

# Prospects of safe motherhood in Botswana: midwifery training and nurses' ability to complete the Botswana obstetric record

Thabo T. Fako<sup>a,\*</sup>, Ntonghanwah Forcheh<sup>b</sup>, Ephraim Neube<sup>c</sup>

<sup>a</sup>Department of Sociology, University of Botswana, Private Bag UB0705, Gaborone, Botswana

<sup>b</sup>Department of Statistics, University of Botswana, Private Bag UB0705, Gaborone, Botswana

<sup>c</sup>Department of Nursing Education, University of Botswana, Private Bag UB0702, Gaborone, Botswana

---

## Abstract

This paper examines several key factors that determine nurses' ability to complete the Botswana Obstetric Record (BOR), an instrument that should help with early diagnosis of problems during pregnancy, labour, delivery and the puerperium. Using a national sample of 309 nurses working in hospitals, clinics and health posts under the local government authority in Botswana, the study found that a nurse's ability to complete the BOR was significantly related to midwifery training, level of basic nursing training, age group, level of income, job satisfaction, adequacy of equipment, attendance of refresher courses, overall level of in-service training, reliance on workshops and seminars, peer reliance and self-reliance for information on new nursing practices. Multivariate analyses indicated that the most competent nurse in completing the BOR was one trained as a midwife, working in an adequately equipped health facility, and who often consulted with peers as well as attended workshops and seminars. The study concludes that it is more important to train all nurses to become midwives than to upgrade enrolled nurses to become registered nurses if the plan for safe motherhood is to be advanced. Further research is needed to establish the objective competence of nurses who claim to be comfortable completing the BOR.

© 2003 Elsevier Ltd. All rights reserved.

*Keywords:* Maternal mortality; Midwife; Nurse; Obstetric record; Safe motherhood; Botswana

---

## Introduction

Of the more than half a million pregnant women who die each year from complications of pregnancy, abortion attempts, labour and childbirth (Panos Institute, 2002; Weil & Fernandez, 1999), almost all (99 per cent) are in developing countries (Boerma, 1987; McCarthy & Maine, 1992; Paul, 1993; Seipel, 1992). In many of these countries, problems of pregnancy and childbirth cause more deaths among women of childbearing age than tuberculosis, suicide, war injuries, traffic accidents, and AIDS (Weil & Fernandez, 1999). Yet, as much as 75 per cent of maternal deaths result from direct obstetric

causes such as haemorrhage, obstructed labour, infection, toxemia and unsafe abortion, that could have been prevented with timely medical treatment (Bhatia, 1993; Seipel, 1992; Thaddeus & Maine, 1994).

In 1987, a major step was taken by international development agencies to reduce maternal mortality in developing countries by launching the safe motherhood initiative (SMI), at a conference in Nairobi, Kenya. The development agencies involved included World Health Organisation, World Bank, United Nations Population Fund, United Nations Children Fund, International Planned Parenthood Federation and the Population Council (Graham, Filippi, & Ronsmans, 1996; Koblinsky, Tinker, & Daly, 1994; Thaddeus & Maine, 1994). The SMI identified a broad and multifaceted range of issues in the life and health of women, which needed to be addressed by developing countries with the hope of reducing the high maternal mortality rates by at least 50

---

\*Corresponding author. Tel.: +267-355-2678; fax: +267-585-099.

E-mail addresses: forchehn@mopipi.ub.bw (N. Forcheh), neubeen@mopipi.ub.bw (E. Neube).

per cent by the year 2000 and by 75 per cent by year 2015 (Panos Institute, 2002). The issues identified at the SMI conference included: overall gender equality; expanded female education; employment and improved socio-economic status of women; health education and community sensitisation; improving health and nutritional status of women who become pregnant; increasing access to prenatal care; improving women's access to health services during pregnancy; improving quality of medical care available to women experiencing complications during pregnancy and delivery; providing proper obstetrical care; teaching on risk signal awareness; providing safe abortion services; strengthening maternity care; increasing access to and effective use of family planning; limiting childbearing to ages 20–39; and eliminating fifth and higher-order births (Da-Silva, 1992; Graham et al., 1996; Kane et al., 1992; Khan, Rochat, Jahan, & Begum, 1986; Koblinsky et al., 1994; Mbizvo, Fawcus, Lindmark, Nystrom, & Maternal Mortality Study Group, 1993; Thaddeus & Maine, 1994; Trussell & Pebley, 1984; Ward, Maine, McCarthy, & Kamara, 1994).

The importance of monitoring and responding in good time to maternal danger signs during pregnancy, labour and delivery, and the puerperium, which has recently been highlighted, was not a priority item in the SMI agenda (Koblinsky et al., 1994; Maine & Rosenfield, 1999). In many developing countries, the methods of monitoring pregnancy and identifying risk signals in pregnant women were either not well developed or were used inconsistently (Maine & Rosenfield, 1999). Before the SMI was launched, few specific measures to reduce high maternal mortality rates in developing countries were known and proposed at national and international meetings (Maine, 1985). As a result, by the middle of the 1990s, evidence from many developing countries indicated that little progress had been made (Turmen & AbouZahr, 1994), and prospects for future results were not promising (Pradhan, Pittrof, & Johanson, 1995; Smyth, 1994).

#### *Safe motherhood and the Botswana obstetric record*

The importance of maternal and obstetric care in Botswana was highlighted when the safe motherhood task force was set up in 1990. The Task Force recognised the issue of clinical skills of health workers in obstetric care as a priority item (Republic of Botswana, 1993). As a consequence, the midwifery curriculum at the Institute of Health Sciences was reviewed and more emphasis placed on clinical skills. Practising enrolled nurse-midwives were required to be upgraded in clinical skills and provision was made available to train doctors and midwives working in maternity units to improve their skills in obstetric care. A manual for basic service standards in antenatal care and the management of

obstetric emergencies was developed in 1994 and later reviewed in 1997 (Republic of Botswana, 1997b). With as much as 72 per cent of the pregnancy-related mortality and morbidity due to preventable direct obstetric causes such as obstetric haemorrhage, sepsis, pregnancy-induced hypertension and abortion (Republic of Botswana, 1997b, 1998), monitoring of pregnancy became an important strategy of maternal care in Botswana.

Attempts at monitoring pregnancy and identifying risk signals in pregnant women date back to December 1983 with the development of the Ramotswa Antenatal Risk Card and Foetal Growth Graph at the Bamaletse Lutheran Hospital, in Ramotswa, South Eastern Botswana, under the then superintendent, Dr. Ian Kennedy. The Ramotswa Antenatal Risk Card and Foetal Growth Graph represented the first "obstetric record" in Botswana. It was helpful in monitoring and assisting with the management of childbearing women during pregnancy, labour and the puerperium (Foetal Growth Watching Group, 1983). However, it did not capture enough information required for critical antenatal and postnatal interventions, and it was not used nationally. In 1984, Dr. Kennedy teamed up with Dr. Lake (an obstetrician working for the Princess Marina Hospital, the national referral hospital in the capital city, Gaborone) and developed a more comprehensive "obstetric record", which was to be used nationally. As a result, it was officially named the Botswana Obstetric Record (BOR) and launched in 1984 (Republic of Botswana, 1984).

When the Botswana government adopted the SMI programme in 1990, its primary tool for monitoring pregnancy was the BOR. The BOR has continued to play an important role in the monitoring of maternal health during all the reviews and implementations of the various aspects of the SMI in Botswana. The BOR was reviewed in 1997 and made more comprehensive to include information on Human Immunodeficiency virus (HIV/AIDS), which further enabled nurses, midwives and doctors to identify additional life threatening conditions for pregnant women. When the Maternal Morbidity and Mortality (MM & M) monitoring system was developed in 1998 to address the causes of MM & M on a continuous basis, the BOR was identified as a key instrument to collect relevant information. In January 2000, the most up-to-date version of the BOR was ready for use in all health facilities.

The BOR is a 21-page instrument (in the form of a booklet) that records critical information about pregnancy, including a mother's history of antenatal care, labour and delivery, the puerperium, postnatal care and family planning. It is designed to also capture the history of medications used by the mother and infant. When completed properly, the BOR should provide valuable information that should enable nurses, midwives and

doctors to make early diagnosis of problems during pregnancy, labour, delivery and the puerperium that might threaten the lives of both mother and baby. The information obtained through the BOR can further be used for completing questionnaires for the MM & M monitoring system (Republic of Botswana, 1997b).

The job of completing the BOR falls squarely on nurses, who form the core of reliable permanent staff for reproductive health services, particularly maternity care in the Botswana Primary Health Care system. A significant component of the BOR involves the nurse using relevant equipment to determine the appropriate information to fill in. Examples of this include equipment for testing blood pressure, laboratory facilities for testing urine samples, manuals and facilities for performing a caesarean section, as well as a supply of relevant drugs for obstetric complications. Since most of the information recorded on the BOR is obtained using a range of equipment, the availability of adequate equipment as well as the nurse's ability to use such equipment should enhance her confidence in completing the BOR.

Even in the best and well-staffed hospitals, the medical doctors are usually required only during emergencies and may be routinely present only at labour and delivery time. At all other times, it is the nurses or midwives who monitor pregnancies and identify complications for effective intervention. Adequate recording and interpretation of critical obstetric information is necessary for timely response to emergencies, which may include referral to other health workers and medical specialists.

Non-midwife nurses constitute two-thirds of the nursing force in Botswana. This makes them the most accessible health care workers, especially for the mothers who routinely visit relatively isolated health facilities that include an estimated 314 health posts and 689 mobile stops nation-wide (United Nations Development Programme, 1998:37). In these health facilities, every nurse—including non-midwives is expected to do everything including maternal care, childcare, family planning, health education and the work of pharmacy technicians (Akinsola & Ncube, 2000). As a result, non-midwife nurses play a vital role in the monitoring and identification of maternal danger signs by completing the BOR and by assisting pregnant women who experience pregnancy-related complications in relative isolation.

It is important to determine and document how competent various categories of nurses such as enrolled nurses, registered nurses (RNs), midwives and non-midwives feel about collecting diagnostic information through the use of the innovative BOR. It is also important to document the extent to which nurses who have no formal midwifery training are involved in completing the BOR, and to establish the extent to

which they feel competent in doing so. This study, therefore, explores factors that may help explain the differences between those nurses that feel competent in completing the BOR and those that do not.

#### *Conceptual framework*

Unlike the situation in North America where obstetricians play a significant role, African countries have by and large adopted the historically British practice whereby the midwife is responsible for looking after pregnant women and handling all normal deliveries. The role of the African midwife in maternal health has been expanded to include the provision of primary health care services, the training of other midwives, supervision of other health workers, conducting of in-service training, providing health education to women, families and communities, and providing team leadership in safe motherhood, family planning, and on knowledge about sexually transmitted diseases including the HIV (Nasah, Mati, & Kasonde, 1994). However, the International Confederation of Midwives, the World Health Organisation and the United Nations Children's Fund have noted that there are not enough midwives to support primary levels and provide life-saving skills pertinent to achieving the goals of reducing maternal mortality by 50 per cent in the near future (Nasah et al. (1994)), or by 75 per cent by the year 2015 (Panos Institute, 2002). As a result, maternal mortality continues to be a significant problem in the African continent.

Prompt intervention by trained midwives is a key factor in the treatment of obstetric complications, the reduction of maternal mortality rates, and in the success of the SMI. Raleigh (2000) has noted that prompt access to emergency obstetric care helped reduce maternal mortality rates in England from 441 per 100,000 women in the mid-1930s to 40 by 1960. In South Africa, differential access to obstetric care accounts for the large difference in maternal mortality between black women (150–250 per 100,000) and white women (3–8 per 100,000) (Raleigh, 2000). Evidence suggests that while the vast majority of obstetric complications can neither be predicted nor prevented, they can be successfully treated (Maine & Rosenfield, 1999) by trained midwives. Trained midwives have the competence to intervene by first recognising maternal danger signs that warrant referral, and by using relevant equipment to serve as emergency surgeons able to perform caesarean sections (Sachs, Beard, Papiernik, & Russell, 1995) without help from obstetricians.

A midwife is trained to give the necessary care and advice to women during pregnancy, labour and the postnatal period, to conduct normal deliveries on her own responsibility, and to care for the newly born infant. A well-trained midwife is able to recognise imminent danger through correctly interpreting the



warning signs of abnormal or potentially abnormal conditions, which necessitate emergency measures (Loudon, 1992; Towler & Bramall, 1986; World Health Organisation, 1966). It has been noted that with appropriate midwifery training, midwives in Britain have greatly contributed to the reduction of the maternal mortality rate and continue to play a central role in providing maternity services (Loudon, 1992). Significant reductions in maternal mortality ratios (from 800 per 100,000 live births in 1751 to 227 per 100,000 in 1990) due to the introduction of formally trained and licensed midwives (as well as the introduction of aseptic techniques in the late 1800s) have been noted (Sachs et al., 1995).

The importance of midwifery training has been highlighted by previous studies of nurses in Botswana. Fako and Linn (1994a) found that nurses with midwifery training provided their clients with a complete set of prenatal assessments and were involved in supervising both health facility and home deliveries. Those without midwifery training were minimally involved in performing blood and urine tests, and hardly ever involved in providing important prenatal services such as vaginal, pelvic, and foetal examinations. Nurses without midwifery training were predominantly involved in the checking of vital signs (blood pressure, heart beat and lungs) and somewhat involved in physical examinations such as weight, nutrition, hygiene and varicosity. Fako and Linn (1994b) found that nurses without midwifery training ranked “the lack of midwifery training to fit IUDs” second on the list of barriers to service delivery, while midwives ranked it seventh. Many non-midwives reported that without midwifery training, they could not attend to women who wanted IUDs or perform complete gynaecological examinations on clients seeking contraceptive methods or devices.

Fako and Forchheh (2000) found that midwifery training was the single most important factor that enhances the extent of nurse’s involvement in antenatal health education. Midwifery training has also been found to be the most important factor determining productivity among nurses in Botswana (Fako, Forchheh, & Balogi, 2002). Midwifery training, adequate equipment, subsequent professional experience and in-service training should equip a nurse with knowledge to recognise obstetric complications and relevant skills to apply obstetrics first aid when needed (Fako & Linn, 1994a; Fako et al., 2002). Midwifery knowledge and skills should enable nurses to approach clinical, antenatal and postnatal care with more confidence.

It is hypothesised that nurses with midwifery training should feel more comfortable completing the BOR than nurses without midwifery training. It is also hypothesised that nurses who work with adequate equipment at their workplace should be more comfortable completing the BOR than those who work with inadequate equipment. A

nurse who is experienced in using the necessary equipment should develop competence to complete the BOR, and make appropriate obstetric interventions. The more resources nurses have for routinely dealing with obstetric emergencies, the more knowledge they should eventually gain to complete the BOR and be effective in circumstances requiring obstetric interventions. Similarly, nurses with high levels of training and opportunities for subsequent in-service training should be more comfortable completing the BOR.

## Methods

The data for this study are a sub-sample from a larger national survey of 325 nurses in Botswana. The target population for the national survey comprised all nurses working in local government health institutions, which include primary hospitals, clinics with and without maternity facilities, and health posts. Nurses who did not fall under the local government health authority, such as those working in referral hospitals, private hospitals and clinics, schools of nursing and the University of Botswana, were not included in the study.

The questionnaires were distributed to nurses in all health institutions operating under the Ministry of Local Government. The number of nurses from each unit depended on the size of the unit. Self-completed questionnaires were collected with the assistance of regional health officers, who also assisted in follow-ups when there were delays in returning the questionnaires. For purposes of this study, only nurses who completed the BOR as part of their routine duties were included. Respondents who did not complete the section of the questionnaire dealing with the BOR were excluded. The resulting sample size for this study was 282.

### *Measurement of ability to complete the BOR*

A nurse’s ability to complete the BOR was measured by asking nurses to indicate how comfortable they were with completing the BOR. Respondents were given four choices from “very comfortable”, “just comfortable”, “not comfortable” and “extremely uncomfortable”. For the first stage of analyses, the categories were collapsed into three as follows: (1) very comfortable; (2) just comfortable; and (3) not comfortable. Most other qualitative variables were also recoded by grouping categories judiciously to ensure that the methods employed for analyses were appropriate and conceptually meaningful.

### *Data analyses methods*

Data analysis was conducted in two parts. The first part comprised of bivariate analyses to investigate the

individual effects of background variables, professional training, sources of support, and work context and work-related satisfaction on nurses' ability to complete the BOR. This was done in order to establish the nature, strength and direction of associations between ability to complete the BOR and each independent variable. The bivariate analyses were followed by multivariable analyses in which only the variables found to have a significant relationship with ability to complete the BOR were included. The multivariable analyses were done to determine if the effects of variables that had a significant relationship with the dependent variable were independent, whether there was any interaction between any of the variables, and to determine which of the variables remained significant after adjusting for other variables.

Statistical analyses of the data investigated the relationship between a nurse's perceived ability to complete the BOR and each of the variables under the following categories: training, in-service training, background variables, work-related satisfaction, work context and resources, and support and recognition. Contingency table analysis and chi-squared tests of association and independence were used to investigate the nature and strength of relationships between ability to complete the BOR and categorised variables. Analysis of variance was used to assess the relationship between ability to complete the BOR and quantitative variables. The variables that were found to be significant in the bivariate analyses were included in multivariate models in order to investigate their combined effects on nurses' ability to complete the BOR. The multivariate analyses consisted of a series of stepwise logistic regression models, intended to identify the most parsimonious models indicating the primacy of each factor on nurses' ability to complete the BOR.

Due to data limitations, ordinal logistic regression that would have been the ideal method for analysing an ordinal dependent variable, such as "ability to complete the BOR", was abandoned in favour of the simpler logistic regression. To this end, ability to complete the BOR was recategorised into a dichotomous variable, involving (1) very comfortable and (2) not very comfortable. The new category, "not very comfortable", was derived by combining into one the original three categories: "just comfortable", "not comfortable" and "extremely uncomfortable" completing the BOR. Since missing values pose a challenge when trying to compare sub-models in a multivariate analysis, nurses who did not respond to one or more of the items were excluded from subsequent analyses, leaving 243 nurses responded to all the items used in the multivariate analysis. A third (80) of these respondents had reported that they felt "very comfortable" completing the BOR.

The use of logistic regression enabled us not only to determine predictive models for nurses who are likely to feel "very comfortable" completing the BOR versus

those who are not, but also to estimate odds ratios for each of the independent variables in the model. These odds ratios indicate how much more likely a nurse with a certain characteristic (say one trained as a midwife) is likely to be "very comfortable" completing the BOR than a similar nurse without such midwifery training. It also enabled us to adjust for the impact of one or more factors while studying other factors.

## Results

### *Description of the sample*

The nurses in the sample were all females aged between 20 and 66 yr and deployed across 15 health regions nation-wide. These nurses included 70 RN-midwives, 15 RNs, 37 enrolled nurse-midwives, and 160 enrolled nurses. There were 197 nurses with Junior Certificate (obtained after 3 years of secondary school), and 83 with higher academic qualifications, mainly a secondary school leaving certificate. The most common type of health facility in which nurses were based was a clinic without maternity ward (46.8 per cent). The rest of the nurses were based in clinics with maternity wards (29.8 per cent), health posts (20.2 per cent) and primary hospitals (2.8 per cent). Most of them (72.3 per cent) were deployed in regions other than their district of birth.

Most nurses (60.6 per cent) were single and had never married, 19.9 per cent had no children, 32.6 per cent had one child, 26.2 per cent had two children and 20.9 per cent of nurses had three or more children. As many as one quarter of the nurses (25.2 per cent) were in the high-income category, 46.1 per cent were in the medium income category, and 27.7 per cent in the low-income category. Many nurses (42.6 per cent) were members of Christian churches introduced by missionaries (such as Roman Catholic, Methodist and Lutheran), 25.5 per cent were members of independent African churches, and the rest belonged to other religions (including Muslim and indigenous religions). Many of the nurses (57.9 per cent) were members of a non-governmental organisation in their community of deployment. The majority (78 per cent) of the nurses felt "comfortable" completing the BOR. One-third (33 per cent) of the nurses felt "very comfortable", 15.6 per cent felt "not comfortable", and 6.4 per cent felt "extremely uncomfortable" completing the BOR.

### *Results of bivariate analyses*

The first research objective was to identify background variables that were significantly associated with nurses' ability to complete the BOR. As evident from Table 1, there was a strong relationship between age

Table 1  
Association between ability to complete the Botswana obstetric record and independent variables

Variable	$\chi^2$ statistic	Df	Significance
<b>Training</b>			
<i>Midwifery training</i>	34.270	4	<b>0.000</b>
<i>Level of basic nursing training</i>	17.876	4	<b>0.001</b>
Level of basic academic education	3.764	2	0.152
<b>In-service training</b>			
<i>Attendance at refresher courses</i>	15.541	6	<b>0.016</b>
Attendance at workshops/seminars	11.415	6	0.076
<i>Overall level of in-service training</i>	27.269	6	<b>0.000</b>
<b>Background variables</b>			
Age group	<b>21.842</b>	<b>8</b>	<b>0.005</b>
<i>Level of income</i>	<b>12.212</b>	<b>4</b>	<b>0.016</b>
<i>Registration with nursing council</i>	9.983	2	<b>0.007</b>
Type of health facility	6.475	6	0.372
Deployment in district of birth	3.245	2	0.197
Number of children	5.250	6	0.512
Marital status	0.927	2	0.629
Religious affiliation	7.179	4	0.127
Registration with nurses association	2.161	2	0.339
<b>Work-related satisfaction</b>			
<i>Satisfaction with current position</i>	12.069	4	<b>0.017</b>
Satisfaction with salary	4.791	4	0.309
Satisfaction with workstation	3.124	4	0.537
<b>Work context and resources</b>			
<i>Adequacy of equipment</i>	16.296	4	<b>0.003</b>
Involvement with the community	0.216	2	0.898
Consistency of work with training	0.640	2	0.726
Conflict between admin and nursing duties	3.979	4	0.409
Adequacy of telecommunications	3.199	4	0.525
Adequacy of transport facilities	5.359	4	0.252
Frequency of staff shortages	1.807	4	0.771
Workload	0.450	2	0.798
<b>Support and recognition</b>			
<i>Reliance on workshops/seminars</i>	31.689	6	<i>0.000</i>
<i>Reliance on peers</i>	14.813	4	<b>0.005</b>
<i>Reliance on independent reading</i>	15.838	4	<b>0.003</b>
Reliance on supervisors	7.933	4	0.094
Recognition from supervisors	0.686	4	0.953

group and ability to complete the BOR. Most nurses in the age group 30–34 yr were very comfortable completing the BOR, while the majority of nurses younger than 30 yr or older than 34 yr were not very comfortable. There was also a strong relationship between registration with the Botswana Nursing Council and ability to complete the BOR, and a strong relationship between level of income and ability to complete the BOR. Other background variables did not show a significant relationship with ability to complete the BOR.

The second objective was to investigate whether there were any aspects of nursing training that were associated with ability to complete the BOR. Table 1 shows that midwifery training, level of basic nursing training, attendance of refresher courses and the overall level of in-service training were all significantly related to nurses' ability to complete the BOR. RNs with a higher level of basic nursing training were generally more comfortable completing the BOR than Enrolled Nurse (ENs) with a lower level of basic nursing training. The difference in



the level of basic academic qualifications between RNs and ENs did not result in a significant difference in nurses' ability to complete the BOR.

Nurse-midwives were more comfortable completing the BOR than nurses without midwifery training. As shown in Fig. 1, almost half (49.5 per cent) of the midwives felt "very comfortable" completing the BOR, compared with only 22.9 per cent of non-midwives. At the other extreme, almost one-third (30.3 per cent) of non-midwives were "not comfortable" completing the BOR, compared with just 8.4 per cent of midwives.

The overall level of in-service training as indicated in Table 1 by attendance of a combination of refresher courses, workshops and seminars during the previous year was significantly related to nurses' ability to complete the BOR, as was attendance at refresher courses. However, attendance at workshops and seminars was only moderately related to ability to complete the BOR. Fig. 2 shows the relationship between ability to complete the BOR and level of in-service training.

The third objective was to find out whether there was any significant relationship between nurses' reliance on different sources of professional support for information regarding new nursing practices and ability to complete the BOR. As shown in Table 1 significant relationships

were found between nurses' ability to complete the BOR and: reliance on independent reading for information about new nursing practices; reliance on peers and reliance on workshops and seminars. There was a moderate-to-weak relationship between the extent to which nurses relied on their supervisors for information regarding new nursing practices and their ability to complete the BOR.

The fourth objective was to investigate whether there were any aspects of the work context that had a significant relationship with nurses' ability to complete the BOR. Analyses show that among the variables investigated, there was a significant relationship only between adequacy of equipment at a health facility and ability to complete the BOR. Other work context variables such as workload, frequency of staff shortages, adequacy of transport facilities, and so on, did not have a significant relationship with the ability to complete the BOR.

The fifth objective was to find out whether indicators of work-related satisfaction such as satisfaction with the current position, satisfaction with salary and satisfaction with the workstation, had significant relationships with nurses' ability to complete the BOR. Table 1 shows that only satisfaction with current position was found to be significantly associated.

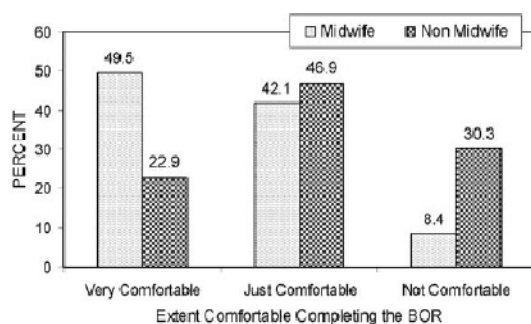


Fig. 1. Extent to which nurses are comfortable completing the BOR.

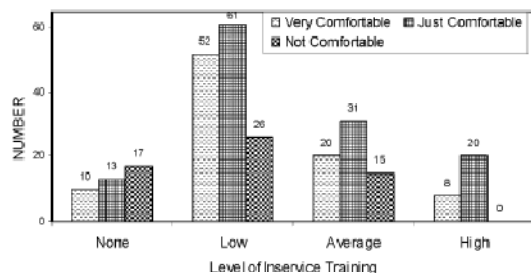


Fig. 2. Nurses' ability to complete the Botswana obstetrics record by level of in-service training.

#### Multivariate analysis

Before proceeding with multivariate analyses, bivariate analyses of the relationship between each of the 12 items/variables found to have a significant relationship with ability to complete the BOR in the first stage analysis were repeated using only the 243 nurses who responded to all 12 items. The results show that with a reduced sample size, some of the variables that had previously shown a statistically significant association at  $p \leq 0.050$  with ability to complete the BOR now reflected only a marginal association or no statistically significant association. Variables that were marginally associated with ability to complete the BOR included level of income ( $p = 0.096$ ), reliance on independent reading ( $p = 0.062$ ) and satisfaction with current position ( $p = 0.055$ ). Variables that were no longer significantly associated with ability to complete the BOR included registration with the Botswana Nursing Council ( $p = 0.851$ ), attendance at refresher courses ( $p = 0.148$ ), and overall level of in-service training ( $p = 0.713$ ).

The variables that continued to have a significant relationship ( $\alpha = 0.050$ ) with ability to complete the BOR and, therefore, requiring further examination using the logistic regression technique, were midwifery training ( $p < 0.001$ ), reliance on workshops and seminars ( $p < 0.001$ ), adequacy of equipment ( $p = 0.010$ ), age

group ( $p = 0.011$ ), reliance on peers ( $p = 0.029$ ) and level of basic nursing training ( $p = 0.047$ ).

Different logistic regression models and sub-models consisting of between one and four factors were fitted. A summary of the results of the logistic regression models is contained in Tables 2–4. For each factor in these tables, the reference category is shown with an odds ratio equal to 1. In Table 2, Model 1(a), 1(b) and 1(c), the reference category was “very comfortable” completing the BOR, while in Tables 3 and 4, Models 2, 3 and 4, the reference category was “not very comfortable” completing the BOR. The results are discussed under each model.

In the first model, the factors age group (model 1a); level of basic nursing training (model 1b); and midwifery training (model 1c), were analysed separately (Table 2). The odds ratios show how much more likely a nurse in a given category was “not very comfortable” completing the BOR compared to a nurse in the reference category (aged 30–34 yr). Model 1(a) shows that there was a significant difference between nurses under the age of 30 and nurses in the reference category. A nurse under 30 yr of age was almost three times more likely to feel “not very comfortable” completing the BOR than a nurse aged 30–34 yr. Although a nurse aged 35 yr or more was over twice as likely to feel “not very comfortable” completing the BOR compared with a nurse in the reference category, there was only a marginal difference between the two groups.

Model 1b shows that the odds of an enrolled nurse feeling “not very comfortable” completing the BOR were almost twice (odds = 1.81) those of an RN feeling “not very comfortable” completing the BOR. Model 1c shows that the odds of a nurse without midwifery

Table 2  
Univariate logistic regression analysis results

	Odds	Sign	95% CI for odds ratio	
			Lower	Upper
<i>Model 1a: Age group</i>				
Age group		0.009		
Under 30 yr	2.975	0.002	1.481	5.975
30–34 yr	1.000	—		
Over 34 yr	2.261	0.053	0.989	5.170
<i>Model 1b: Level of basic nursing training</i>				
Registered nurse	1.000			
Enrolled nurse	1.805	0.029	1.063	3.063
<i>Model 1c: Midwifery training</i>				
Midwife	1.000			
Non midwife	3.321	0.000	1.974	5.559

Dependent variable—Ability to complete the BOR.  
Reference category—“Very comfortable” completing the BOR.

Table 3  
Bivariate logistic regression analysis results

	Odds	Sign	95% CI for odds ratio	
			Lower	Upper
<i>Model 2a: Midwifery training and level of basic nursing training</i>				
Midwifery training				
Non-midwife	1.000			
Midwife	3.628	0.000	1.781	7.393
Level of basic nursing training				
Enrolled nurse	1.000			
Registered nurse	0.798	0.553	0.378	1.684
<i>Model 2b: Midwifery training and equipment</i>				
Midwifery training				
Non-midwife	1.000			
Midwife	3.423	0.000	1.921	6.098
Adequacy of equipment				
Inadequate	1.000			
Adequate	2.749	0.005	1.350	5.597
<i>Model 2c: Midwifery training and age group</i>				
Midwifery training				
Non-midwife	1.000			
Midwife	3.470	0.000	1.816	6.630
Age group				
Age group		0.040		
Under 30	0.492	0.077	0.224	1.081
30–34	1.000			
Over 34	0.303	0.012	0.120	0.770

Dependent variable—Ability to complete the BOR.  
Reference category—“Not very comfortable” completing the BOR.

training feeling “not very comfortable” completing the BOR were over three times (odds = 3.31) those of a nurse with midwifery training feeling “not very comfortable” completing the BOR.

The next level of analysis was intended to investigate whether, after controlling for midwifery training, each of the factors age group, level of basic nursing training; and adequacy of equipment, were still significant determinants of ability to complete the BOR. The results (Table 3) show that age group and adequate equipment remained important determinants of ability to complete the BOR, given midwifery training status of a nurse. However, the level of basic nursing training (i.e., being an enrolled nurse versus an RN) was no longer an important determinant given midwifery training status of a nurse.

Among both midwives and non-midwives, nurses aged 30–34 were significantly more comfortable than older nurses, but were not significantly more comfortable than younger nurses. Further investigations



Table 4  
Multiple logistic regression analysis results

	Odds	Sign	95% CI for odds ratio	
			Lower	Upper
<i>Model 3a: Midwifery training, adequacy of equipment and age</i>				
Midwifery training				
Non-midwife	1.000			
Midwife	3.723	0.000	1.917	7.231
Age group				
Age group		0.045		
Under 30 yr	1.000			
30–34 yr	2.064	0.079	0.921	4.626
Over 34 yr	0.623	0.253	0.277	1.402
Adequacy of equipment				
Equipment inadequate	1.000			
Equipment adequate	2.757	0.006	1.336	5.686
<i>Model 3b: Midwifery training, adequacy of equipment, age and peer reliance</i>				
Midwifery training				
Non-midwife	1.000			
Midwife	3.980	0.000	2.174	7.285859
Adequacy of equipment				
Equipment inadequate	1.000			
Equipment adequate	2.756	0.006	1.334	5.695421
Peer reliance				
Do not rely on peers	1.000			
Rely on peers	2.494	0.006	1.297	4.798156
<i>Model 4: Midwifery training, adequacy of equipment, peer reliance and reliance on workshops and seminars</i>				
Midwifery training				
Non-midwife	1.000			
Midwife	3.757	0.000	2.015	7.003
Adequacy of equipment				
Equipment inadequate	1.000			
Equipment adequate	2.237	0.036	1.053	4.752
Peer reliance				
Do not rely on peers	1.000			
Rely on peers	2.664			
Reliance on workshops/seminars				
Do not rely on workshops	1.000			
Rely on workshops	3.433	0.000	1.807	6.524

Dependent variable—Ability to complete the BOR.

Reference category—“Not very comfortable” completing the BOR.

indicated that there was no interaction between midwifery training and age group of a nurse. Hence the effects of midwifery training and age group were additive. Similarly, the impact of midwifery training was not enough to compensate for the effect of inadequate equipment on a nurse's ability to complete the BOR. In fact, there was no interaction between

midwifery training and adequacy of equipment. The odds of a nurse who worked in a facility with adequate equipment feeling that she was very comfortable completing the BOR were almost three times (2.75) that of a nurse who worked in a facility without adequate equipment after adjusting for midwifery training.

Further analyses (Model 3a) showed that adequacy of equipment remained significant after adjusting for midwifery training and age group, and that age group also remained significant after adjusting for midwifery training and adequacy of equipment. None of the pairwise interactions was found to be significant.

The impact of peer reliance on ability to complete the BOR remained very strong, even after adjusting for midwifery training, age group and adequacy of equipment. Irrespective of midwifery training, age group and adequacy of equipment, a nurse who frequently consulted her peers remained over two times (odds = 2.45) more likely to feel comfortable completing the BOR than a nurse who did not often consult her peers. After adjusting for midwifery training, adequacy of equipment and reliance on peers, age group became only marginally related to a nurse's ability to complete the BOR. Hence, age group was dropped from higher-level analyses.

The final analysis (Model 4) investigated the importance of workshops and seminars for a nurse's ability to complete the BOR after adjusting for midwifery training, adequacy of equipment and peer reliance. The results indicated that reliance on workshops and seminars remained an important contributor to a nurse's ability to complete the BOR. A nurse who often relied on workshops and seminars for information about new nursing practices was over three times (odds = 3.43) more likely to feel comfortable completing the BOR than a nurse who had the same midwifery status, who relied to the same extent on peers, and who worked in a facility with a similar standard of equipment, but who did not often attend workshops and seminars.

The multivariate analyses have identified midwifery training, adequacy of equipment, peer reliance and attendance of workshops and seminars as the critical determinants of a nurse's ability to complete the BOR. Age group and level of training are also important predictors in the absence of any three of these four factors.

#### Discussion and conclusions

This study has contributed to the discourse on safe motherhood by confirming the importance of trained midwives in the identification of risk signals in pregnant women, the subsequent treatment of obstetric complications and the reduction of maternal mortality rates. The study should extend the body of literature that has underscored the importance of effective monitoring and responding in good time to maternal danger signs during pregnancy, labour and delivery, and the puerperium (Koblinsky et al., 1994; Raleigh, 2000; Maine & Rosenfield, 1999). The findings support the argument that, while the vast majority of obstetric complications

cannot be predicted nor prevented, they can be successfully treated by trained midwives (Maine & Rosenfield, 1999).

Trained midwives have the competence to intervene by first recognising maternal danger signs that require prompt action, including the use of relevant equipment to perform caesarean sections without help from obstetricians (Sachs et al., 1995), and to refer patients for specialised medical attention in good time. Although monitoring and responding in good time to maternal danger signs was not a priority item in the SMI agenda (Koblinsky, Tinker, & Daly, 1994; Maine & Rosenfield, 1999), it is a critical factor in promoting safe motherhood. Effective monitoring and prompt obstetric care, normally provided by midwives, is an effective way of reducing maternal mortality rates (Raleigh, 2000).

The study has found that, although a significant proportion of nurses in Botswana felt "comfortable" completing the BOR, only one-third felt "very comfortable" completing the BOR. The multivariate analyses have revealed that the most competent nurse in completing the BOR is one trained as a midwife, working in an adequately equipped health facility, and who often consults with peers as well as attending workshops and seminars. The knowledge gained in midwifery training should increase the ability of a nurse to effectively interpret information on the BOR. It should impart knowledge of obstetric complications and skills in obstetrics first aid. Subsequent professional experience and in-service training should increase both competence and confidence in maternal health care. It is, therefore, not surprising that nurses with midwifery training should feel more comfortable than nurses without midwifery training in completing the BOR.

The study has shown that attending workshops and seminars was associated with feeling "comfortable" completing the BOR among nurses and midwives. It is worth noting that some workshops and seminars involve imparting safe motherhood skills, which should make nurses more effective in maternal health and in completing the BOR. Attending a variety of workshops should enhance a professional's knowledge, skills and attitudes. On the other hand, basic academic qualifications did not have a significant impact on ability to complete the BOR. This can be understood in the light of the fact that obtaining higher academic qualifications does not necessarily add to a nurse's knowledge of obstetrics and midwifery.

The findings of this study suggest that it is better to upgrade all (enrolled and registered) nurses without midwifery training to become nurse-midwives, than to upgrade all enrolled nurses to the level of RN without midwifery training. This is especially important for those nurses working in remote facilities at the peripheral level of the health care system, as well as nurses routinely involved in completing the BOR. Making midwifery

training compulsory would go a long way towards creating the capacity for effective maternal care and the treatment of complications that arise during pregnancy, childbirth and the puerperium.

It appears that the best strategy towards achieving the ideals of the SMI is to assume that all pregnant women are at risk for serious complications and to focus efforts on improving the quality of access to, and utilisation of, emergency obstetric care services by making trained midwives available and accessible. In the absence of a midwife working in an adequately equipped health facility, consulting her peers often and attending workshops and seminars frequently, the level of basic nursing training would be the next best significant determinant of ability to complete the BOR, with RNs feeling more comfortable than enrolled nurses.

Effective maternal care in Botswana could have advanced more rapidly if an attempt in the 1980s to improve the national midwifery capacity, by requiring that RNs should proceed to midwifery training (Republic of Botswana, 1997a), had been followed through. The benefits of midwifery training should outweigh the cost of making it compulsory. As long as two-thirds of the nurses in Botswana, including the majority of those that work in health posts located in remote rural areas, have no midwifery training, the plan for safe motherhood will be compromised. Non-midwife nurses will continue to take charge of situations that strictly speaking require the competence, skills and experience of a midwife, with incalculable but predictable consequences and implications for the maternal mortality rate in Botswana.

Finally, since ability to complete the BOR was based on self-assessment by nurses rather than an independent professional assessment, further research needs to be conducted to investigate just how competent the nurses really are in completing the BOR.

While efficient completion of the BOR remains the basis for identifying complications during pregnancy and birth for the foreseeable future, Letamo and Majelantle (2001) have noted that most Botswana Obstetric Records are not usually adequately completed.

## References

- Akinsola, H. Y., & Neube, E. (2000). Rural health care provision in Botswana: The context of nursing practice and the expanded role of the nurse. *Africa Journal of Nursing and Midwifery*, 2(1), 49–55.
- Bhatia, J. C. (1993). Levels and causes of maternal mortality in Southern India. *Studies in Family Planning*, 24(5), 310–318.
- Boerma, J. T. (1987). Levels of maternal mortality in developing countries. *Studies in Family Planning*, 18(4), 213–221.
- Da-Silva, K. S. (1992). Maternal mortality: Evaluation of the situation in Rio de Janeiro from 1977 to 1987. *Cadernos de Saude Publica*, 8(4), 442–453.
- Fako, T. T., & Forchheh, N. (2000a). Involvement in antenatal health education among nurses in Botswana, Mosenodi. *Journal of the Botswana Educational Research Association*, 8(1), 27–39.
- Fako, T. T., Forchheh, N., & Balogi, K. T. O. (2002b). Productivity among nurses and midwives in Botswana. *African Sociological Review*, 6(1), 2002.
- Fako, T. T., & Linn, J. G. (1994). Changes in the nursing curriculum in Botswana, Pala. *Botswana Journal of African Studies*, 8(1), 70–89.
- Fako, T. T., & Linn, J. G. (1994). Family planning, midwifery training and nursing practices in Botswana, Mosenodi. *Journal of the Botswana Educational Research Association*, 2(2), 43–57.
- Foetal Growth Watching Group. (1983). *The Ramotswa antenatal risk card and fetal growth graph: Instructions and background notes*. Gaborone: Government Printer.
- Graham, W. J., Filippi, V. G. A., & Ronsmans, C. (1996). Demonstrating programme impact on maternal mortality. *Health Policy and Planning*, 11(1), 16–20.
- Kane, T. T., El-Kady, A. A., Saleh, S., Hage, M., Stanback, J., & Potter, L. (1992). Maternal mortality in Giza, Egypt: Magnitude, causes, and prevention. *Studies in Family Planning*, 23(1), 45–57.
- Khan, A. R., Rochat, R. W., Jahan, F. A., & Begum, S. F. (1986). Induced abortion in a rural area of Bangladesh. *Studies in Family Planning*, 17(2), 95–99.
- Koblinsky, M., Tinker, A. G., & Daly, P. M. (1994). Programming for safe motherhood: A guide to action. *Health-Policy and Planning*, 9(3), 252–266.
- Letamo, G., & Majelantle, R. G. (2001). Health implications of early childbearing on pregnancy outcome in Botswana: Insights from the institutional records. *Social Science & Medicine*, 52(2001), 45–52.
- Loudon, I. (1992). *Death in childbirth: An international study of maternal care and maternal mortality 1800–1950*. Oxford: Clarendon Press.
- Maine, D. (1985). Mothers in peril: The heavy toll of needless deaths. *People*, 12(2), 6–8.
- Maine, D., & Rosenfield, A. (1999). The safe motherhood initiative: Why has it stalled? *American Journal of Public Health*, 89(4), 480–482.
- Mbizvo, M. T., Fawcus, S., Lindmark, G., Nystrom, L., Maternal Mortality Study Group. (1993). Operational factors of maternal mortality in Zimbabwe. *Health Policy and Planning* 8(4), 369–378
- McCarthy, J., & Maine, D. (1992). A framework for analyzing the determinants of maternal mortality. *Studies in Family Planning*, 23(1), 23–33.
- Nasah, B. T., Mati, J. K. G., & Kasonde, J. M. (1994). *Contemporary issues in maternal health care in Africa*. Luxembourg: Harwood Academic Publishers.
- Panos Institute. (2002). Safe motherhood initiative goals not achieved. *Nation's health*, 32(2), 13, 1/3.
- Paul, B. K. (1993). Maternal mortality in Africa: 1980–1987. *Social Science & Medicine*, 37(6), 745–752.
- Pradhan, S., Pittrof, R., & Johanson, R. (1995). Safe motherhood a reality? *Sexual and Marital Therapy*, 10(2), 121–133.
- Raleigh, V. S. (2000). Safe Motherhood Initiatives. *British Medical Journal*, 321(7264), 839–839.



- Republic of Botswana. (1984). *Botswana obstetric record*. Gaborone: Government Printer.
- Republic of Botswana. (1993). *Botswana safe motherhood programme: The curriculum for update training in clinical skills and management of obstetric emergencies for medical officers and midwives*. Gaborone: Government Printer.
- Republic of Botswana. (1997a). *National health manpower plan for Botswana National Development Plan 8, 1997–2002*. Gaborone: Government Printer.
- Republic of Botswana. (1997b). *The safe motherhood initiative (SMI: A manual on basic standards in antenatal care and the management of obstetric emergencies*. Gaborone: Government Printer.
- Republic of Botswana. (1998). *The safe motherhood initiative: The maternal morbidity and mortality monitoring system in Botswana*. Gaborone: Government Printer.
- Sachs, B. P., Beard, R., Papiernik, E., & Russell, C. (1995). *Reproductive health care for women and babies*. New York: Oxford University Press.
- Seipel, M. M. O. (1992). Promoting maternal health in developing countries. *Health and Social Work*, 17(2), 200–206.
- Smyth, I. (1994). Safe motherhood, family planning and maternal mortality: An Indonesian case study. *Focus on Gender*, 2(2), 19–28.
- Thaddeus, S., & Maine, D. (1994). Too far to walk: Maternal mortality in context. *Social Science & Medicine*, 38(8), 1091–1110.
- Towler, J., & Bramall, J. (1986). *Midwives in history and society*. London: Croom Helm.
- Trussell, J., & Pebley, A. R. (1984). The potential impact of changes in fertility on infant, child, and maternal mortality. *Studies in Family Planning*, 15(6), 267–280.
- Turmen, T., & AbouZahr, C. (1994). Safe motherhood. *International Journal of Gynecology and Obstetric*, 46, 145–1153.
- United Nations Development Programme. (1998). *Botswana human development report 1997: Challenges for sustainable human development—A longer term perspective*. Gaborone: T.A. Publications.
- Ward, V. M., Maine, D., McCarthy, J., & Kamara, A. (1994). A strategy for the evaluation of activities to reduce maternal mortality in developing countries. *Evaluation—Review*, 18(4), 438–457.
- Weil, O., & Fernandez, H. (1999). Is safe motherhood an orphan initiative? *Lancet*, 354(9182), 940–943.
- World Health Organisation. (1966). *The Midwife in Maternity Care*. Technical report series no. 331. Geneva: WHO.