ORIGINAL ARTICLE

Prevalence and risk factors of preterm birth in Pakistan

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Abstract

Objectives: To find prevalence of preterm birth in Pakistan and to explore its related risk factors.

Method: This analytical cross-sectional study was conducted from October 1, 2016, to September 30, 2017, at Hajvery University, Lahore, Pakistan, and data was collected from Obstetrics and Gynaecology departments of various hospitals in four provinces of the country. To find risk factors of preterm birth, data was divided into two groups: Group-1 consisted cases with preterm birth defined as gestational age <37 weeks on ultrasonography; and Group-2 consisted controls with full-term birth defined as gestational age 37-41 weeks. Data was analysed using SPSS 22.

Results: There were 1,691 females with mean gestational age of 37.3±2.062 weeks. The prevalence of preterm birth was 366(21.64%). Top 5 major risk factors identified were Placenta Previa (odds ratio: 51.97), maternal thyroid disease (odds ratio: 18.46), being a minority (odds ratio: 7.73), foetal distress (odds ratio: 7.19), and maternal asthma (odds ratio: 6.23).

Conclusion: The prevalence of preterm birth was found to be high with several modifiable and controllable risk factors.

Keywords: Pregnancy, Gestational age, Risk factors, Socio-demographic, Anthropometric, Maternal, Foetal, Gynecological issue, Logistic regression, Odds ratio. (JPMA 70: 577; 2020) **https://doi.org/10.5455/JPMA.295022**

Introduction

All births within 21 days before 40 weeks of gestational age are called pre-term births (PTBs), and birth at or later than 40 weeks are full-term births (FTBs), also called 'term' births.[1] Due to lack of facilitation, the prevalence of minor and major illnesses related with pregnancy and childbirth is much higher in Pakistan which is consequently responsible for poor foeto-maternal outcomes, including PTB.[2] A recent study reported that Pakistan is 3rd highest country with high maternal and child mortality[3] and one of the major contributors of such neonatal incidents is PTB.[4] In Pakistan, the healthcare system consistently remains in crisis.[5] Currently, PTB is the leading burden of hospital economy and sources. One study reported that across 184 countries, the rate of PTB ranged from 5% to 18% of all newborns.[6] Many risk factors can be encountered by a female through the reproductive phase which may augment the risk of PTB.[7,8] These risk factors are mainly related to female lifestyle and behaviour, comprising marital status, substance abuse and insurance status.[7] Identification of the risk factors can help us to screen such women and with proper strategies PTB can be reduced.[7] Detection of various risk factors might be helpful in understanding the crucial mechanisms that result in PTB.[9,10]

Very little is known regarding the risk factors of PTB in spite of extensive research in developing countries like Pakistan.[11] There is no consistency in published prevalence of PTB worldwide, as the lowest and highest prevalence of PTB in recent literature is as low as 1.52%[12] and as high as 41.5%.[13] Also, no detailed study on the local population and no further comprehension in national and international studies are available. Most of the studies available have varying sample sizes and study designs. The current study was planned to find PTB prevalence and to explore all possible risk factors in Pakistan.

Material and Methods

A list of hospitals having Gynaecology Department across the four provinces was made and then using the lottery method 3 hospitals were selected from each province. Request for permission to collect data was sent to head of the departments of selected 3 hospitals in each province. Final data was taken from where the permission was taken first i.e. Lady Aitchison Hospital, Lahore, Punjab, Bacha Khan Medical College, Mardan, Khyber Pakhtunkhwa (KP), Civil Hospital Quetta, Balochistan, and Liaquat University of Medical & Health Sciences, Jamshoro, Sindh. So, analytical cross-sectional study was conducted from October 1, 2016, to September 30, 2017, at Hajvery University, Lahore, Pakistan, by taking data from Obstetrics and Gynaecology departments of selected hospitals. The study was started after approval from the institutional

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board of advanced studies and research. The sample size was calculated on the basis of literature using the highest PTB prevalence p=22.8%[14] at lowest precision i.e. d=2% and 95% confidence level using following formula:

$$n = \frac{z_{1^2-\alpha 2}\, p(1 - p)}{d^2}$$

Here p = proportion of preterm birth = 22.8%,[14] $z_{1^2-\alpha 2}$ = 1.96 and n = 1, 691.

Mixed sampling technique (random sampling for finding the prevalence and convenience sampling for risk factors identification) was used to collect the data. PTB was defined as gestational age <37 weeks on ultrasonography (USG)/dating scan, and FTB as gestational age 37-41 weeks on USG. The data was recorded on predesigned proforma by direct investigation method. Data was collected from all females who were admitted after delivery of the baby having any parity. Those not willing to participate in the study, having had termination of pregnancy <22 weeks of gestation (miscarriage), females with unconfirmed gestational age on last menstrual period (LMP) dates or USG report, females with postdate pregnancy i.e. gestational age ≥42 weeks, still-birth (as no sign of life at time of delivery), and females with incompetent cervical length (as available on their medical record) were excluded. Subjects or attendants with unsure information were also excluded.

The age of female and her husband was asked from mother or the attendant. Lower and advanced age was categorised as ≤18 years and ≥35 years, respectively. Their age at marriage was categorised at <20 and ≥20 years.

Maternal pre-pregnancy weight and height, and father's weight height at the time of conception were asked and then body mass index (BMI) was calculated for both husband and wife. Obesity was defined as BMI ≥25 kg/m^2 as per the World Health Organisation (WHO) criteria for Asian Adults.[15] Variables related to cultural and living status was taken as cousin marriage, marriages in same cast and joint family system. Socio-economic status (SES) was measured on the basis of education, occupation and monthly income using Kuppuswamy's socio-economic status scale.[16] Variables related to family were self-reported by the mothers about support system and domestic issues during pregnancy. Previous obstetric, gynaecological history and foetal / neonatal outcome were taken from the available antenatal records or were asked form the subjects.

Data was analysed using SPSS version 22. Frequency and percentage were used for qualitative data whereas means and standard deviations (SDs) were used to present quantitative data. In order to compare the mean of quantitative data in PTB and FTB, the normality assumption was tested using one-sample Kolmogorov-Smirnov test. Data was not normal, so Mann Whitney U test was used to compare median ± interquartile range. Final model for all variables was determined by forward logistic regression model. P-value ≤0.05 and odds ratio >1 (with 95% confidence levels not containing 1) was considered as significant.

Results

There were 1,691 females with overall mean gestational age of 37.3±2.062 weeks. The prevalence of PTB was 366(21.64%) (Figure). Preterm birth was seen in 366(21.64%), and 1327(78.35%) were FTBs (37-41 weeks). Moreover there were 27(1.6%) extreme PTB (<28 weeks) cases, 106(6.3%) very PTB

Table-1: Comparison of Demographic Characteristics of Mothers, Fathers in pre-term birth (PTB) and full-term birth (FTB).

	Study groups	Mean ± S.D	Median ± IQR	p-value
Age of mother (years)	Pre term(n=364)	31.33 ± 8.12	30 ± 16	<0.0001**
	Full term(n=734)	29.29 ± 6.17	28 ± 10	
	Total (n= 1098)	29.97 ± 6.94	30 ± 11	
Age of mother at marriage (years)	Pre term(n=364)	22.01 ± 5.92	20 ± 8	0.362
	Full term(n=734)	21.62 ± 4.45	21 ± 6	
	Total (n= 1098)	21.75 ± 4.98	21 ± 6	
Age of father (years)	Pre term(n=364)	35.15 ± 8.66	35 ± 10	<0.0001**
	Full term(n=734)	32.80 ± 7.21	32 ± 9	
	Total (n= 1098)	21.76 ± 4.97	33 ± 10	
Age of father at marriage (years)	Pre term(n=364)	26.59 ± 6.30	26 ± 7	0.061
	Full term(n=734)	26.01 ± 5.74	26 ± 7	
	Total (n= 1098)	26.2 ± 5.94	26 ± 7	

**Highly significant (significant at 0.001) & * significant at 0.05, p-values were calculated using Mann Whitney U test.
SD: Standard deviation, IQR: Interquartile range.

Table-2: Overall Final Regression Model using forward conditional technique.

Predictors	β	S.E.	Wald	df	p-value	OR	95.0% C.I. for OR	
							Lower	Upper
Father's age ≥35 years	0.90	0.23	15.56	1	<0.001	2.47	1.58	3.87
Parent's Marriage age <20	1.48	0.39	14.54	1	<0.001	4.41	2.06	9.46
Mother's obesity	0.50	0.23	4.63	1	0.031	1.65	1.05	2.62
Religion (Minority)	2.04	0.89	5.23	1	0.022	7.73	1.34	44.53
Low socioeconomic status	-0.07	0.02	15.31	1	<0.001	0.94	0.91	0.97
Previous uterine curettage	0.76	0.28	7.36	1	0.007	2.13	1.23	3.68
Unplanned pregnancy	1.18	0.27	19.69	1	<0.001	3.26	1.93	5.49
Unbooking status	0.52	0.24	4.77	1	0.029	1.68	1.06	2.69
Maternal Asthma	1.83	0.41	19.87	1	<0.001	6.23	2.79	13.94
Maternal Thyroid	2.92	0.38	57.81	1	<0.001	18.46	8.70	39.13
H/O Maternal Periodontal disease	1.64	0.28	35.24	1	<0.001	5.14	2.99	8.82
H/O Maternal bacterial vaginosis	1.42	0.34	17.56	1	<0.001	4.12	2.13	8.00
Oligohydramnios	1.16	0.33	12.35	1	<0.001	3.18	1.67	6.06
Polyhydramnios	0.97	0.44	4.78	1	0.029	2.64	1.11	6.30
Previous H/O of Fetal death	1.97	0.75	7.00	1	0.008	7.19	1.67	30.96
Placenta Previa	3.95	0.47	71.95	1	<0.001	51.97	20.86	129.48
Premature rupture of membrane	1.64	0.25	44.10	1	<0.001	5.17	3.18	8.40
Intrauterine grown restriction	1.88	0.77	5.94	1	0.015	6.58	1.45	29.94
Constant	-3.21	0.36	79.95	1	<0.001	0.04		

OR: Odds ratio; CI: Confidence interval; SE: Standard error, df: Degree of freedom, β; B is a parameter of logistic regression , Wald is a test to be applied to check the significance of B.

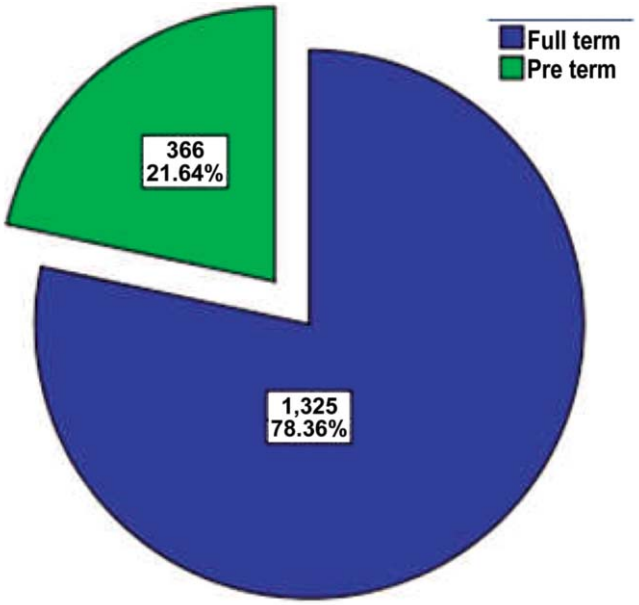

Figure: Prevalence of pre-term birth (PTB) in Pakistan.

(28-32 weeks), 231(13.7%) late PTB (32-37 week). The prevalence of PTB in Punjab, Sindh, KP and Balochistan was 176(18.4%), 86(22.5%), 77(27.9%) and 26 (32.1%), respectively. The mean ages of PTB mothers was 31.33±8.12 years and it was 29.29±6.17 years for FTB mothers (Table-1).

Binary logistic regression was applied by taking n = 364 i.e. preterm birth and number for FTB was ensure as >2 times than PTB i.e. n = 734 for FTB. Note: for FTB complete information was available for these 734 females only). In the final model, father's age ≥35 years, parent's marriage age <20, mother's obesity, religion (minority), low socioeconomic status, previous uterine curettage, unplanned pregnancy, un-booking status, maternal asthma, maternal thyroid, history of (H/O) maternal periodontal disease, H/O maternal bacterial vaginosis, oligohydramnios, polyhydramnios, previous H/O of Fetal death, placenta previa, premature rupture of membrane, intrauterine grown restriction. Top 5 major PTB risk factors identified were placenta previa (OR: 51.97), maternal thyroid disease (OR: 18.46), being a minority (OR: 7.73), foetal distress (OR: 7.19), and maternal asthma (OR: 6.23).

Discussion

New-borns are perhaps the most vulnerable population in the world on high risks to get the adverse outcome, especially PTB infants.[6,17] Since the last 2 to 3 decades, an incline in the rate of PTB by 33% has been observed because of increase in late PTB, defined as birth at 34-36 weeks of GA.[18] An Australian study done on 37,500 subjects found PTB prevalence of 5.5%.[19] The PTB prevalence has also been reported from 17.69% to 22.3%.[20] Consistent prevalence of PTB in Brazil in different studies has been reported to be 12.3% to 15%.[21,22]

In literature, there is a well-known interaction between

maternal age and risk of adverse perinatal outcomes, including PTB.[23] Both lower and advanced mother's age are associated with PTB risk. Teenage mothers carry an increased risk of adverse pregnancy outcomes, including an increased risk of delivering earlier than mothers aged 20-39 years.[24]

In the current study, mean weight-gain during pregnancy was higher in PTB group compared to FTB group ($p<0.0001$). Advanced maternal age >35 years at the estimated date of delivery (EDD) has become increasingly common.[25] In the current study, the median age of mothers with PTB was higher compared to FTB mothers ($p<0.001$). The females who delivered PTB had median age >30, while females who delivered full-term had median age <30 years. Father's age was also associated with risk of PTB, as reported by a retrospective cohort study.[26] Another study also reported increased risk of PTB with father's age.[27] However, a study reported no role of father's age and PTB (OR: 1.3)[28] which is in clear contrast to previous findings and the findings of the current study.

There are a few studies that used logistic regression for PTB prediction using a variety of independent variables. In a 2016 study, logistic regression analysis was done to find risk factors of late PTB after adjusting maternal age, parity status, foetal position, mode of delivery and booking status during pregnancy.[28] It reported the OR for mother's age ≥35 was 1.47, for un-booked status it was 2.15 and only maternal hypertension increased the risk of PTB (OR: 2.76).[29] On comparing the final model of the current study, only un-booked status of mothers during pregnancy for their antenatal check-ups was common in the two studies.[28]

Another study using logistic regression reported high risk of PTB for mothers with age ≥35 years (OR: 1.8), refugee (OR: 1.57), antenatal visits <4 (OR: 2.4), medically-induced pregnancy (OR: 2.89), history of previous preterm delivery (OR: 5.58), previous history of stillbirth (OR: 4.01) and previous history of Caesarean section (OR: 1.78).[30] None of these variables were significant in the current study and thus were not included in the final model. The difference may have been due to various conditions, sample size and the number of predictors.

Another study reported that the risk of PTB was significantly increased for those on poor diet during pregnancy (OR: 4.33), caring for animals (OR: 5.06), females having urinary tract infection (UTI) (OR: 2.85), anxiety during pregnancy (OR: 2.16), females with cervical incompetence (ORL 4.74), more than one pregnancies (OR: 7.51), abdominal trauma (OR: 3.76) and previous history of abortion (OR: 6.36).[31] In the current study, the final model gave none of these variables as predictors of PTB, though females were not asked about their dietary habits and caring for domestic animals.

One study using logistic regression with adjusted odds ratio (AOR) reported factors for PTB as multiple pregnancy, foetal malformation, vaginal bleeding, suspected cervical insufficiency, inadequate number of antenatal visits and UTI.[22] Though many of these predictors were selected, none of them were significant in the final model of the current study.

A 2015 study found only 3 significant risk factors: antenatal visiting ≤4 times (OR: 4.072), premature rupture of membranes (PROM) (OR: 4.031) and placenta previa (OR: 15.304).[11] The current study also found placenta previa in its final model (OR: 51.97).

An Iranian study in 2015 found 11 possible PTB risk factors which included history of previous PTB (OR: 12.7), hypertension (OR: 7.3), Oligohydramnios (OR: 3.9), abuse from husband during pregnancy (OR: 3.7), preeclampsia (OR: 3.6), PROM (OR: 3), spotting / bleeding during pregnancy (OR: 2.0), hyperemesis gravidarum (OR: 2.0), UTI (OR: 1.8), hypotension (diastolic blood pressure ≤60 mmg) (OR: 1.5).[32] The current study only reported Oligohydramnios (OR: 3.18) from among the risk factors cited by the Iranian study.[31]

A cross-sectional study demonstrated that pregnancy-induced hypertension (PIH) had increased risk of PTB (OR:1.12) alongside eclampsia (OR:3.57), anaemia (OR: 4.12), antepartum haemorrhage (OR: 3.05), placenta praevia (OR: 3.30), malaria during pregnancy (OR: 2.93) and UTI (OR: 1.53).[33]

In one study, the risk of PTB was found to rise cent per cent with previous PTB (OR: 2.13). Moreover, persistent malaria (even with medication) (OR: 1.99), age <20 (OR: 1.73) and anaemia (OR: 1.95) were significantly associated with PTB.[34] In the current study, parent's age <20 years at the time of their marriage was a significant contributor for PTB, while anaemia and malaria findings were almost similar in the two studies mentioned above.[32,33]

Another retrospective study on singleton pregnancy found few risk factors using logistic regression that included lack of antenatal care (OR: 2.63), previous PTB (OR: 5.06), pregnancy-related complications, such as antepartum haemorrhage, hypertensive disorder and PROM (OR: 5.12), being unmarried (OR: 2.41) and nulliparity (OR: 2.08).[35] The current study also confirmed that the risk of PTB was 5.17 times higher for PROM which is similar to the earlier study.[34]

One study used different kinds of producers and reported that any antenatal complication had higher risk for PTB (OR: 1.3), iron consumed <60 days, for 60-180 days and >180 days also had higher risk for PTB (OR: 1.32, 1.33, 1.28), middle upper arm circumference <214, 214-221, 222-250 (OR: 1.26, 1.23, 1.17), previous history of child death (OR: 1.05).[19] It measured SES using the wealth index and reported risk for the lowest quintile (OR: 1.37), for the second lowest quintile (OR: 1.47), for the middle quintile (OR: 1.43) and the second highest quintile (OR: 1.31).[20] In the current study, different and valid method to measure SES was adopted and it found to increase the risk of PTB for lower SES.

An observational study on 1810 Japanese females revealed few risk factors using multivariate analysis, like low educational level (OR: 16.3), part-time employment (OR: 2.54), uterine myoma (OR: 2.13), and multiple pregnancy (OR: 53.52) and male baby (OR: 5.06).[36] Male baby is not established as a risk factor by either the current study or any of the cited literature above.

Conclusion

The PTB prevalence was found to be high with several modifiable and controllable risk factors. Healthcare providers are the most important source for controlling PTB and they can definitely PTB minimise.

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References

1. Lawn JE, Gravett MG, Nunes TM, Rubens CE, Stanton C, GAPPS Review Group. Global report on preterm birth and stillbirth (1 of 7): definitions, description of the burden and opportunities to improve data. BMC Pregnancy Childbirth. 2010; 10:S1.
2. Nilses C, Nystrom L, Munjanja S, Lindmark G. Self-reported reproductive outcome and implications in relation to use of care in women in rural Zimbabwe. Acta Obstet Gynecol Scand. 2002; 81:508-15.
3. Bhutta ZA, Hafeez A, Rizvi A, Ali N, Khan A, Ahmad F, et al. Reproductive, maternal, newborn, and child health in Pakistan: challenges and opportunities. The Lancet. 2013; 381:2207-18.
4. Turab A, Pell LG, Bassani DG, Soofi S, Ariff S, Bhutta ZA, et al. The community-based delivery of an innovative neonatal kit to save newborn lives in rural Pakistan: design of a cluster randomized trial. BMC Pregnancy Childbirth. 2014; 14:315.
5. Punjani NS, Shams S, Bhanji SM. Analysis of health care delivery systems: pakistan versus united states. Int J Endorsing Health Sci Res. 2014; 2:38-41.
6. Blencowe H, Cousens S, Oestergaard MZ, Chou D, Moller AB, Narwal R, et al. National, regional, and worldwide estimates of preterm birth rates in the year 2010 with time trends since 1990 for selected countries: a systematic analysis and implications. Lancet. 2012; 379:2162-72.
7. Goldenberg RL, Goepfert AR, Ramsey PS. Biochemical markers for the prediction of preterm birth. Am J Obstet Gynecol. 2005; 192:S36-46.
8. Zhang C, Garrard L, Keighley J, Carlson S, Gajewski B. Subgroup identification of early preterm birth (ePTB): informing a future prospective enrichment clinical trial design. BMC Pregnancy Childbirth. 2017; 17:18.
9. Satterfield N, Newton ER, May LE. Activity in Pregnancy for Patients with a History of Preterm Birth. Clin Med Insights Womens Health. 2016; 9:17-21.
10. Rodrigues T, Barros H. Short interpregnancy interval and risk of spontaneous preterm delivery. Eur J Obstet Gynecol Reprod Biol. 2008; 136:184-8.
11. Zhang X, Zhou M, Chen L, Hao B, Zhao G. Risk factors for preterm birth: a case-control study in rural area of western China. Int J Clin Exp Med. 2015; 8:4527.
12. Tehranian N, Ranjbar M, Shobeiri F. The Prevalence and Risk Factors for Preterm Delivery in Tehran, Iran. JMid wif Reproduct Health. 2016; 4:600-4.
13. Bastek JA, Sammel MD, Jackson TD, Ryan ME, McShea MA, Elovitz MA. Environmental variables as potential modifiable risk factors of preterm birth in Philadelphia, PA. Am J Obstetr Gynecol. 2015; 212:236e1-10.
14. Badshah S, Mason L, McKelvie K, Payne R, Lisboa PJG. Risk factors for low birthweight in the public-hospitals at Peshawar, NWFP-Pakistan. BMC Public Health. 2008; 8:197.
15. WHO expert consultation. Appropriate body-mass index for Asian populations and its implications for policy and intervention strategies. [Online] [Cited 2018 October 13]. Available from: URL: http://www.wpro.who.int/nutrition/documents/docs/Redefining obesity.pdf.
16. Kumar BR, Dudala SR, Rao A. Kuppuswamy's socio-economic status scale–a revision of economic parameter for 2012. Int J Res Dev Health. 2013; 1:2-4.
17. Mokuolu OA, Suleiman B, Adesiyun O, Adeniyi A. Prevalence and determinants of pre-term deliveries in the University of Ilorin Teaching Hospital, Ilorin, Nigeria. Pediatr Rep. 2010; 2:11-4.
18. Shapiro-Mendoza CK, Lackritz EM. Epidemiology of late and moderate preterm birth. Semin Fetal Neonatal Med. 2012; 17:120-5.
19. Roberts CL, Algert CS, Raynes-Greenow C, Peat B, Henderson-Smart DJ. Delivery of singleton preterm infants in New South Wales, 1990–1997. Aust N Z J Obstet Gynaecol. 2003;43:32-7.
20. Shah R, Mullany LC, Darmstadt GL, Mannan I, Rahman SM, Talukder RR, et al. Incidence and risk factors of preterm birth in a rural Bangladeshi cohort. BMC Pediatr. 2014; 14:112.
21. Barros AJ, Santos IdSd, Victora CG, Albernaz EP, Domingues MR, Timm IK, et al. The 2004 Pelotas birth cohort:methods and description. Revista de saude publica. 2006; 40:402-13.
22. Passini Jr R, Cecatti JG, Lajos GJ, Tedesco RP, Nomura ML, Dias TZ, et al. Brazilian multicentre study on preterm birth (EMIP): prevalence and factors associated with spontaneous preterm birth. PloS one. 2014; 9:e109069.
23. Schempf AH, Branum AM, Lukacs SL, Schoendorf KC. Maternal age and parity-associated risks of preterm birth: differences by race/ethnicity. Paediatr Perinat Epidemiol. 2007; 21:34-43.
24. Shrim A, Ates S, Mallozzi A, Brown R, Ponette V, Levin I, et al. Is young maternal age really a risk factor for adverse pregnancy outcome in a canadian tertiary referral hospital? J Pediatr Adolesc Gynecol. 2011; 24:218-22.
25. Martin JA, Hamilton BE, Ventura SJ, Menacker F, Park MM, Sutton PD. Births: final data for 2001. Natl Vital Stat Rep. 2002; 51:1-102.
26. Chen XK, Wen SW, Krewski D, Fleming N, Yang Q, Walker MC. Paternal age and adverse birth outcomes: teenager or 40þ, who is at risk? Hum Reprod. 2008; 23:1290-6.
27. Astolfi P, De Pasquale A, Zonta LA. Paternal age and preterm birth

in Italy, 1990 to 1998. Epidemiol. 2006; 17:218-21.
28. Basso O, Wilcox AJ. Paternal age and delivery before 32 weeks. Epidemiol. 2006; 17:475-8.
29. Butali A, Ezeaka C, Ekhaguere O, Weathers N, Ladd J, Fajolu I, et al. Characteristics and risk factors of preterm births in a tertiary center in Lagos, Nigeria. Pan Afr Med J. 2016; 24:1.
30. Abu Hamad K, Abed Y, Abu Hamad B. Risk factors associated with preterm birth in the Gaza Strip: hospital-based case-control study. East Mediterr Health J. 2007; 13:1132-41.
31. Al-Dabbagh SA, Al-Taee WY. Risk factors for pre-term birth in Iraq: a case-control study. BMC Pregnancy Childbirth. 2006; 6:13.
32. Alijahan R, Hazrati S, Mirzarahimi M, Pourfarzi F, Hadi PA. Prevalence and risk factors associated with preterm birth in Ardabil, Iran. Iran J Reprod Med. 2014; 12:47-56.
33. Feresu SA, Harlow SD, Woelk GB. Risk factors for prematurity at Harare maternity hospital, Zimbabwe. Int J Epidemiol. 2004; 33:1194-201.
34. van den Broek NR, Jean-Baptiste R, Neilson JP. Factors associated with preterm, early preterm and late preterm birth in Malawi. PloS one. 2014; 9:e90128.
35. Iyoke C, Lawani L, Ezugwu E, Ilo K, Ilechukwu G, Asinobi I. Maternal risk factors for singleton preterm births and survival at the University of Nigeria Teaching Hospital, Enugu, Nigeria. Niger J Clin Pract 2015; 18:744-50.
36. Shiozaki A, Yoneda S, Nakabayashi M, Takeda Y, Takeda S, Sugimura M, et al. Multiple pregnancy, short cervix, part-time worker, steroid use, low educational level and male fetus are risk factors for preterm birth in Japan: A multicenter, prospective study. J Obstet Gynaecol Res. 2014; 40:53-61.