The quality of risk factor screening during antenatal consultations in Niger

A PRUAL, A TOURE, D HUGUET and Y LAURENT

A decade after the first International Conference on Safe Motherhood, maternal mortality remains very high in most West African countries, even in capital cities. The detection of high risk pregnancies, known as the risk approach, during antenatal consultations has been the basis of most maternal and child health programmes over the last decade. The effectiveness of antenatal care as a tool to prevent or predict obstetric complications is being questioned more and more. In addition to the scarcity of reliable data about the predictivity of most risk factors, the quality of the screening must be questioned. The goal of this study was to assess the frequency of risk factors among a sample of pregnant women attending antenatal care in Niger and to assess the quality of the screening of those risk factors.

Overall, 330 pregnant women were enrolled in the study. Each woman was examined twice: the first time by a midwife, the second time by one of the authors but without knowledge of the results of the first consultation. Fifty-five percent of pregnant women had at least one risk factor, 31% had more than one. Ninety-one percent of the risk factors were detected at interview. The following risk factors were not systematically searched for by midwives: height (48.5%), blood pressure (43.6%), glycosuria (40.6%), vaginal bleeding (38.2%), oedema (37.3%), parity (17%), age (16%), previous caesarean section (15.2%), previous stillbirth (15.2%) and previous miscarriages (14.8%). This study has shown that, in Niger, the quality of screening for risk factors during antenatal consultation is poor. In the urban settings where this study took place, lack of personnel, lack of equipment, lack of time and poor compliance by women cannot be made responsible for this situation. While screening of these risk factors continues as policy, the quality of screening must be dramatically improved.

Introduction

A decade after the first International Conference on Safe Motherhood (Nairobi, 1987), maternal and neonatal mortality remain very high in most West African countries. In Niamey, capital of Niger, one of the poorest countries in the world, the maternal mortality ratio was estimated, in the 1990s to be 1200 maternal deaths per 100 000 live births and in Niamey, the capital, to be 456; neonatal mortality was estimated at 24.3/1000. It is a well recognized fact that any pregnancy carries in itself a risk of complication and that some pregnancies carry more risks than others. However, many complications occur to women at zero risk and many women identified as ‘at risk’ do not experience any complication. Therefore, all women must be considered to be at risk. In spite of this, in developing countries, where resources are scarce and qualified personnel (midwives, obstetricians) are both in small numbers and concentrated in capital cities, the detection of pregnancies at increased risk and the prevention of complications through antenatal consultations has been at the centre of most maternal and child health programmes, a policy leading most often to the neglect of the development of essential obstetric care.

Most antenatal records used in West Africa are based on the risk approach, conceptualized and promoted by the World Health Organization. This is based on the assumption that complications of pregnancy are both predictable and preventable. However, the effectiveness of antenatal care and the ‘risk approach’ to predict and prevent obstetric problems has long been questioned, both in developed and developing countries. So far, the scientific debate has focused mostly on the predictive value of risk factors, and rarely on the quality of detection of those risk factors in the context of developing countries. In 1983, Lilford and Chard wrote that ‘precise and formal assessment of risk in obstetrics is doomed to failure in the immediate future’. Fifteen years later, there is still insufficient evidence about the effectiveness of antenatal care. Recently, Villar and Bergsjö wrote that ‘scope and content of antenatal care programs are ritualistic rather than evidence-based’.

To maximize the limited benefits of antenatal care, the following conditions must be met: (1) it must be equally accessible to all; (2) it must be utilized by the population most at risk; (3) appropriate risk factors, as well as diseases, must be searched for and detected by the health personnel; (4) appropriate care
must be provided to those detected to be at risk; (5) women identified as at high risk must be referred, on time, to a health facility offering essential obstetric care (instrumental delivery, caesarean section, blood transfusion, etc.); (6) referred women must comply and be able and willing to comply, and able to afford transport and hospital costs; and (7) the referral hospital must have the human and physical resources (drugs, equipment etc) necessary for treatment.

In urban areas of Niger where this study took place, it is estimated that 92% of preganant women have at least one antenatal consultation during their pregnancy. The goal of this study was to assess the frequency of risk factors among pregnant women attending antenatal care, a factor potentially affecting quality of screening, and to assess the quality of the screening of those risk factors.

Materials and methods

Background information

In Niger, four antenatal visits are recommended: at the end of the third, sixth and eighth months of pregnancy and during the ninth month. Official antenatal records, based on the risk approach, are provided free by the Ministry of Public Health to all maternal and child health (MCH) centres. The risk factors to detect and physical and biological exams to perform, according to the term, have been set. Three columns facing each risk factor permit the classification of pregnant women in either column one (no risk or normal exam), column two (treatment or reference to a higher level of the health system) or column three (delivery at high risk). Each risk factor is given the same weight (one) and a risk score permits the detection of either column one (no risk or normal exam), column two (treatment or reference to a higher level of the health system) or column three (delivery at high risk). Each risk factor is given the same weight (one) and a risk score permits the detection of women at higher risk, although no range of higher risk is offered. At the first contact with a pregnant woman, the health personnel (most often a qualified midwife in urban MCH centres) must interview the woman about her socio-demographic characteristics and past obstetric history. A physical examination is performed: the height of the woman, fundal height and blood pressure must be measured. Pregnancy hypertension is defined as a diastolic blood pressure above 90 mmHg. Oedema, vaginal bleeding and skeletal abnormalities, especially of the pelvis, must be searched for. The following biological tests must be performed: detection of proteinuria by the boiling method and of glycosuria by dipsticks. Although anaemia must be detected by measuring the haemoglobin level, it is not commonly practised due to lack of appropriate equipment and supplies. A syphilis test is theoretically mandatory but, in practice, is rarely done for the same reasons. At the end of pregnancy, the physical examination is completed by the detection of an abnormal position of the foetus and by counting foetal heart rate.

Study population

This study took place in two urban areas, Niamey (the capital city) and Zinder (the second largest city, 1200 km east of Niamey), and in one rural town of Zinder Region, Mirriah. Eight MCH centres were randomly chosen. Four of the eleven MCH centres of Niamey and three of the five MCH centres of Zinder were randomly selected for the study. Mirriah’s only MCH centre was also chosen. The quality of the screening for risk factors was assessed in each of these centres for five consecutive working days, yielding a total of 40 days of observation. The study population is a randomly selected sample of pregnant women attending an antenatal consultation in these centres.

Methodology

The goals of the study were explained to all the health personnel of each MCH centre. A separate room with the equipment necessary to an antenatal consultation was provided to one of the authors (AT). At the beginning of each day, a random number was computed to select the first woman entering the study. Thereafter, a systematic sampling of every third woman was done. After her antenatal visit with the health personnel, each selected woman was interviewed and examined again by one of the authors, in the same conditions and with the same equipment as midwives, after the goals of the study were explained to the woman and her consent to participate obtained. In case of an abdominal or pelvic scar, the woman was interviewed about the cause and type of intervention she had undergone. The same antenatal record as that used by the health personnel was then filled in, the author having no access at this stage to the record completed by the midwife. Overall, 330 pregnant women were enrolled in the study.

Statistical analysis

The frequency of risk factors is the number of risk factors detected by the reference examiner, divided by the number of studied pregnant women. The 95% confidence interval of the frequency was calculated using binomial distribution. The agreement between the midwives and the authors was calculated using the Cohen’s Kappa coefficient. Statistical significance was at 5%.

Results

The mean age (±SD) of the 330 pregnant women screened was 25.2 ±0.4 years. Ages ranged from 15 to 45 years. The great majority were married (95.4%) and were housewives (96.3%). Nearly three-quarters were illiterate (73.2%). More than half had a gestational age between 24 and 37 weeks of amenorrhea (56.4%). 21.6% were seen during the last month of pregnancy and 22.4% before 24 weeks of amenorrhea.

In our study population, the frequency of pregnancies with at least one risk factor, as detected by the official antenatal record, was high (55%); 31% of pregnancies had more than one risk factor (Figure 1). Overall, 283 risk factors were detected among 330 pregnancies at interview alone and 28 risk factors at physical and/or biological examination. Each pregnancy thus had, on average, 0.94 risk factors, some women having up to seven risk factors. Ninety-one percent of risk factors could be detected at interview alone. Of the women consulting in the study MCH centres, 51.1% were in parity groups at higher risk of complications (nulliparous and grand multiparous); only 8.3% were at high risk because of age (<16 years and >35 years), and only 7.8% had two or more previous
miscarriages (Table 1). Risk factors that can be detected at physical and/or biological examinations are much less frequent than risk factors related to socio-demographic characteristics and past obstetrical or medical history (Table 2).

Many risk factors were not systematically searched for by midwives. The pregnant women's height, blood pressure and glycosuria were not measured in respectively 48.5, 43.6 and 40.6% of pregnant women attending antenatal consultations; vaginal bleeding and oedema were not searched for in respectively 38.2% and 37.3% of women. An abnormal foetal position after the 37th week of amenorrhea was not searched for in 91.7% of women at this term. Other important risk factors were missed less often: parity (17%); age (16%); previous caesarean section (15.2%); previous stillbirth (15.2%) and previous miscarriages (14.8%). It is notable that screening for risk factors by interview is much more frequently performed than screening by examination (on average, 85% vs. 61%, p < 10^{-4}).

Tables 1 and 2 compare the frequency of detection of the risk factors by the midwives and the reference examiner. Denominators are different since many risk factors were not screened by the midwives (see above). These tables also display the proportion of cases with an agreement between the reference examiner and the midwives (Cohen’s Kappa).

![Figure 1. Proportion of pregnant women with obstetric risk factors](image)

**Table 1.** Quality of the detection of risk factors at first antenatal visit (history taking): comparison between reference examiner and midwives

<table>
<thead>
<tr>
<th>Risk factors as reported on antenatal cards</th>
<th>% detected by</th>
<th>No. of discordant cases</th>
<th>Chance corrected agreement</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reference examiner</td>
<td>midwives(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>age &lt;16 or age &gt;35 years</td>
<td>10.20%</td>
<td>8.30%</td>
<td>10</td>
<td>78.8%</td>
</tr>
<tr>
<td>grand multiparity (&gt;5)</td>
<td>29.30%</td>
<td>26.60%</td>
<td>19</td>
<td>83.0%</td>
</tr>
<tr>
<td>previous caesarean section</td>
<td>0.90%</td>
<td>1.40%</td>
<td>4</td>
<td>32.0%</td>
</tr>
<tr>
<td>stillbirth at previous delivery</td>
<td>3.00%</td>
<td>3.20%</td>
<td>11</td>
<td>33.0%</td>
</tr>
<tr>
<td>≥ 2 miscarriages</td>
<td>2.17%</td>
<td>4.27%</td>
<td>7</td>
<td>57.6%</td>
</tr>
<tr>
<td>history of cardiac disease</td>
<td>0.00%</td>
<td>0.00%</td>
<td>0</td>
<td>100.0%</td>
</tr>
<tr>
<td>history of diabetes</td>
<td>0.30%</td>
<td>0.00%</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) Denominators differ between reference examiner and midwives since risk factors were not systematically searched for by midwives.

**Table 2.** Quality of the detection of risk factors during antenatal consultation (physical, obstetrical and biological examinations): comparison between reference examiner and midwives

<table>
<thead>
<tr>
<th>Risk factors as reported on antenatal cards</th>
<th>% detected by</th>
<th>No. of discordant cases</th>
<th>Chance corrected agreement</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>reference examiner</td>
<td>midwives(^a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>size &lt;150 cm</td>
<td>1.54%</td>
<td>1.76%</td>
<td>1</td>
<td>85.40%</td>
</tr>
<tr>
<td>abnormal pelvic skeleton</td>
<td>0.30%</td>
<td>0.00%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>hypertension (diastolic BP &gt;90 mmHg)</td>
<td>1.21%</td>
<td>1.07%</td>
<td>2</td>
<td>66.20%</td>
</tr>
<tr>
<td>edema and/or proteinuria</td>
<td>1.91%</td>
<td>0.50%</td>
<td>2</td>
<td>49.60%</td>
</tr>
<tr>
<td>sugar in urine</td>
<td>0.91%</td>
<td>0.50%</td>
<td>0</td>
<td>100.00%</td>
</tr>
<tr>
<td>vaginal bleeding</td>
<td>1.23%</td>
<td>0.30%</td>
<td>2</td>
<td>66.20%</td>
</tr>
<tr>
<td>weight gain &gt;10 kg</td>
<td>0.30%</td>
<td>0.00%</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>abnormal foetal position (&gt;37 weeks)</td>
<td>8.20%</td>
<td>50.00%</td>
<td>0</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

\(^a\) Denominators differ between surveyors and midwives since risk factors were not systematically searched for by midwives.

\(^b\) Cohen’s Kappa coefficient.
coefficient). Among the women for whom the risk factor was actually screened, the proportion of women with a risk factor was significantly always lower with midwives than with the reference examiner, except for caesarean section, stillbirth, miscarriage and short stature. The proportions of women with a caesarean section and a history of miscarriage, on the other hand, were significantly higher with midwives (p < 10⁻⁴). The proportion of women at 37th week of amenorrhea with an abnormal foetal position was very high (50%) with midwives for they screened only six women, three of whom were identified with the complication. Disagreement between the reference examiner and the midwives was high for many risk factors. Vaginal bleeding was not found by midwives but was found in two pregnant women by the reference examiner (p < 10⁻⁴). Fifteen grand multipara, six women with a history of miscarriage and short stature. The proportions of women with a caesarean section and a history of miscarriage, on the other hand, were significantly higher with midwives (p < 10⁻⁴). Fifteen grand multipara, six women with a history of stillbirth, six of eleven with a miscarriage at last pregnancy, two of three with an oedema, one of two with a history of caesarean section, the only woman with diabetes mellitus, the only woman with an abnormal pelvic skeleton, and two of four hypertensive women, were not identified by the midwives.

Discussion

The detection of high risk pregnancies through antenatal consultations and during labour has been advocated as a good tool to reduce maternal mortality in developing countries. Nasah et al. claimed that the risk approach led to a 60% reduction in maternal mortality in women delivering at the Central Maternity, Yaoundé. However, implementation of the risk approach was not the only intervention, and it is likely that the other interventions implemented simultaneously (improved quality of care of high risk women, improved management of complications of pregnancy and delivery, use of partogramme and active management of the third stage of labour) contributed to a greater decline in mortality than did the risk approach. Harrison, in Zaria (Nigeria), found that ‘booked’ mothers delivering in maternity wards had fewer complications and a much smaller maternal mortality ratio than ‘unbooked’ mothers. But this requires the assumption that booking in itself is effective, regardless of other related factors. Selection bias may well operate here. Women who are ‘booked’ are more likely to seek care earlier than those who are not. The effectiveness of screening procedures, including antenatal detection of risk factors, could actually be verified only by randomized controlled trials. Two recent reviews of published studies have shown that studies with this design are dramatically lacking. The World Health Organization is currently conducting a multicentre randomized controlled trial to evaluate a new antenatal care programme ‘consisting of tests, clinical procedures and follow-up actions scientifically demonstrated to be effective in improving maternal and newborn outcomes’. Since Ebrahim wrote in 1983 that ‘the risk approach is an epidemiological and managerial tool which is intended to enable the health workers to concentrate attention on families and individuals in greatest need’, little progress has been made to define which pregnant women are really in greatest need. In our study, we have shown that 55% of pregnant women attending antenatal consultations in Niger had at least one of the risk factors of severe complications of pregnancy, delivery and post-partum and that one pregnant woman out of three had more than one risk factor. Our proportion of pregnancies at risk is comparable with that found in Papua New Guinea using the same risk factors (53%) but double that in Cameroon, as reported by Nasah et al. (27.5%). In Maputo, 55% of pregnant women were found with a risk requiring referral according to the programme’s recommendations. These recommendations were that women be either referred for birth at the Central Hospital (6%) or referred to an obstetrician (27%) or to the health centres’ doctors (22%). The implementation of the risk approach led to the classification of over 50% of pregnant women into high risk groups, as in Niger. This is not practical. In fact, in Maputo, referral rates were low: only 43% of the women in the highest risk category (referral for birth at the hospital), 32% of those who should have been referred to an obstetrician and 49% of those who should have been referred to the medical doctor were actually referred. Moreover, compliance of women was low: 43% of the women actually referred for birth at the Central Hospital did not deliver there. If this part of the programme had been very effective (all women at risk would have been referred and all would have complied), referral centres and hospitals would have overflowed. In addition to the likelihood of uselessly overloading referral centres, this selection of commonly occurring risk factors of often unproven predictive value, carries the risk of diverting the attention of health personnel away from essential parts of antenatal care (e.g. blood pressure, screening for proteinuria, etc.).

This study has shown that, in Niger, the quality of the screening for risk factors was poor. Although 91% of risk factors could have been detected at interview, as in the Papua New Guinea study, and the physical examination of pregnant women is limited to simple and easy procedures, important risk factors were not searched for by midwives, particularly when their detection required a physical or biological exam. Even when a particular risk factor was searched for, the midwives often did not detect it. In industrialized countries, the detection rate is also less than 100%. The few studies from developing countries show that, as in Niger, the proportion of risk factors that are detected is low.

Two studies from India report on the quality of antenatal care. During the first year of one study, which aimed to identify basic indicators to monitor the quality of maternal care over a period of time, history-taking was done for only 75% of pregnant women attending antenatal care but was unsatisfactory according to the study’s criteria in 33.3% of cases. A general physical examination was not performed in 40% and obstetric examination in 15% of pregnant women. These examinations, when they were performed, were satisfactory in only 16.7 and 58.8% of cases. After 3 years of training and supervision, physical and obstetric examinations were performed in 80 and 90% of pregnant women but were still unsatisfactory in respectively 37.5 and 11.2% of cases. In the other Indian study, which used a scoring system, obstetric examination reached a score of 72% of the maximum obtainable score, general physical examination 59%, measurement of weight and height 50% but blood pressure...
100%, and haemoglobin estimation and urine analysis 94%.\textsuperscript{20} A study in Burkina Faso showed that several important risk factors were not assessed by the midwives during antenatal consultation: excess or lack of weight gain, height at risk (<150 cm) and contracted pelvis.\textsuperscript{21} In addition, when a risk was detected and a subsequent action undertaken, actions were not appropriate. Information collected during antenatal consultation was not systematically used by health personnel performing deliveries. A sample of women was followed until labour to assess the quality of the detection of risk factors during labour. The antenatal card was only examined in 17% of cases. History-taking, time of onset of labour, blood pressure, assessment of dilatation and pelvic exam were not determined or performed in 30% of parturient women.

Although antenatal consultation has been practised for at least two decades with the same principles, approximately the same methods and the same goals throughout most developing countries, published data on the assessment of the quality of antenatal consultation in sub-Saharan Africa are scarce. In Niger, the poor quality of screening for risk factors cannot be attributed to the lack of equipment, the lack of qualified personnel (in urban settings) or the overloading of personnel. The checklist of the risk factors to screen for is printed on all antenatal records and is easy to use. Ninety-one percent of the risk factors can be detected by a simple interview of the pregnant women. General physical examination and obstetric examination require little and unsophisticated equipment, which was available in all the MCH centres where this study was conducted. The only real problem of equipment and supplies concerns the biological tests. Anaemia is not diagnosed by measuring haemoglobin level but by a vague examination of the colour of the conjunctiva, which is done only when the woman complains of serious fatigue. Albuminuria is not systematically checked although laboratory personnel, present in all MCH centres, are trained to detect it by the boiling method. Glycosuria is rarely checked due to lack of dipsticks. The Bordet Wasserman test to detect syphilis is done only episodically due to lack of supplies. All the studied MCH centres were staffed by qualified personnel with a sufficient number of qualified midwives.

The poor quality of maternal health services in Niger is always attributed, by health personnel, to the lack of time. In this study, we included, by systematic sampling, one pregnant woman out of three attending antenatal consultation. During the study period, 992 pregnant women were seen in the studied MCH centres, which yields an average of 25 pregnant women per working day. In each MCH centre but one (Mirriah), at least three midwives were appointed full time to antenatal consultation. We assume that one midwife can perform easily nine antenatal consultations per working day. A previous study, conducted in all MCH centres of Niamey to assess the quality of MCH services has shown that the actual working time of health personnel was very limited and that, consequently, little time was effectively dedicated to MCH activities (unpublished data).

The lack of productivity of antenatal care in respect to prediction and detection of obstetric problems has been demonstrated in industrialized countries.\textsuperscript{5} This service of flawed methodology has been exported to developing countries’ (McDonagh)\textsuperscript{8} without this approach being questioned until recently. In addition to this conceptual problem, the effectiveness of antenatal consultation in West Africa is further diminished by the lack of motivation of midwives and the difficult relationships between midwives and pregnant women.\textsuperscript{22,23} Midwives behave as if they themselves have little faith in the services they provide. Even though they are of sufficient number in Niger urban MCH centres, and have the necessary equipment, they provide poor quality services. A study has shown that, in Niger, midwives are constantly trying to balance their obligation to perform modern obstetric care and their traditional beliefs.\textsuperscript{22} As several authors have pointed out, antenatal consultation lacks more like ‘rituals’ than goal-oriented activities aimed at identifying those pregnancies at higher risk of severe foetal and maternal outcomes, and at preventing these too often fatal outcomes.\textsuperscript{9} In developing countries such as Niger, where maternal and neonatal mortality are still very high, the promotion of maternal health services of quality, based on scientific evidence rather than on rituals is urgently needed. In addition, we must arrive at a better understanding of what motivates providers at all levels to behave in certain ways. Furthermore, we should begin discussion among health care providers (especially midwives), pregnant women and health authorities to improve the relationships among them and to improve the quality of maternal care.

However, the most efficient action to decrease maternal and neonatal mortality is the implementation of essential obstetric care of quality at the primary or secondary level of the health system. Antenatal care can only play a limited role. If midwives carry out the screening correctly, too many women will be detected at risk. As screening tests have poor predictive values, most women referred to hospitals would have no complication but many women categorized as at no risk would experience complications. Thus, if all women complied, referral obstetric centres would be needlessly overloaded and would become still less efficient. In addition, the referral institutions would pay still less attention to the risk factors. Decision-makers must be aware that care of complications is more important than a very hypothetical prediction and prevention.

**References**


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