Risk Factors for Preterm Delivery in Burkina Faso (West Africa)

THIERRY PRAZUCK,* FRANÇOIS TALL,** ALAIN J ROISIN,† SALIF KONFE,** MICHEL COT‡ AND CHRISTIAN LAFAIX*

Prazuck T (Groupe d'Etudes Epidémiologiques et Prophylactiques, et Service de Maladies Infectieuses et Tropicales, 40 allée de la Source, 94190 Villeneuve St Georges, France), Tall F, Roisin A J, Konfe S, Cot M and Lafaix C. Risk factors for preterm delivery in Burkina Faso (West Africa). *International Journal of Epidemiology* 1993; 22: 489–494.
The environmental and socioeconomic risk factors for preterm delivery were assessed in a West African urban population (Bobo-Dioulasso, Burkina Faso). The study population were 102 cases of preterm delivery matched with 102 controls obtained from 4124 sequential deliveries which occurred between May and October 1989 in the three maternity centres in the city. The univariate analysis identified the risk factors as age (<20 years), primiparity, marital status (single), low frequency of antenatal visits, death of a previous child and level of education of the mother. The following risk factors identified by multivariate analysis (logistic regression) are consistent with those identified in previous studies: youth of the mother, primiparity ($P = 0.01$) and death of a previous child ($P < 0.05$). On the other hand, in this study, the level of education of the parent was identified as an independent risk factor ($P < 0.001$). This finding could be used to determine a target population for prevention programmes.

Prematurity is a major risk factor for postnatal mortality and morbidity,[1-4] especially in developing countries where health facilities are limited. Socio-environmental risk factors have already been investigated in Europe and the US.[5-7] To our knowledge, no case-control studies have been carried out on geographical and social factors in a developing country. The identification, in West Africa, of a population more at risk of preterm deliveries would contribute to the development of simple strategies and programmes adapted to the African situation.

MATERIALS AND METHODS

Bobo-Dioulasso is the second city of Burkina Faso with a population of 300000 inhabitants. Between 1975 and 1985, the average growth rate of the city (migration included) was 7.2% per year. In 1989, 20.55% of the women were of childbearing age, and 12814 deliveries were expected during a 1-year period.[8]

* Groupe d'Etudes Epidémiologiques et Prophylactiques, et Service de Maladies Infectieuses et Tropicales, 40 allée de la Source, 94190 Villeneuve St Georges, France.
** Department of Pediatrics, Hôpital National Sanon Souro, Bobo-Dioulasso, Burkina Faso and Ecole Supérieure des Sciences de la Santé (ESSSA), Ouagadougou, Burkina Faso.
† USAID, Ouagadougou, Burkina Faso.
‡ ORSTOM, Paris, France.

The city is served by three maternity clinics, one of which is in the hospital. Between 60 and 70% of pregnant women give birth in one of these clinics.

The study was carried out in the three clinics between May and October 1989. A detailed record of all deliveries was kept during this period. A physician (KS) visited each clinic daily to check the diagnosis of preterm delivery. The diagnosis was not based solely on the date of the last menstrual period, the recollection of which is often inexact. The following conventional neurological and clinical criteria were noted in order to determine precisely gestational age: the tonus, the flexion of the limbs, plantar striations, the diameter of the nipple and the presence of auricular cartilage. This classification enabled cases born between 28 and 37 weeks of pregnancy to be identified. Premature multiple pregnancies and preterm deliveries with fetal malformation were excluded. Similarly, diagnosis based on clinical criteria and the probable date of last menstrual period led to the exclusion of late abortions and cases of late low birthweight due to intrauterine growth retardation. The average duration of hospitalization after delivery was 48 hours. All the mothers who delivered premature babies in the maternity clinics during the study period were included. Each case was matched with a mother whose baby was born at term in the same clinic immediately after the baby of the identified case.

The data were collected by the investigating physician and included details of socioeconomic status of the parents, professional and farming activity during the pregnancy, obstetric and gynaecologic history, health care during pregnancy in an adapted centre (mother-child dispensary) and drugs prescribed during pregnancy. The age of the mother was taken from the identity card possessed by the whole urban population of Bobo-Dioulasso.

The study period coincided with the annual period of farming activity. In order to assess the intensity of physical activity, a cumulative score was attributed according to the work undertaken. Table 1 summarizes the scores according to the activity.

The statistical analysis involved comparing the cases and controls. A 95% confidence interval (CI) was used to determine the degree of significance. The relative risk was assessed by odds ratios (OR), the CI of which was measured according to the Cornfield method. Quantitative variables were compared by the t-test,

TABLE 1 *Scores according to work undertaken*

No work undertaken during pregnancy	0
Housework	1
Grinding millet regularly	2
Chopping and carrying wood	2
Work in fields	3
Carrying water regularly for over 500 m	3

and qualitative variables by the McNemar test and the χ^2 test with Yates' correction for continuity. A stepwise logistic regression was carried out with BMDP computer software, to control for confounding factors.

RESULTS

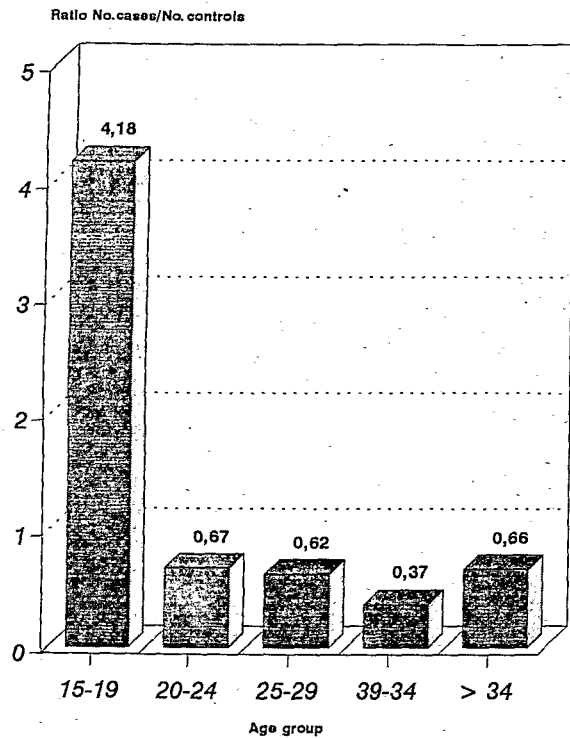During the 5-month study period, 4124 deliveries were recorded in the three maternity clinics (2051 in the maternity hospital, 962 in Farakan maternity clinic, 1111 in Guimbi maternity clinic). Of these, 123 were stillbirths and 436 (10.8% of the livebirths) were of low birthweight ($\leqslant 2500$ g). In all 102 women gave birth to premature babies (gestational age 28–37 weeks). These cases were recorded sequentially and matched with 102 controls. The premature infants accounted for only 23.4% of the low birthweight infants according to the morphological and neurological criteria used.

The incidence rate of preterm deliveries was thus found to be 2.6% of non-gemellary normally formed livebirths. The recruitment of the cases showed similar distribution by month and by maternity clinic (51,24 and 27 cases respectively). The age distribution was similar in pregnant women from the three maternity clinics. The average age of the cases was 22 years (range: 15–44). This was significantly lower than the controls ($P < 0.001$) whose average age was 26 years (range: 15–40). The risk varied according to age.

Figure 1 shows the ratio of the number of cases to number of controls in each age group. The maximum risk was in the 15–19 age group when compared with older women [$\chi^2 = 7.43$] (OR = 6.9, 95% CI : 3.1–15.5). The number of previous pregnancies was inversely associated with the risk of prematurity, but this factor was strongly correlated with the age of the mother ($r = 0.89$). The average number of pregnancies was 2.7 for the cases and 3.6 for the controls ($\chi^2_{df4} = 15.2$; $P < 0.001$). Primigravidae accounted for 47.1% of the cases and 23.5% of the controls. The risk of a premature delivery for primigravidae was nearly three times that for multigravidae ($\chi^2 = 5.87$, OR = 2.88, 95% CI : 1.66–5.31).

Figure 2 shows the risk of premature delivery according to the number of previous pregnancies represented by the ratio of the number of cases to the number of controls in each class. Mother's education (correlated with that of the father) was also related to
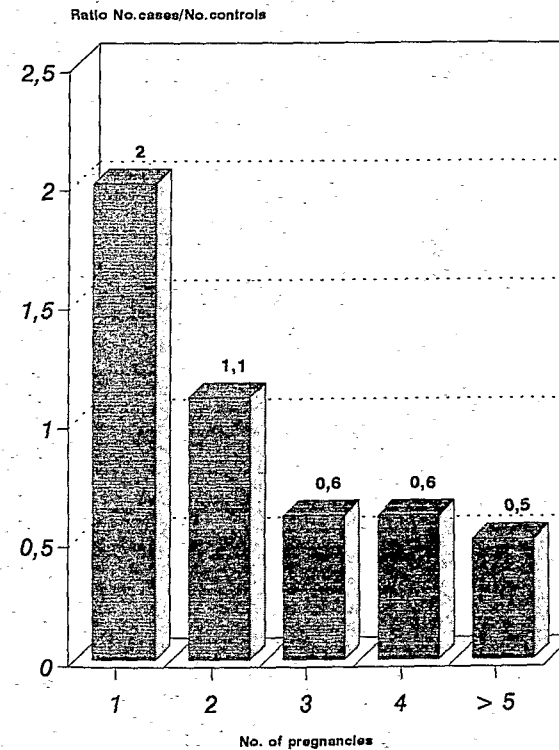

Ratio No.cases/No. controls

FIGURE 1 *The risk of premature delivery according to age*

Ratio No.cases/No.controls

No. of pregnancies

FIGURE 2 *The risk of premature delivery according to number of previous pregnancies*

the occurrence of premature births and in our study, lack of schooling seemed to be a protective factor against prematurity. Indeed, 60.2% of the cases had been to school compared with 39.8% of the controls ($\chi^2 = 7.13$). Two or less antenatal visits was significantly associated with the occurrence of premature births; 56% of the cases and 14% of the controls had two or fewer visits. With one or fewer visits, the risk was 8-fold ($\chi^2 = 38.1; P < 0.001$, OR = 7.9 [95% CI : 4.2–15.1]).

Figure 3 illustrates the significant increase in risk observed with less than three visits.

For the cases, 27% (30/110) of their previous children had died compared with 11% (26/241) for the controls. This factor significantly increased the risk of prematurity in later pregnancies ($\chi^2 = 8.5; P < 0.01$; OR = 3.1, 95% CI : 1.7–5.6). Finally, 37% (38/102) of the cases had taken regular antimalarial prophylaxis during pregnancy compared with 51% (52/102) of the

controls (OR = 1.75, 95% CI : 1.01–3.01). Other variables such as past history of preterm deliveries, previous gynaecologic or obstetric problems and the profession of the parents were not found to be associated with the risk of premature delivery. The cumulative assessment of physical work during pregnancy did not reveal a significant difference between cases and controls.

Table 2 summarizes the variables which are significantly associated with prematurity, and the corresponding OR. Logistic regression was carried out in order to determine which of the variables identified by univariate analysis were independently related to the risk of prematurity.

Table 3 shows the four variables identified by the logistic model. Three of them independently increased the risk of prematurity. These are the youth of the mother (confounded with the primigravid status) ($\chi^2 = 6.37, P = 0.01$), lack of antenatal follow-up in
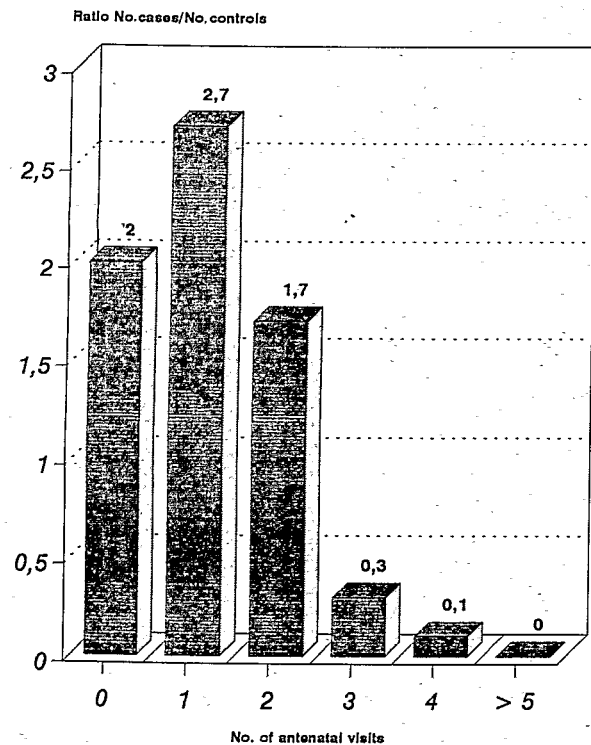
Ratio No.cases/No.controls

FIGURE 3　The risk of premature delivery according to number of antenatal visits

medical centres ($\chi^2 = 37.4, P < 0.001$) and the death of a previous child. However the fourth identified factor, the lack of schooling of the parents, appears as a protective factor, even after adjusting for the other significant variables: ($\chi^2 = 8.2, P < 0.01$).

TABLE 2　Odds ratio of risk factors for preterm delivery, (Univariate analysis)

Risk factor	Odds ratio	P
Age: < 20 years	6.9	< 0.01
Parity < 2	2.9	0.03
Uneducated parents	0.47	< 0.001
Marital status: single	3.44	< 0.01
Antenatal visits: < 3	7.9	< 0.001
Death of a previous child	3.1	< 0.01
Malaria prophylaxis	1.7	0.05
Physical activity (grinding millet)	1.1	NS
Interval between pregnancies	1.2	NS

TABLE 3　Odds ratio adjusted after logistic regression

Risk factor	Odds ratio (95% confidence interval)	P
Primiparity or < 20 years	4.40 (1.70–7.40)	0.01
Antenatal visits: < 3	9.30 (2.04–12.6)	< 0.001
Uneducated parents	0.37 (0.32–2.60)	< 0.001
Death of a previous child	2.20 (1.80–2.60)	< 0.05

DISCUSSION

No epidemiological study has investigated the risk factors for premature delivery in a West African urban population. In our study, the sample was obtained from the 4124 births observed prospectively in all the maternity centres in the city of Bobo-Dioulasso over 5 months. The observed incidence of prematurity in this population is lower than that found in studies carried out in industrialized countries (3.6–15%).[9–11] To a certain extent, this may be due to the case definition which we used. Indeed, gestational age was based primarily on clinical examination of the newborn

rather than the date of the last menstrual period, recollection of which is often inexact. Thus, newborn babies with intrauterine growth retardation though not premature were excluded from the study. The exclusion of multiple pregnancies and obvious congenital malformations also decreased the observed prevalence. However, this exclusion enables the obvious cases of prematurity, unrelated to environmental factors, to be eliminated.

The univariate analysis identified risk factors usually found in studies carried out in industrialized countries (youth of the mother, no previous pregnancies, marital status of the mother). On the other hand, risk factors related to the intensity of work during pregnancy were not found in this population.[11,12] The determination of scores of increasing intensity according to the difficulty of the work endured did not modify this result. During the study period, pregnant women belonging to the lower social classes had to carry out intense physical work in the fields, which, apart from farm work, included carrying water, grinding millet and chopping wood. Similarly, the interpregnancy interval was not a significant risk factor in this population. In Africa this interval is invariably short, especially among young women, and even in urban populations.

Antimalarial prophylaxis was identified as a risk factor in the univariate analysis. This disappeared after adjustment since it is strongly related to the monitoring of pregnancy.

The multivariate analysis enabled all the environmental confounding factors to be eliminated. The intrinsic factors characteristic of certain populations can be distinguished. Indeed, youth and death of previous children are classically recognized.[6,9,12,13] These populations require targeted prevention programmes. In industrialized countries, education of parents has never been found as a risk factor but often as a protective factor.[9] In Burkina Faso, a higher standard of education obviously affects income and socioeconomic status. In our study, women who had been to school, or whose husbands had secondary or higher education, were at higher risk of preterm delivery. Apart from any bias related to the recruitment of our population to maternity clinics, this may be due to the more frequent use of motorized transport by women of higher socioeconomic status. One consequence of a higher income is that for various reasons (business, family) these women travel by bush taxi or bus on bumpy roads, and it takes 6–7 hours to travel between the two main towns. The same women may travel around the town on motor scooters on poor laterite roads, probably causing intrauterine vibrations. This mode of transport is a sign of wealth

and social status of the couple. It is the chosen mode of transport for the wives of middle managers. Women of lower socioeconomic status are more sedentary and always travel on foot. Further studies are required to confirm this hypothesis.

Finally, since tobacco consumption is very low among West African women, this factor was not investigated. The major risk factor identified in our study was the level of follow-up in mother-child clinics. This does not, however, seem to be related to the quality of antenatal visits which often have limited scope in terms of prevention, but rather to reflect the attitude of women towards the follow-up of their pregnancies. It is certain that regular visits to the health centres by pregnant women would reduce the frequency of premature deliveries in this population. Screening for genito-urinary infections by specialized staff using appropriate microbiological tests should be included in these preventive activities given the considerable role they play in the occurrence of prematurity.[14,15] It was not, however, possible to demonstrate their role in this study.

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