature births. In developing countries, preeclampsia contributes to a quarter of stillbirths and infant deaths [15 - 17].

The family-centered medical home (FCMH) is the recommended healthcare delivery model for children. It is unknown how often PTB receive care in an FCMH and how this affects health service utilization [18]. Contraception after childbirth is an important tool for preventing recurrent preterm birth. Antepartum contraceptive counseling increases the uptake of postpartum contraceptives, indicating that women with preterm labor are less likely to be exposed to prenatal contraceptive counseling [19].

Women who give birth between 16 and 36 weeks of pregnancy have an increased risk of preterm birth in subsequent pregnancies. The approximate risk of recurrent preterm birth can be estimated by a comprehensive reproductive history, emphasizing the mother's race, number, and gestational age of previous births, and the sequence of events preceding the index preterm birth. Interventions, including smoking cessation, eradication of asymptomatic bacteriuria, progestational agents, and cervical cerclage, can reduce the risk of recurrent preterm birth if used appropriately [20].

In a multivariate logistic analysis, the young mother's age, pregnancy complications, and fetal anomalies in the second pregnancy as well as previous abortions, short interval between pregnancies and length of pregnancy in the first pregnancy, the incidence of adverse pregnancy outcomes (perinatal mortality, small for gestational age, gestational age less than 34 weeks, Apgar $\leq$ 7), and lack of prenatal care were significantly associated with adverse pregnancy outcomes and incidence of recurrent preterm birth [21].

In a study titled "Perspectives in the Prevention of Premature Birth", Pierre-Yves Ancel showed that obstetric and neonatal interventions can improve the survival of premature babies [22]. Pregnancy and newborn care is a combination of appropriate and timely interventions for the prevention and/or management of preterm birth, including pre-pregnancy and intra-pregnancy care [23].

Therefore, interventions should be made to find ways to prevent and reduce preterm birth. Although there are several programs available in the form of guidelines on how to prevent the frequency of premature births, the results of several studies [24, 25] showed that most of the interventions that are carried out to prevent premature birth have not had a favorable effect on reducing the rate of premature birth. Therefore, public health approaches and public awareness at the community level of the factors involved in premature birth, regular screenings, and midwifery interventions as soon as possible can play a role in preventing premature birth [22].

Effective interventions for healthy PTB infants are needed to increase the use of preventive care and reduce the use of acute care in the first few months after discharge from the NICU [26]. Moreover, some studies reported that there are certain changes in neonatal outcomes between different countries [27]. In order to plan and manage prevention programs effectively, it is important to consider the incidence and trend of PTB. The purpose of this study was to determine the incidence of PTB and process evaluation of pregnancy health care in the south of Kerman province, Iran.

2. METHODS AND MATERIALS

In this cross-sectional study, first, the national PTB maternal care code was entered into the national system of the Ministry of Health (Iman), and information on premature children was extracted. Finally, 554 premature babies were identified and included in the study. According to the checklist made by the researcher, which was extracted by studying various sources and scientific articles, the available information was extracted from the system, and the information that was not in the system was completed by asking the mothers. Premature babies whose prematurity disorder occurred from April 1st, 2018, to the end of March, 2018, were included in the study. The data collection tool was a researcher-made checklist that included the demographic characteristics of the preterm infants and parents, the place of residence, and the habit/or attitudes of healthcare and mothers, which could contribute to PTB.

Data analysis was carried out using SPSS version 20. Descriptive statistics include number, percentage, mean, and standard deviation, and also for comparing demographic variables with the health care of preterm infants, statistical tests, including one-way analysis of variance, chi-square, t-test,

and Spearman's correlation, were used with a significance level <0.05.

3. RESULTS

A total of 554 premature babies were included in the study, 55% of them were boys. About 80% of mothers of premature babies were between 18 and 35 years old, most parents had primary education (mothers and fathers with 13.70% and 20%, respectively), most mothers were housewives (87.90%) and most fathers were farmers (37%) and 58/50 parents lived in the village (Table **1**).

This study indicated that 95% of mothers did not participate in childbirth preparation classes, 33% did not receive pre-pregnancy care, about 7% did not go to healthcare centers due to their gestational age, and about 9% of mothers were under the supervision of only one health service provider (Table **2**).

Table 1. Demographic variables of study participants.

Variable	Category/Scale	Mean ± SD or N (%)
Mother's age in the recent pregnancy	18Years>	12 (2.20%)
	18-35 Years	437 (78.90%)
	35Years<	105 (19.00%)
Infant's gender	Male	307 (55.40%)
	Female	247 (44.60%)
Mother education	Illiterate	34 (6.1)
	Elementary	76 (13.17)
	Guidance	87 (15.7)
	High school	72 (13)
	Diploma	162 (29.2)
	Associate degree	31 (5.6)
	Bachelor≤	92 (16.6)
Father education	Illiterate	47 (8.5)
	Elementary	111 (20)
	Guidance	93 (16.8)
	High school	74 (13.4)
	Diploma	124 (22.4)
	Associate degree	35 (6.3)
	Bachelor≤	70 (12.6)
Accommodations	City	230 (41.5)
	Village	324 (58.5)
Mother occupation	Employee	32 (5.8)
	Housewife	477 (87.9)
	Farmer/breeder	9 (1.6)
	Manual worker	8 (1.4)
	Other	18 (3.2)
Father occupation	Employee	65 (11.7)
	Farmer/breeder	205 (37)
	Manual worker	133 (24)
	Driver	23 (4.2)
	The seller	17 (3.1)
	Unemployed	13 (2.3)
	Other	98 (17.7)
Monthly family income	5 million>	102 (18.4)
	5-10 Million	219 (39.5)
	10 million<	233 (42.1)
Type of residential house	Personal	422 (76.2)
	Rental	132 (22.8)
Drinking water source	Piping network	512 (42.4)
	Well	10 (1.8)
	Tanker	27 (4.9)
	Other	5 (0.9)

There was a statistical relationship between the number of risk factors related to the occurrence of preterm infants in the context of receiving health care and demographic variables, between the gender of the baby and the number of cares received ($p<0.01$), the level of education of the mother and father and the number of cares received ($p < 0.001$), mother's occupation and the number of care received ($p < 0.01$), father's occupation and the number of care received ($p < 0.001$), monthly income and participation in childbirth preparatory classes and the number of cares received (in both cases), the type of residential home and the number of cares received ($p<0.01$), place of residence and pre-pregnancy cares ($p<0.05$), appropriateness of receiving care with pregnancy age (0.5) ($p<0.001$), and the number of people providing healthcare services ($p<0.001$) (Table **3**).

Table 2. Prevalence of PTB risk factors related to receiving health care.

Variable	Category/Scale	Mean ± SD or N (%)
Mother's participation in birth preparation classes	Yes	28 (5.1)
	No	526 (94.9)
Pre-pregnancy care	Yes	369 (66.6)
	No	185 (33.4)
Proportion of receiving care with gestational age	Yes	514 (92.8)
	No	40 (7.2)
Number of pregnant women cared for by the service provider	Behvarz (rural health workers)	1 (0.2)
	Midwife	33 (6)
	General practitioner	0
	Obstetricians	14 (2.52)
	Combination of caregivers	506 (91.3)

Table 3. Statistical relationship between the number of risk factors related to the occurrence of PTB in the context of receiving health care and demographic variables.

Factors Related to Prenatal Care										
Each Pregnant Woman Received Health Care from Multiple Healthcare Providers			**Proportion of Receiving Care with Gestational Age**		**Pre-pregnancy Care**		**Mother's Participation in Birth Preparation Classes**		**Category/Scale**	**Variable**
1person	2person	2person<	Yes	No	Yes	No	Yes	No		
11	39	197	228	19	160	87	14	233	Girl	Baby gender
37	47	223	286	21	209	98	14	293	Boy	
0.00			0.70		0.41		0.55		p-value*	
0	0	12	12	0	9	3	2	10	18>	Mother's age in the recent pregnancy
40	65	332	409	28	300	137	22	415	18-35	
8	21	76	93	12	60	45	4	101	35<	
0.22			0.12		0.06		0.15		p-value	
25	2	7	2	32	11	23	32	2	Illiterate	Mother literacy
66	2	8	4	72	28	48	71	5	Elementary	
80	2	5	5	82	32	55	80	7	Guidance	
58	8	6	4	68	17	55	65	7	High school	
124	28	10	14	148	52	110	159	3	Diploma	
20	11	0	1	30	11	20	31	0	Associate Degree	
47	33	12	10	82	34	58	88	4	Bachelor≤	
0.00			0.65		0.58		0.10		p-value	
38	2	7	3	44	11	36	43	4	Illiterate	Father literacy
96	5	10	8	103	46	65	103	8	Elementary	
82	4	7	5	88	26	67	88	5	Guidance	
61	10	3	5	69	20	54	70	4	High school	
83	32	9	110	114	47	77	120	4	Diploma	
21	11	3	0	35	11	24	35	0	Associate Degree	
39	22	9	9	61	24	46	67	3	Bachelor≤	
0.00			0.34		0.16		0.53		p-value	

(Table 3) contd.....

Factors Related to Prenatal Care										
Each Pregnant Woman Received Health Care from Multiple Healthcare Providers			**Proportion of Receiving Care with Gestational Age**		**Pre-pregnancy Care**		**Mother's Participation in Birth Preparation Classes**		**Category/Scale**	**Variable**
1person	2person	2person<	Yes	No	Yes	No	Yes	No		
14	10	8	6	26	17	15	31	1	Employee	Mother's occupation
376	73	38	31	456	154	333	461	26	Housewife	
9	0	0	0	9	3	6	9	0	Farmer/breeder	
8	0	0	0	8	4	4	8	0	manual worker	
13	3	2	3	15	7	11	17	1	Other	
0.00			0.03		0.11		0/871		p-value	
33	21	11	7	58	22	43	63	2	Employee	Father's occupation
173	16	16	6	199	60	145	191	14	Farmer/breeder	
121	7	5	11	122	38	95	128	5	manual worker	
13	7	3	2	21	13	10	23	0	Driver	
5	9	3	3	14	6	11	16	1	the seller	
66	24	8	8	90	40	58	93	5	Unemployed	
9	2	2	3	10	6	7	12	1	Other	
0.00			0.02		0.06		0.7		p-value	
92	5	5	8	94	33	69	89	13	5 million>	Monthly family income
184	15	20	9	210	63	156	209	10	5-10 Million	
144	66	23	23	210	89	144	228	5	10 million<	
0.00			0.05		0.10		0.00		p-value	
332	53	37	30	392	138	284	400	22	Personal	Type of residential house
88	33	11	10	122	47	85	126	6	Rental	
0.00			0.85		0.53		0.76		p-value	
381	84	47	38	474	175	337	487	25	Piping network	Drinking water source
9	1	0	0	10	3	7	10	0	the well	
26	0	1	2	25	5	22	24	3	Tanker	
4	1	0	0	5	2	3	5	0	Other	
0.18			0.75		0.39		0.4		p-value	
104	83	43	24	206	89	141	221	9	City	Accommodations
316	3	5	16	308	86	228	305	19	Village	
0.00			0.01		0.02		0.3		p-value	

Note: *P-values are based on Chi-Square or independent samples t-test.

4. DISCUSSION

Prematurity is considered one of the risk indicators causing infant mortality in any society. Many factors are related to this defect, including various maternal care and cultural, social, and economic situations, *etc*. This study surveyed potential risk factors associated with preterm delivery and subsequent management to prevent preterm delivery. This was done in low- and high-risk women with singleton or multiple pregnancies. A history of premature birth is the most important risk factor for premature birth in the next pregnancy.

In this study, there was a statistical relationship between the number of risk factors related to the occurrence of PTB in the context of receiving health care and demographic variables, the gender of the baby and the number of cares received, the care of the mother and father and their literacy status and the number of cares received, occupation of mother and the number of cares received, income and father's occupation and the number of cares received, participation in preparation classes and the number of cares received, place of residence and pre-pregnancy care, and the proportion of receiving care with gestational age and the number of health care providers.

Our study showed a significant relationship between the receipt of health care and the birth of a premature baby with the variables of gender, literacy and occupation of the mother and father, income, participation in childbirth preparation classes, gestational age, and the number of health service providers, which was consistent with the results of other studies. Moreover, a study by Xu *et al*. showed that older maternal age, less maternal education, use of assisted reproductive technology (ART), higher income, living in urban areas, and the gender of the infant were independently associated with a higher incidence of preterm delivery [28].

This study showed that the lower education level of the parents has a statistical association with PTB, which was similar to the results of the studies by Enayat Rad *et al*. [14] and Eshghizadeh *et al*. [29], and also, most cases occurred in mothers with a low education level, which was consistent with a study conducted in Spain demonstrating that most cases of premature babies occurred in mothers with secondary education. This is also confirmed by the results of other similar

studies conducted in other countries [30, 31].

Razeq *et al*. showed that male gender, first pregnancy, high blood pressure, preeclampsia, and diabetes were significantly associated with an increased risk of preterm delivery [32].

Our study showed that the mother's illness increases the chance of giving birth to a PTB, which was similar to the results of a study by Enayat Rad *et al*. [14], while the results of the study by Valadan *et al*. [33] in Tehran did not show a significant relationship between the mother's illness and the birth of a PTB. This difference in the results can be in the type of selected diseases for examination and their relationship with pregnancy.

This study showed health care during pregnancy was low, which was consistent with the findings of a study by George *et al*. that showed that health care can prevent adverse pregnancy outcomes, including low birth weight and preterm birth [34]. Moreover, a study by Huybrechts *et al*. showed that large databases of healthcare utilization should be considered for monitoring drug safety and pregnancy stages [35].

This study reported that preterm infants occurred in mothers with low-education levels. Ghaffari *et al*. also reported that educational intervention in pregnant women referring to health centers has an effect on maternal and newborn health [36].

In the present study, the mothers of premature babies had less prenatal care. It has been reported that with the increase in the number of care, the chance of having a premature baby decreases, and one of the reasons for this can be more attention to dangerous signs during pregnancy care and proper medical and health advice by health personnel. Islam *et al*. showed that many maternal and newborn health problems can be prevented with accessible, simple, and cost-effective maternity care interventions during pregnancy, delivery, and the postpartum period [37].

Edu *et al*. highlighted the importance of antenatal care and stated that the government must address other deterrents to significantly increase the use of maternal health care services [38]. Several studies have shown that improving the condition of prenatal care reduces the risk of premature birth [39, 40].

One of the limitations of the present study that can be mentioned is the nutritional status of women during pregnancy, which is affected by some cases and consequences of pregnancy, and the unwillingness to clearly express personal issues related to the birth of preterm infants among women in society. In order to solve the mentioned limitations, it is suggested to conduct related studies on a larger scale and with a larger number of samples.

CONCLUSION AND RECOMMENDATIONS

In this study, potential risk factors associated with preterm delivery and subsequent management to prevent preterm delivery in low-risk and high-risk women with single or multiple pregnancies were reviewed. A history of premature birth is the most important risk factor for premature birth in the next pregnancy. Performing prenatal care and identifying mothers at risk can reduce the birth of preterm infants.

LIST OF ABBREVIATIONS

PTB	=	Preterm births
WHO	=	World health organization
LBW	=	Low birth weight
IMR	=	Infant mortality rate
FCMH	=	Family-centered medical home
IMR	=	Infant mortality rate

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

This article reports the results of a research project approved by Jiroft University of Medical Sciences with the code of ethics (IR.JMU.REC.1399.086).

HUMAN AND ANIMAL RIGHTS

No animals were used in the studies that are the basis of this research. All human procedures followed were per the guidelines of the Helsinki Declaration of 1975.

CONSENT FOR PUBLICATION

In order to comply with ethical considerations in this research, the information of the participants was kept confidential and other people were not able to access this information. The names and surnames of the participants were not used for data collection, and data collection was done after obtaining the code of ethics from the Jiroft University of Medical Sciences.

STANDARDS OF REPORTING

STROBE guideline has been followed.

AVAILABILITY OF DATA AND MATERIALS

The data that support the findings of this study are available from the corresponding author [S.D] upon reasonable request.

FUNDING

This research was done with the financial support of Jiroft University of Medical Sciences (Grant No. 401178).

CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

ACKNOWLEDGEMENTS

The authors would like to thank and appreciate the cooperation of the health department of Jiroft University of Medical Sciences and the staff of the health centers.

REFERENCES

[1] Wagura P, Wasunna A, Laving A, Wamalwa D, Ng'ang'a P. Prevalence and factors associated with preterm birth at kenyatta national hospital. BMC Pregnancy Childbirth 2018; 18(1): 107. [http://dx.doi.org/10.1186/s12884-018-1740-2] [PMID: 29673331]

[2] Leal MC, Esteves-Pereira AP, Nakamura-Pereira M, *et al.* Prevalence and risk factors related to preterm birth in Brazil. Reprod Health 2016; 13(S3)(3): 127.

[http://dx.doi.org/10.1186/s12978-016-0230-0] [PMID: 27766978]

[3] Sigalla GN, Mushi D, Meyrowitsch DW, *et al.* Intimate partner violence during pregnancy and its association with preterm birth and low birth weight in Tanzania: A prospective cohort study. PLoS One 2017; 12(2): e0172540. [http://dx.doi.org/10.1371/journal.pone.0172540] [PMID: 28235031]

[4] Koullali B, Oudijk M, Nijman T, Mol B, Pajkrt E. Risk assessment and management to prevent preterm birth. Seminars in fetal and neonatal medicine. Semin Fetal Neonatal Med 2016; 21(2): 80-8. [http://dx.doi.org/10.1016/j.siny.2016.01.005]

[5] Hofstetter AM, Jacobson EN, deHart MP, Englund JA. Early childhood vaccination status of preterm infants. Pediatrics 2019; 144(3): e20183520. [http://dx.doi.org/10.1542/peds.2018-3520] [PMID: 31391213]

[6] Yu VY. Global, regional and national perinatal and neonatal mortality. J Perinat Med 2003; 31(5): 376-9. [http://dx.doi.org/10.1515/JPM.2003.057]

[7] Moss W, Darmstadt GL, Marsh DR, Black RE, Santosham M. Research priorities for the reduction of perinatal and neonatal morbidity and mortality in developing country communities. J Perinatol 2002; 22(6): 484-95. [http://dx.doi.org/10.1038/sj.jp.7210743] [PMID: 12168128]

[8] Bassani DG, Kumar R, Awasthi S, *et al.* Causes of neonatal and child mortality in India: A nationally representative mortality survey. Lancet 2010; 376(9755): 1853-60. [http://dx.doi.org/10.1016/S0140-6736(10)61461-4] [PMID: 21075444]

[9] Sankaran K, Chien L-Y, Walker R, Seshia M, Ohlsson A, Lee SK. Variations in mortality rates among Canadian neonatal intensive care units. CMAJ 2002; 166(2): 173-8. [http://dx.doi.org/cir.nii.ac.jp/crid/1570291225078808960] [PMID: 11826939]

[10] Shirvani F, Khosrovshahi N. Prevalence and causes of infant mortality in Tehran Tehran Univ Med J 1998; 56(1): 69-73. [http://dx.doi.org/tumj.tums.ac.ir/article-1-1597-en.html]

[11] Chaman R, Naieni KH, Golestan B, Nabavizadeh H, Yunesian M. Neonatal mortality risk factors in a rural part of Iran: A nested case-control study. Iran J Public Health 2009; 38(1): 48-52. [http://dx.doi.org/ijph.tums.ac.ir/index.php/ijph/article/view/3210/3009]

[12] Fallahian M, Emadolsadaty N. Effects of maternal hypertension on the taleghani hospital's neonates in 1378. J Reprod Infertil 2001; 1380(2): 48-53. [https://www.jri.ir/article/57].

[13] Ananth CV, Joseph KS, Smulian JC. Trends in twin neonatal mortality rates in the United States, 1989 through 1999: Influence of birth registration and obstetric intervention. Am J Obstet Gynecol 2004; 190(5): 1313-21. [http://dx.doi.org/10.1016/j.ajog.2003.11.029] [PMID: 15167835]

[14] Chen XK, Wen SW, Smith G, Yang Q, Walker M. General obstetrics: Pregnancy-induced hypertension is associated with lower infant mortality in preterm singletons. BJOG 2006; 113(5): 544-51. [http://dx.doi.org/10.1111/j.1471-0528.2006.00898.x] [PMID: 16579801]

[15] Clark SL, Saade GA, Tolcher MC, *et al.* Gestational hypertension and "severe" disease: Time for a change. Am J Obstet Gynecol 2023; 228(5): 547-52. [http://dx.doi.org/10.1016/j.ajog.2022.11.1280] [PMID: 36396107]

[16] Fox R, Kitt J, Leeson P, Aye CYL, Lewandowski AJ. Preeclampsia: Risk factors, diagnosis, management, and the cardiovascular impact on the offspring. J Clin Med 2019; 8(10): 1625. [http://dx.doi.org/10.3390/jcm8101625] [PMID: 31590294]

[17] Duley L. The global impact of pre-eclampsia and eclampsia. Seminars in perinatology. Semin Perinatol 2009; 33(3): 130-7. [http://dx.doi.org/10.1053/j.semperi.2009.02.010]

[18] Litt JS, McCormick MC. Preterm infants are less likely to have a family-centered medical home than term-born peers. J Perinatol 2018; 38(10): 1391-7. [http://dx.doi.org/10.1038/s41372-018-0180-1] [PMID: 30046181]

[19] Toscano M, Li D, Dye T, Olson-Chen C. Antepartum contraceptive counseling in women with preterm birth. Am J Perinatol 2019; 36(12): 1310-6. [http://dx.doi.org/10.1055/s-0038-1676831] [PMID: 30609431]

[20] Iams JD, Berghella V. Care for women with prior preterm birth. Am J Obstet Gynecol 2010; 203(2): 89-100. [http://dx.doi.org/10.1016/j.ajog.2010.02.004] [PMID: 20417491]

[21] Ratzon R, Sheiner E, Shoham-Vardi I. The role of prenatal care in recurrent preterm birth. Eur J Obstet Gynecol Reprod Biol 2011; 154(1): 40-4. [http://dx.doi.org/10.1016/j.ejogrb.2010.08.011] [PMID: 20869804]

[22] Ancel P. Perspectives in the prevention of premature birth. Eur J Obstet GynecolReprod Biol 2004; 117(1): S2-5. [http://dx.doi.org/10.1016/j.ejogrb.2004.07.007]

[23] Fernandez Turienzo C, Bick D, Briley AL, *et al.* Midwifery continuity of care *versus* standard maternity care for women at increased risk of preterm birth: A hybrid implementation–effectiveness, randomised controlled pilot trial in the UK. PLoS Med 2020; 17(10): e1003350. [http://dx.doi.org/10.1371/journal.pmed.1003350] [PMID: 33022010]

[24] Medley N, Vogel JP, Care A, Alfirevic Z. Interventions during pregnancy to prevent preterm birth: An overview of Cochrane systematic reviews. Cochrane Database Syst Rev 2018; 11(11): CD012505. [http://dx.doi.org/10.1002/14651858.CD012505.pub2]

[25] Chang HH, Larson J, Blencowe H, *et al.* Preventing preterm births: Analysis of trends and potential reductions with interventions in 39 countries with very high human development index. Lancet 2013; 381(9862): 223-34. [http://dx.doi.org/10.1016/S0140-6736(12)61856-X] [PMID: 23158883]

[26] Vonderheid SC, Rankin K, Norr K, Vasa R, Hill S, White-Traut R. Health care use outcomes of an integrated hospital-to-home mother–preterm infant intervention. J Obstet Gynecol Neonatal Nurs 2016; 45(5): 625-38. [http://dx.doi.org/10.1016/j.jogn.2016.05.007] [PMID: 27505467]

[27] Shah PS, Lui K, Sjörs G, Mirea L, Reichman B, Adams M, *et al.* Neonatal outcomes of very low birth weight and very preterm neonates: An international comparison. J Pediatr 2016; 177: 144-152-e6. [http://dx.doi.org/10.1016/j.jpeds.2016.04.083]

[28] Xu H, Dai Q, Xu Y, *et al.* Time trends and risk factor associated with premature birth and infants deaths due to prematurity in Hubei Province, China from 2001 to 2012. BMC Pregnancy Childbirth 2015; 15(1): 329. [http://dx.doi.org/10.1186/s12884-015-0767-x] [PMID: 26653182]

[29] Eshghizadeh M, Moshki M, Majeedi Z, Abdollahi M. Modifiable risk factors on preterm birth: A case-control study. Quart Hori Med Scie 2015; 21(2): 141-6. [http://dx.doi.org/10.18869/acadpub.hms.21.2.141]

[30] Hidalgo-Lopezosa P, Jiménez-Ruz A, Carmona-Torres JM, Hidalgo-Maestre M, Rodríguez-Borrego MA, López-Soto PJ. Sociodemographic factors associated with preterm birth and low birth weight: A cross-sectional study. Women Birth 2019; 32(6): e538-43. [http://dx.doi.org/10.1016/j.wombi.2019.03.014] [PMID: 30979615]

[31] Benavente-Fernández I, Synnes A, Grunau RE, Chau V, Ramraj C, Glass T, *et al.* Association of socioeconomic status and brain injury with neurodevelopmental outcomes of very preterm children. JAMA Netw Open 2019; 2(5): e192914. [http://dx.doi.org/10.1001/jamanetworkopen.2019.2914]

[32] Abdel Razeq NM, Khader YS, Batieha AM. The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013). J Turk Soc Obst Gyne 2017; 14(1): 28-36. [http://dx.doi.org/10.4274/tjod.62582] [PMID: 28913132]

[33] Valadan M, Kaveh M, Bagherzadeh S, Hasanzade M. Risk factors for recurrent preterm delivery in three university hospitals. Tehr Uni Med J TUMS Publ 2008; 65(2): 24-9. [http://dx.doi.org/tumj.tums.ac.ir/article-1-828-en.html]

[34] George A, Dahlen HG, Reath J, *et al.* What do antenatal care providers understand and do about oral health care during pregnancy: A cross-sectional survey in New South Wales, Australia. BMC Pregnancy Childbirth 2016; 16(1): 382. [http://dx.doi.org/10.1186/s12884-016-1163-x] [PMID: 27903257]

[35] Huybrechts KF, Bateman BT, Hernández-Díaz S. Use of real-world evidence from healthcare utilization data to evaluate drug safety during pregnancy. Pharmacoepidemiol Drug Saf 2019; 28(7): 906-22. [http://dx.doi.org/10.1002/pds.4789] [PMID: 31074570]

[36] Ghaffari M, Rakhshanderou S, Safari-Moradabadi A, Torabi S. Oral and dental health care during pregnancy: Evaluating a theory-driven intervention. Oral Dis 2018; 24(8): 1606-14. [http://dx.doi.org/10.1111/odi.12928] [PMID: 29949233]

[37] Islam MM, Masud MS. Health care seeking behaviour during pregnancy, delivery and the postnatal period in Bangladesh: Assessing the compliance with WHO recommendations. Midwifery 2018; 63: 8-16. [http://dx.doi.org/10.1016/j.midw.2018.04.021] [PMID: 29758443]

[38] Edu B, Agan TU, Monjok E, Makoweicka K. Effect of free maternal

health care program on health-seeking behaviour of women during pregnancy, intra-partum and postpartum periods in cross river state of Nigeria: A mixed method study. Open Access Maced J Med Sci 2017; 5(3): 370-82. [http://dx.doi.org/10.3889/oamjms.2017.075] [PMID: 28698759]

[39] Mohammadian S, Vakili M, Tabandeh A. Survey of related factors in prematurity birth. J GUILAN UNI MED SCI 2000; 9(34-33): 117-22. Available from: https://www.sid.ir/paper/39979/en

[40] Heaman MI, Blanchard JF, Gupton AL, Moffatt MEK, Currie RF. Risk factors for spontaneous preterm birth among Aboriginal and non-Aboriginal women in Manitoba. Paediatr Perinat Epidemiol 2005; 19(3): 181-93. [http://dx.doi.org/10.1111/j.1365-3016.2005.00644.x] [PMID: 15860077]