



## Environmental factors and risk of prematurity in West Algeria (Sidi Bel Abbes and Oran region)

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**Key words:** Prematurity, Risk factors, Oran, Sidi Bel Abbes, Epidemiological study.

<http://dx.doi.org/10.12692/ijb/15.2.70-77>

Article published on August 09, 2019

### Abstract

Preterm births constitute one of the major causes of neonatal mortality and thus a public health problem. The aim of this study was to evaluate risk factors of preterm births. It was an retrospective study, done from December 2017 to May2018 in west Algeria (Sidi Bel Abbes and Oran). The premature cases were comprised of 1640 neonates with different gestational ages. Data was comprised of the term of the pregnancy, weight, sex, apgar score, beep, socio-demographic and the obstetrical profile of the mother. Data was analyzed with the Stat View software. Out of the 1640 neonates admitted in the neonatology unit during the study period, 486 were born preterm, giving an incidence of 60.75% in Oran and 487 cases or 57.97% in Sidi Bel Abbes. Females were predominant with no statistically significant difference. Medical antecedents, maternal pathologies and the socio-economic level were identified as maternal risk factors for prematurity. Multiple pregnancies and congenital malformations, low birth weights, apgar score, the resuscitation to neonatology service were fetal risk factors. Neonatal mortality in these preterm neonates was 82.05% at Oran and 90.90% at Sidi Bel Abbes. Factors which influenced mortality were gestational age less than 28 and between 28 and 32 SA, birth weight<2500g, 5<sup>th</sup>s Apgar score less than 3, and resuscitation at birth. In conclusion, we thus recommend information and education of pregnant women and young girls at child bearing age on the importance of family planning and good follow up of pregnancies.

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## Introduction

Perinatal and maternal mortality has long been the major health concern for the health of pregnant and newborn women. This mortality has fallen sharply in recent decades in industrialized countries, including France; it is still higher in non-industrialized countries (Voyer *et al.*, 1996; Foix-L'Helias *et al.*, 2000). Other pregnancy outcomes carry a significant burden on public health. This is particularly the case for premature births associated with increased neonatal morbidity and mortality (Klerman *et al.*, 1998).

Pre-term labor and delivery (<37 weeks of amenorrhea) is a major perinatal problem. Each year, some 15 million babies are born prematurely; this number is increasing. It is estimated that more than one million babies die each year from complications due to premature birth (Unicef, 2008).

Prematurity are the leading cause of death in newborns (during the first four weeks of life) and the second major cause of death, after pneumonia, in children under five years of age. Three-quarters could be avoided through routine interventions, both effective and inexpensive, even without the use of intensive care (WHO, 2008).

Prevention is difficult because of the multiplicity of etiologies and risk factors, and the lack of reliable diagnostic tests to identify women at risk. Besides the obstetric risk factors (multiple pregnancies, infections ...), there are associations between preterm delivery and certain psychosocial factors (Epiney *et al.*, 2011). The objective of this article is to compare the risk factors of prematurity in western Algeria (the city of Oran and the city of Sidi Bel Abbes).

## Materials and methods

### *Type of study*

We did a retrospective study on the newborns at the High Risk Pregnancy Department of the University Hospital Center of Oran and the maternity of Sidi Bel Abbes (west of Algeria), during the two years 2017-2018 for a sample of 1640 children born.

### *Data collection*

We developed a questionnaire that included the gestational, anthropometric, socio-economic characteristics of the mother and the characteristics of her newborn.

Data for newborns were collected from a data sheet containing.

The gestational age, the weight, the sex, the beep, The score of Apgar, number of children born from the same pregnancy, the presence of malformation, the notion of resuscitation, state.

Each mother whose newborn was included in the survey was asked about: Age, the occupation, parity, gravity, Mode of delivery, successful pregnancy, the pathologies observed during pregnancy, medical history, smoking, and the socio-economic level.

### *Statistical analysis*

Statistical data were processed and analyzed using software (Statview 1997). The statistical methods used are the ANOVA test and means were compared using the Student test. Correlations were considered significant with the observed significance level (P-value was <0.05).

## Results

A total of 1640 deliveries were reported during the study period. The study showed obvious variations in demographic factors, socioeconomic status, obstetric/gynecological history, current obstetric information, and maternal physical characteristics and factors fetal risk.

### *Demographic characteristics*

The mean age of pregnant women in our study is  $30.41 \pm 6.46$  (years), Statistical results revealed that the highest percentages are in the 20- to 40-year-old categories. We observed the distribution of gestational age in both cities had a high percentage in the category from 33 to 37 weeks. The difference between the different gestational age categories in the two cities was statistically significant ( $P = 0.027$ ) (Table 1).

**Table 1.** Distribution of Gestational age in both cities.

Gestational age	City		P (X <sup>2</sup> )
	Oran	Sidi Bel Abbes	
<28	25(3.12%)	9 (1.07%)	0.027
28 à 32	83(10.37%)	87(10.35%)	
33 à 37	378(47.25%)	391(46.54%)	
>37	314(39.25%)	353(42.02%)	

During this study the rate of prematurity was greater in the vicinity than in city, with 57.95% and 57.08 respectively in rural area of both Oran and Sidi bel abbes. Regarding the relationship between maternal

residence and gestational age our results revealed that there is no statistically significant relationship between the two parameters (P = 0.849) (Table 2).

**Table 2.** Distribution of Gestational age in both cities and surroundings.

Cities and surroundings	Prematurity		P (X <sup>2</sup> )
	Yes	No	
Oran	174(42.02%)	232 (60.73%)	0.03
Zahana	24(5.79%)	7(1.83%)	
Sig	19(4.58%)	31(8.11%)	
Autre(Arzew, Hassi bounif, Chtaibou,Gdyel, Sidi el Bachir,Bouttelis,Sid el Chahmi,Hassi Amer)	197(47.58%)	112(29.31%)	
Sidi Bel Abbes	278(57.08%)	191(54.10%)	0.027
Télagh	36(10.19%)	24(4.92%)	
Sidi Ali Benyoub	17(3.49%)	15(4.24%)	
Autre (Sfisef,Telmouni,Tanira ,Sidi Lahsen,Sidi Dahou, Sidi Ibrahim, Sidi Hamadouche, Tassala, Tabia, Ras El Ma)	168(34.49%)	111(31.44%)	

#### Current pregnancy

Concerning parity, the gestational age is much smaller in the Multipart women with an average of 35 SA compared to averages of 36 AW in nullipares and primiparous. The relation between preterm birth and the mode of delivery in this study was statistically significant (P=0.0005).

Compared of the different categories of medical history, 50, 42% are hypertensive in Oran, 64.02% are near myopia and asthma in Sidi bel abbes.

For the other diseases (Diabetes and Hypothyroidism) the percentages are convergent in both cities (Table 3).

**Table 3.** Distribution of mother's Medical background by city.

Medical background	City	
	Oran	Sidi Bel Abbes
HTA	119(50.42%)	36 (19.04%)
Diabetes	26(11.01%)	22(11.64%)
Hypothyroidism	16(6.77%)	10(5.29%)
Other (Strong Myopia, Asthma)	75(31.77%)	121(64.02%)

Most women whose infants were studied were in the age group 20-40 years and the mean age was 30.41±6.46, no association was found between prematurity and mother's age. The proportion of working women was 17.62% cases in the city of Oran

and 22.46% in the city of Sidi Bel Abbes. This study did not reveal any statistically significant relationship between maternal activity and gestational age (P = 0.804) (Tabale 4).

**Table 4.** Distribution of Gestational age according to maternal characteristics, pregnancy and maternal history.

Variable	Gestational age (GA)		P value
	Number	Average %	
<b>Origin</b>			
Urban	878 (53.53%)	36.49±3.10	0,849
Rural	762 (46.46%)	36.29±3.63	
<b>Age groups of mothers (years)</b>			
<20	57	35.38±4.13	0,309
20-30	782	36.55±3.48	
31-40	70	36.20±3.16	
>40	93	36.31±3.2	
<b>Activities of the mother</b>			
Teacher	57	36.28±3.43	0,804
Housewife	1310	36.32±3.35	
Others (student, secretary ...)	273	36.47±3.47	
<b>Parity</b>			
Nulliparous	747	36.41±3.52	0,002
Primipare	422	36.69±3.32	
Multiparous	471	35.93±3.11	
<b>Maternal pathologies</b>			
HTA pregnancy	185	34.23±4.43	0,0001
Gestational diabetes	31	36.12±3.00	
Anémia	35	35.48±3.14	
PRM	390	33.84±2.93	
IUGR	93	35.16±2.68	
Autres (MAP, MIU, Oligoamnios...)	473	37.57±2.38	
<b>Pregnancy followed</b>			
Followed	1185	36.64±3.16	0,0001
Badly followed	283	35.29±3.65	
Not followed	172	36.08±3.86	
<b>Socio-economic level</b>			
Low	77	35.05±4.55	0,0001
Way	1477	36.41±3.29	
High	84	36.50±3.30	
<b>Smoking</b>			
Active	36	35.50±4.33	0,0001
Passive	724	35.71±3.53	
Négative	879	36.91±3.07	

There is a statistically significant relationship between maternal conditions and gestational age ( $P = 0.0001$ ) (Table 4).

There was a significant relationship between preterm birth and pregnancy follow-up, gestational age is much lower in women who have not followed their pregnancy with an average of 35 AW compared to 36 AW averages in pregnancies followed and not followed. The patients with low socioeconomic level have a reduced gestational age of 35.05AW, compared to those with a high average level (Table4). Maternal smoking appeared to be a strong risk factor, indeed

the active and passive smoking of mothers was statistical significant relation with preterm birth ( $P=0.0001$ ), (Table4).

#### *Newborn characteristics*

Number of fetus per pregnancy was compared between the two groups. The premature baby born from a single pregnancy represent 57.71% and 80.34% is born from a multiple pregnancy. Statistically significant difference was found. Compared to babies with normal Apgar score >7, infants with low Apgar Scores <7 were found born prematurely ( $p < 0.001$ ) (Table 5).

**Table 5.** Distribution of Gestational age according to Newborn characteristics.

Variable	Gestational age (GA)		P value	
	Number			
	GA<37	GA>37		
	n/N(%)	n'/N(%)		
Number of fetuses per pregnancy				
Single pregnancy	879/1523(57.71%)	644/1523(42.28%)	36.44±3.34	0,0001
Multiple pregnancy	94/117 (80.34%)	23/117 (19.65%)	35.17±3.43	
Birth weight (g)				
<2500	115		35.58±3.75	0,003
2500à2700	71		36.57±2.29	
>2700	406		36.70±2.46	
Apgar score (5th min)				
<3	93		31.91±4.52	0,0001
3-7	246		34.23±3.59	
>7	1297		37.08±2.69	
	GA<37	GA>37		
	n/N(%)	n'/N(%)		
Congenital malformation				
Presence	36/51(70.58%)	15/51(29.41%)	33.94±4.83	0,0001
Absence	937/1589 (58.96%)	652/1589 (41.03%)	36.42±3.28	

Our data showed that gestational age was significantly associated with birth weight ( $P=0.003$ ). There is statistical significant ( $P=0.0001$ ) between the prematurity and the presence of malformation. Congenital malformations were predominant in GA <37SA neonates, 70.58%. (Table5).

### Discussion

The present study was designed to investigate the risk factors that contributed to preterm birth in Oran and Sidi bel Abbes city. The prevalence of prematurity found in this study was 29.7% in Oran and 29.6% in Sidi Bel Abbes.

This study revealed that factors most associated with prematurity were parity, hypertension, and lack of follow up during pregnancy, low economic status and active smoking.

### Prevalence

The prevalence of 29.7% and 29.6% in the two cities. It is far superior to that of other authors; 8,5% in

Nigéria (Etuk *et al.*, 2005), 11,1% in Togo (Balaka *et al.*, 2002) and 15,1% in Madagascar (Honein *et al.*, 2010). This impact is doubled or even tripled compared to that of developed countries. 7.4% in France (Mamelle *et al.*, 2002) and 12% in the USA (Boyle, 2011).

### New born sex

In our study, the rate of female sex was predominant prematurity's infants, Studies dealing with the etiology of preterm birth have shown us that; female sex is an important risk factor and this is attributed to the predisposition of the female sex to the other risk factor (Tietche *et al.*, 1994).

### Mother's age

Our results note that maternal age did not affect prematurity, however some studies have shown an excess risk of preterm birth among older women (Beta *et al.*, 2011) (Cnattingius *et al.*, 1992). In historical cohort study were all birth in Quebec and Denmark were analyzed from 1981 to 2008, over the entire

study period women aged 40 years or older in both Denmark and Quebec had the highest risk of Preterm deliveries relative to women aged 25 to 29 years (Auger *et al.*, 2013).

#### *Risk factors*

Our study confirmed some risk factors for prematurity well known literature; this is the case for pathological obstetric history, surveillance insufficient prenatal, low level of education. The link between pathological obstetric history and prematurity is well known and work has showed that a history of perinatal death, child birth premature or abortion was strongly related to risk of prematurity for later pregnancy (Berkowitz and Papiernik, 1993).

The surveillance inadequate pregnancy, a factor closely related to prematurity, seems to result from the lack of a health care system prenatal and a very unfavorable social environment (Florey and Taylor, 1994) (Schrestha *et al.*, 2010).

#### *Maternal pathologies*

Regarding Maternal pathologies, In our study 34% of preterm labor were caused by preterm premature rupture of the membranes (PPROM) this results is consistent to some the general result where About 30–35% of preterm births are indicated, 40–45% follow spontaneous preterm labor, and 25-30% follow PPRM.(Goldenberg *et al.*, 2008)(Tucker *et al.*, 1991).

#### *Smoking*

According to our study 44% of mothers were exposed to passive smoking, a negligible amount between them was smoking. In literature the researchers found that, maternal exposure passive smoking was associated with prematurity (Centers for Disease Control and Prevention, 2004).

Non-smoking mothers who are exposed daily to the smoke of the tobacco at home or at work seem to be more likely to have a birth premature that mothers who are never exposed to the smoke (Fantuzzi *et al.*, 2007).

#### *Gynecological problems*

In this study, the presence of congenital gynecological problems of the uterus, number of fetus per pregnancy, increased the chance of having a preterm birth. Carroll *et al.* supported this finding and clarified that congenital uterine anomalies are implicated in preterm delivery (Aroll *et al.*, 1996).

Schaaf *et al.*, in the Netherlands, stated in his study that the risk of prematurity increased significantly in twin pregnancies (Schaaf *et al.*, 2011).

#### **Conclusion**

The prevalence of prematurity found in this study of 29.7% and 29.6% in two different regions of west Algeria. Those number are high and those results should direct health care professional to have a serious look at this problem and start addressing it in a better way, Indeed Preterm birth is an important prenatal health problem across the globe especially in developing countries like Algeria. It is not easy to single out one particular factor that cause the prematurity because there are many different factors interacting together affecting the women's in pregnancy.

This is why we need a better understanding of the different causes of preterm birth, and better evaluation of it incidence to be able to improve the obstetric and neonatal care, and thus reduce the percentage of preterm birth.

We thus recommend information and education of pregnant women and young girls at child bearing age on the importance of family planning and good follow up of pregnancies; intensify training of medical staff on the management of premature babies and pathologies during pregnancy, and equip hospitals for adequate neonatal resuscitation.

#### **References**

**Carroll SG, Sebire NJ, Nicolaides KH.** 1996. Management of preterm amniorrhexis. In: Nicolaides KH, Ed. Preterm prelabour amniorrhexis. London: The Parthenon Publishing Group, 126-164.

- Auger N, Hansen AV, Mortensen L.** 2013. Contribution of maternal age to preterm birth rates in Denmark and Quebec, 1981-2008. *American Journal of Public Health* **103**, 33-38.
- Balaka B, Baeta S, Agbéré AD, Boko K, Kessie K, Assimadi K.** 2002. Facteurs de risque associés à la prématurité au CHU de Lomé, Togo. *Le Bulletin de la Société de Pathologie Exotique* **95(4)**, 280-283.
- Berkowitz GS, Papiernik.** 1993. E- Epidemiology of preterm birth. *Epidemiologic reviews* **15**, 414-443.
- Beta J, Akolekar R, Ventura W, Syngelaki A, Nicolaides KH.** 2011. Prediction of spontaneous preterm delivery from maternal factors, obstetric history and placental perfusion and function at 11-13 weeks. *Prenatal Diagnosis* **31**, 75-83.
- Boyle JD, Boyle EM.** 2011. Born just a few weeks early: does it matter *Archives of Disease in Childhood: Fetal & Neonatal* **98(1)**, 85-88.  
<http://dx.doi.org/10.1136/archdischild-2011-300535>
- Centers for Disease Control and Prevention.** 2004. Smoking during pregnancy--United States, 1990-2002. *MMWR Morbidity and Mortality Weekly Report* **53(39)**, 911-5.
- Cnattingius S, Forman MR, Berendes HW, Isotalo L.** 1992. Delayed childbearing and risk of adverse perinatal outcome. A population-based study. *The Journal of the American Medical Association* **268(7)**, 886-890.
- Epiney M, Boulvain W, Irion O.** 2011. Psychosocial risk factors and preterm delivery. *J gynécologie obstétrique* **26(7)**, 2066-2068.
- Etuk SJ, Etuk IS, Oyo-Ita AE.** 2005. Factors influencing the incidence of preterm birth in Calaba, Nigerian *Journal of Physiological Sciences* **20(1-2)**, 63-8.
- Fantuzzi G, Aggazzotti G, Righi E, Facchinetti F, Bertucci E, Kanitz S.** 2007. Preterm delivery and exposure to active and passive smoking during pregnancy: a case-control study from Italy. *Paediatric and Perinatal Epidemiology* **21(3)**, 194-200.
- Florey C, Taylor DJ.** 1994. The relation between antenatal care and birth weight. *La Revue Epidémiologique de Santé Publique* **42**, 191 - 197.
- Foix-L'Helias L, Ancel P-Y, Blondel B.** 2000. Facteurs de risque de la prématurité en France et comparaison entre prématurité spontanée et prématurité induite. *Journal de Gynécologie Obstétrique et Biologie de la Reproduction* **29(1)**, 55-65.  
<http://dx.doi.org/JGYN-02-2000-29-1-0368-2315-101019-ARTS>
- Goldenberg RL, Culhane JF, Iams JD, Romero R.** 2008. Epidemiology and causes of preterm birth. *Lancet* **371**, 75-84.
- Honein MA, Kirby RS, Meyer RE.** 2010. The association between major birth defects and preterm birth. *Maternal and Child Health Journal* **13**, 164-75.
- Klerman LV, Cliver SP, Goldenberg RL.** 1998. The impact of short interpregnancy intervals on pregnancy outcomes in a low-income population. *American Journal of Public Health* **88**, 1182-1185.
- Mamelle N, David S, Venditelli F.** 2002. La santé périnatale en 2001 et son évolution depuis 1994. Résultats du réseau sentinelle AUDIPOG. *Gynécologie Obstétrique & Fertilité* **30(1)**, 36-39.
- Schaaf JM, Mol BW, Abu-Hanna A, Ravelli AC.** 2011. Trends in preterm birth: singleton and multiple pregnancies in the Netherlands, 2000-2007. *An International Journal of Obstetrics & Gynaecology* **118(10)**, 1196-204.
- Shrestha S1, Dangol SS, Shrestha M, Shrestha RP.** 2010. Outcome of preterm babies and associated risk factors in a hospital. *Journal of Nepal Medical*

Association **50(180)**, 286-90.

**Tietche F, Koki Ndombo P, Kago I.** 1994. Facteurs de mortalité des nouveau-nés de petit poids de naissance à l'Hôpital Central de Yaoundé. *Annale de Pédiatrie* **41(4)**, 259-63.

**Tucker JM, Goldenberg RL, Davis RO, Copper RL, Winkler CL, Hauth JC.** 1991. Etiologies of preterm birth in an indigent population: is prevention a logical expectation. *Obstetrics & Gynecology* **77(3)**, 343-347.

**Unicef Childinfo Anuual Repport.** 2008. Available at (accessed 1 July 1, 2019).

[https://www.unicef.org/publications/files/UNICEF\\_Annual\\_Report\\_2008\\_EN\\_0727.09.pdf](https://www.unicef.org/publications/files/UNICEF_Annual_Report_2008_EN_0727.09.pdf)

**Voyer M.** 1996. Prématurité (I) Encyclopédie médico-chirurgicale **4(2)**, 10-30.

**WHO.** 2008 Statical Information System (WHOSIS). 2008. Available at (Accessed 12 December 2011).

<http://www.who.int/whosis/indicator/compendium/2008/2bwn/en/>