



# Better Neonatal Health Outcomes: Management of Materno-Foetal Risk Factors in Peripheral Health Centres In Burundi

Pontien Ndabashinze<sup>1,2</sup>, Desire Habonimana<sup>1,2\*</sup>, Denis Niyomwungere<sup>1</sup>, Nadine Misago<sup>3</sup>, Emile Nkurunziza<sup>4</sup>, Leonard Bivahagumye<sup>1,2</sup>, Eugene Ndirahisha<sup>1,2</sup>, Gaspard Banyankimbona<sup>5</sup>

<sup>1</sup>Department of Community Medicine, Research and Innovation Unit, Medical Teaching Hospital of Kamenge, Burundi

<sup>2</sup>Faculty of Medicine, University of Burundi, Burundi

<sup>3</sup>Health Healing Network Burundi, Burundi

<sup>4</sup>Department of Public Health, National Institute of Public Health, Burundi

<sup>5</sup>Ministry of National Education and Scientific Research, Republic of Burundi

**\*Corresponding author:** Desire Habonimana, Department of Community Medicine, Research and Innovation Unit, Medical Teaching Hospital of Kamenge. Boulevard Mwezi Gisabo, Bujumbura, Burundi

Desire Habonimana ORCID: [0000-0003-0832-5558](https://orcid.org/0000-0003-0832-5558)

Denis Niyomwungere ORCID: [0000-0002-1814-3339](https://orcid.org/0000-0002-1814-3339)

Received: 📅 November 06, 2020

Published: 📅 November 30, 2020

## Abstract

### Background

In Burundi, maternal health care is mainly provided by midwives especially in peripheral health centres. However, midwives may not have needed knowledge and management capacity to offer care needed for women presenting maternal risks. This study assessed and modelled determinants of the knowledge and management of materno-foetal risk factors among midwives offering maternal health care in peripheral health centres in Burundi.

### Subjects and Method

A cross-sectional survey was conducted on 90 midwives from 32 peripheral health centres offering maternal health care using a multistage random sampling. Dichotomous outcomes were built, and logistic models fitted on sociodemographic determinants. Significance of coefficients were detected using confidence intervals.

### Results

Of 90 midwives, 57 (63%) and 63 (70%) had deficient knowledge level and management capacity of materno-foetal risk factors; respectively. Younger midwives, those who studied in technical public schools, and those who had received professional trainings were more likely to have good knowledge. The effect of experience was inconclusive. Midwives whose work experience amounted up to 5 years were better off while those with higher experience accused having deficient knowledge. A good knowledge of materno-foetal risk factors predicted better management capacity up to seven times more (OR=7.21 [2.23-23.40]). Contrarily, male gender, long commute distance and the age above 45 years negatively predicted better management capacity.

### Conclusion

In peripheral health centres offering maternal health care, newly recruited midwives and those who completed university education need further capacity building training to enhance both their knowledge level and management capacity related to materno-foetal risk factors.

**Keywords:** Midwives; Peripheral Health Centres; Materno-Foetal Risk Factors; Knowledge Level; Management Capacity

## Background

Majority of Burundian pregnant women consult peripheral health centres where the staff is mainly paramedical (midwives). Often, pregnant women present materno-foetal risk factors requiring special management (Poon, Mbonye, Bustan, Sheldon, et al. [1-4]). Therefore, knowledge of materno-foetal risk factors by midwives offering maternal care services (antenatal, childbirth, and postnatal care) is essential for risk management. In developing countries, commonly cited materno-foetal risk factors include chronic diseases such as diabetes, hypertension (HTA) and acquired immunodeficiency syndrome (AIDS); maternal and foetal history of pregnancy complications; as well as maternal factors such as extreme age (age<19 or age>35) and abnormal weight (BMI<19.5 kg/m<sup>2</sup> or BMI>25 kg/m<sup>2</sup>) (Artal-Mittelmark, 2019). As per the World Health Organization (WHO) guidelines, most of these factors require specialised medical monitoring before and after childbirth (Organization, 2017, Carolan, 2009, Mamba, 2000). Therefore, midwives should be able to assess and grade maternal and foetal risk factors with an aim to transfer all women presenting one or more risk factor(s) requiring higher-level management. This study sought to shed more light on the level of knowledge and management of materno-foetal risk factors among midwives offering maternal health care in peripheral health centres in Burundi.

## Subjects and Method

### Study Design

We conducted a cross-sectional survey in 32 peripheral health centres in four health provinces namely Bururi, Cibitoke, Kayanza, and Rutana. The study was conducted on a period of two months, from April to May 2020.

### Population and Sample

The study targeted midwives offering maternal health care in selected peripheral health centres. Selection of health centres was done using multistage sampling. In the first instance, four health provinces were randomly selected from a total of 18 health provinces. In each province, two health districts were randomly selected (n=8). In each district, four health centres offering maternal health care were randomly selected (n=32). The study was carried out on 90 midwives offering maternal health care.

We employed the following formulae to calculate the sample size:

$$n \geq \left(\frac{z}{m}\right)^2 p(1-p); \text{ where}$$

n = sample size

z = critical z score for  $\alpha = 0.05$

m = error rate (0.1)

p = prevalence of materno-foetal risk factors (p = 0.2)

### Study Variables

We constructed two dependent variables; the knowledge level of materno-foetal risk factors and their management skills. The first outcome -level of knowledge of materno-foetal risk factors -was constructed based on a score from 26 knowledge questions; each question having a specific score scale. The overall score was reported as a percentage. The second outcome was the management capacity. It was constructed based on an overall score from 24 management questions. An average score was reported as a percentage. Independent variables included sociodemographic factors such as age, gender, civil status, education, professional experience, type of school attended, the number of professional trainings, and the commute distance.

### Operational Definition of Variables

We constructed binary outcome variables coded "good" if a midwife achieved 50% or above, and "deficient", otherwise. Details are presented in Table 1. Continuous independent variables such as age, number of professional trainings, number of years of professional experience, and the commute distance were categorized.

**Table 1:** Operational definition of outcome variables.

Outcome variable	operation definition
Level of knowledge of materno-foetal risk factors	If a midwife scored <50% = "deficient" knowledge level. Else, "good" knowledge level
Management capacity of materno-foetal risk factors	If a midwife scored <50% = "deficient" management capacity. Else, "good" management capacity

### Study Instruments

All variables were obtained using a pre-established and tested questionnaire.

### Data Analysis

#### Materno-foetal risk factors knowledge level

In the first instance, knowledge level was dichotomized, taking value 0 if midwife i scored less than 50%; and value 1, otherwise. Factors that determine the knowledge level were assessed using a logistic model. The model specification is as follows:

$$\log \left[ \frac{pi1}{pi0} \right] = \beta_0 + \beta x_{ij} + \epsilon_{ij}$$

The dependent variable is the log odds that a midwife i scores j relative to alternative, where 0= deficient knowledge; and 1= good knowledge. Determinants are represented by a standard vector of covariates x.  $\beta_0$  captures fixed effects and  $\beta_1$  detect random effects on the probabilities of knowledge score.

### Materno-foetal risk factors management capacity

In the second time, the management capacity was also dichotomised, taking value 0 if midwife i scored less than 50%; and value 1, otherwise. Factors that determine the management capacity were assessed using a logistic model as follows:

$$\log \log \left[ \frac{p_{1i}}{p_{0i}} \right] = \beta_0 + \beta_1 X_{ij} + \epsilon_{ij}^1$$

The dependent variable is the log odds that a midwife *j* scores *j* relative to alternative 0, where 0= deficient management capacity; and 1 = good management capacity. Determinants are represented by a standard vector of covariates *x*.  $\beta_0$  captures fixed effects and  $\beta_1$  detect random effects on the probabilities of management capacity score. In addition to standard covariates, the logistic model on the management capacity of materno-foetal risks included the level of knowledge as a predictor. To ascertain significance of coefficients in logistic models, we used confidence intervals – which the literature claims to be more reliable (Bewick et al. [5], Chakraborty et al. [6]).

### Research Ethics

This study obtained a certificate of ethics issued by the Ethical Research Committee of the Faculty of Medicine, University of Burundi (Ethics Certificate no 03/04/2020). Informed consent were signed by each participant. The data collected were anonymous and confidential and exclusively used for purposes of the study.

### Results

#### Sociodemographic Determinants

Sociodemographic characteristics of surveyed midwives are summarized in Table 2. 60% of midwives were middle-aged, female, and without professional training despite them having been working for more than 5 years. 86% of midwives were married and more than three thirds lived within five kilometers walk. There was no difference between the proportion of midwives who attended public versus private schools irrespective of the degree obtained. With respect to outcomes, 63% of midwives had a deficient knowledge level of materno-foetal risk factors and 70% had a deficient management capacity.

**Table 2:** Sociodemographic determinants.

Determinant	n	Frequency
<b>Age</b>		
Less than 30 years old	17	18.89
Between 30 and 45 years old	59	65.56
Older than 45 years	14	15.56
<b>Gender</b>		

Male	35	38.89
Female	55	61.11
<b>Level of education</b>		
Technical diploma	49	54.44
University diploma	41	45.56
<b>School</b>		
Public	46	51.11
Private	44	48.89
<b>Professional training</b>		
None	60	66.67
1 and more	30	33.33
<b>Civil status</b>		
Single	13	14.44
Married	77	85.56
<b>Distance</b>		
Less than 5 km walk	62	68.89
More than 5 km walk	28	31.11
<b>Experience [number of years]</b>		
Less than 1 year	13	14.44
Between 1 and 5 years	26	28.89
More than 5 years	51	56.67
<b>Outcome 1. Knowledge level</b>		
Deficient	57	63.33
Good	33	36.37
<b>Outcome 2. Management capacity</b>		
Deficient	63	70.00
Good	27	30.00

### Logistic models

#### Materno-foetal risk factors knowledge level

Table 3 summarizes results on the likelihood of a midwife achieving a good knowledge score with reference to midwives who scored deficient knowledge. In comparison with younger midwives, the likelihood that a midwife scores good in materno-foetal risk factors was more than five times for those aged above 30 years and again reached nine times more for midwives beyond the age of 45 years. Being a male midwife who studied in a technical public school was associated with a more likelihood of achieving a good knowledge score (1<OR<2). Other determinants that influenced a better knowledge score included having received one or more professional training, being married, living more than five kilometers (km) away from the health centres and having between one and five years of experience. On the other hand, having worked for more than 5 years was found to be associated with the likelihood of achieving a deficient score. Unfortunately, coefficients are not significant.

**Table 3:** Results of the logistic model on the knowledge level.

Base outcome: Midwives with deficient knowledge level			
Explanatory variables	Sample (90)		
	Coefficient	OR	95% CI
<b>Age (reference: &lt; 30 years)</b>			
30-45 years	0.30	5.58	0.72-43.22
Older than 45 years	0.42	8.81	0.85-91.35
<b>Gender (reference: female)</b>			
Male	0.12	1.86	0.60-5.77
<b>Education (reference: university diploma)</b>			
Technical diploma	0.01	1.09	0.34-3.52
<b>School attended (reference: private)</b>			
Public	0.12	1.83	0.63-5.36
<b>Professional training (reference: none)</b>			
1 or more	0.12	1.67	0.58-4.81
<b>Civil status (reference: single)</b>			
Married	0.28	4.86	0.70-33.76
<b>Distance (reference: &lt; 5 km)</b>			
More than 5 km	0.03	1.18	0.42-3.31
<b>Experience (reference: &lt; 1 year)</b>			
1-5 years	0.04	1.30	0.19-8.86
More than 5 years	-0.08	0.75	0.07-6.51

**Materno-foetal risk factors management capacity**

The model shows that midwives who had good knowledge of materno-foetal risk factors were more than seven times more likely to provide adequate maternal care when a woman presents with one or more risks (OR=7.21 [2.23-23.40]). Despite other coefficients being nonsignificant, the likelihood that a midwife provides better materno-foetal risk management was lower for midwives older than 45 years, for married or male midwives, as well as those who commute 5 km long to reach the workstation. Conversely, chances that a midwife performs better increased with the number of years of experience; reaching five times more for those who worked for more than 5 years. Also, in comparison with private school and university certificate, midwives from public and technical schools were more likely to offer better management of risk factors Table 4.

**Table 4:** Results of the logistic model on the management capacity.

Base outcome: Midwives with deficient knowledge level			
Explanatory variables	Sample (90)		
	Coefficient	OR	95% CI
<b>Age (reference: &lt; 30 years)</b>			
30-45 years	0.00	1.07	0.11-10.56
Older than 45 years	-0.13	0.03	0.85-6.93
<b>Gender (reference: female)</b>			

Male	0.02	0.98	0.25-3.82
<b>Education (reference: university diploma)</b>			
Technical diploma	0.05	1.36	0.33-5.66
<b>School attended (reference: private)</b>			
Public	0.19	2.95	0.87-10.00
<b>Professional training (reference: none)</b>			
1 or more	-0.17	0.34	0.09-1.30
<b>Civil status (reference: single)</b>			
Married	-0.04	0.71	0.21-2.36
<b>Distance (reference: &lt; 5 km)</b>			
More than 5 km	-0.19	0.26	0.02-3.35
<b>Experience (reference: &lt; 1 year)</b>			
1-5 years	0.05	3.22	0.21-53.57
More than 5 years	0.13	5.39	0.27-105.79
<b>Knowledge level (reference: deficient)</b>			
Good	0.35	7.21	2.23-23.34

**Discussion**

This study, which targeted midwives offering maternal health care in peripheral health centres in Burundi, aimed to determine the level of knowledge of materno-foetal risk factors and further assess their management capacity. Results do not depart away from the existing literature. In the first instance, the likelihood that midwives have a better knowledge level related to materno-foetal risk factors was highly determined by older ages and married status. Also, male gender, technical degree, public school, professional trainings and the higher experience positively determined the better risk knowledge level. These trends have also been found in Ghana (Adams and Ray [7]), in Nigeria (Ashimi et al. [8]), and in other low- and middle-income countries. For instance, in a recent study which assessed determinants of the knowledge of materno-foetal risk factors among auxiliary midwives in Myanmar, older age and professional trainings were associated with more than twice higher knowledge level (Than et al. [9]). Tchounga et al. [10] in Côte d'Ivoire found similar results. In their study, better knowledge level of cervical cancer management of midwives was determined by exposure to professional trainings and the technical education (midwifery school) (Tchounga et al. [10]). However, our findings contradicted those in Tanzania where higher knowledge level was associated with younger ages (Urasa and Darj [11]). In our context, the decreased knowledge level among recent graduants could be ascertained to the decreasing quality of education which can be explained by the growing number of private and low-quality schools augmented by the lack of permant teachers (Obura, [12]).

With respect to materno-foetal risk management capacity, we found an interesting positive contribution of the knowledge level. In fact, midwives who have a good knowledge of risk factors are more than seven times more likely to provide adequate care to mothers presenting either risks. Other management enablers, though not

significant, included higher work experience, professional trainings, and training in public schools. In the study to determine factors that affect midwives' performance in pain management in Ghana, inadequate professional trainings as well as being from a deficient education background predicted poor performance (Aziato and Adejumo [13]). Most importantly, in the same country, another author established a strong correlation between the increased number of years of experience and the higher likelihood of providing better maternal and child health services (Jonas et al. [14]). Midwives better performance was also cited in many other studies including in Nigeria (Opiah et al. [15]), in Surakarta and Karanganyar, Central Java (Wahidah et al. [16]), and in Omdurman State, Sudan (Andugry et al. [17]). In our study, the likelihood of better midwives' performance predicted by the knowledge level of risk factors (OR=7.21 [2.23-23.34]) is higher than most of evidence in the literature. This trend could be associated with local context. In our study, majority of midwives who scored higher knowledge level of materno-foetal risk factors were mostly from ancient technical education. Ideally, they constitute an excellent pool of human resources in terms of health care provision [18-21].

We acknowledge the strengths and limitations of this study. The study used a statistically significant sample and employed multisampling techniques to minimise biases. This implies that results can be generalised countrywide. A major weakness comes from the study design. Despite cross-sectional designs generating evidence on associations to guide policy, they do not allow causality inference. Also, the study relied on self-reported data which can be fraught with Hawthorne effect. The contribution of this study is its great policy implication. Results inform decision-makers and other stakeholders on the need to strengthen the knowledge level and management capacity of materno-foetal risk factors among most of peripheral midwives. In conclusion, in peripheral health centres offering maternal health care, newly recruited midwives and those who completed university education need further capacity building training to enhance both their knowledge level and management capacity related to materno-foetal risk factors.

### Financial Support and Sponsorship

This work was supported by the Medical Teaching Hospital of Kamenge.

### Acknowledgement

We acknowledge all Health Province Officers and District Health Officers who have facilitated the conduct of this work.

### Conflict of Interest

There are no conflicts of interest

### References

1. Poon L, Kametas N, Chelemen T, Leal A, Nicolaidis K (2010) Maternal risk factors for hypertensive disorders in pregnancy: a multivariate approach. *Journal of human hypertension* 24: 104-110.

2. Mbonye AK (2001) Risk factors associated with maternal deaths in health units in Uganda. *African Journal of Reproductive Health* 5: 47-53.
3. Bustan Mn, Salmah U, Syafar M (2019) Analysis of Risk Factors Maternal Mortality in Sinjai District. *Indian Journal of Public Health Research & Development* 10: 1503-1507.
4. Sheldon W, Blum J, Vogel J, Souza J, Gülmezoglu A, et al. (2014) Postpartum haemorrhage management, risks, and maternal outcomes: findings from the World Health Organization Multicountry Survey on Maternal and Newborn Health. *BJOG: An International Journal of Obstetrics & Gynaecology*, 121: 5-13.
5. Bewick V, Cheek L, Ball J (2005) Statistics review 14: Logistic regression. *Critical care* 9: pp.112.
6. Chakraborty N, Islam MA, Chowdhury RI, Bari W, Akhter HH (2003) Determinants of the use of maternal health services in rural Bangladesh. *Health promotion international* 18: 327-337.
7. Adams YJ, Ray He (2019) Knowledge of postpartum care and post birth warning signs among midwives in Ghana. *Birth*.
8. Ashimi Ao, Amole Tg, Abdullahi Hm, Jibril Ma, Iliyasu Z (2017) Determinants of Pre-service Knowledge and Use of Emergency Contraception by Female Nursing and Midwifery Students in Northern Nigeria. *Journal of Basic and Clinical Reproductive Sciences* p.6.
9. Than KK, Morgan A, Pham MD, Beeson JG, Luchters S (2017) Determinants of knowledge of critical danger signs, safe childbirth and immediate newborn care practices among auxiliary midwives: a cross sectional survey in Myanmar. *BMJ open* 7(6): e017180.
10. Tchounga BK, Jaquet A, Coffie PA, Horo A, Sauvaget C, et al. (2014) Cervical cancer prevention in reproductive health services: knowledge, attitudes and practices of midwives in Côte d'Ivoire, West Africa. *BMC health services research* 14: pp.165.
11. Urasa M, Darj E (2011) Knowledge of cervical cancer and screening practices of midwives at a regional hospital in Tanzania. *African health sciences* 11: 48-57.
12. Obura A (2008) Staying power: Struggling to reconstruct education in Burundi since 1993. *International Institute for Educational Planning*.
13. Aziato L, Adejumo O (2014) Determinants of midwives' knowledge gap on pain management in Ghana. *Midwife education in practice*, 14, 195-199.
14. Jonas K, Reddy P, Van Den Borne B, Sewpaul R, Nyembezi A, et al. (2016) Predictors of midwives' and midwives' intentions to provide maternal and child healthcare services to adolescents in South Africa. *BMC health services research* 16: pp.658.
15. Opiah MM, Ofi AB, Essien EJ, Monjok E (2012) Knowledge and utilization of the partograph among midwives in the Niger Delta Region of Nigeria. *African journal of reproductive health* 16: 125-132.
16. Wahidah N, Sulaeman ES, Budihastuti URS (2018) Determinants of midwife performance in lactation management in Surakarta and Karanganyar, Central Java. *Journal of Health Policy and Management* 3: 26-33.
17. Andugry N, Abdalla Aaa, Elnasry Sma (2017) Determinants of Midwifery Practice in the Active Management of Third Stage of Labor in Omdurman State, Sudan. *Int J Heal Sci Res* 7: 224-228.
18. Artal Mittel mark R (2019) Risk Factors for Complications During Pregnancy. *Saint Louis University School of Medicine*.
19. Carolan MC (2009) Towards understanding the concept of risk for pregnant women: some nursing and midwifery implications. *Journal of Clinical Nursing* 18: 652-658.
20. Mamba PP (2000) Midwife-midwives knowledge & basis for decision-making on maternal reproductive high-risk factors in pregnancy. *Africa Journal of Nursing and midwifery* 2: 58-62.
21. Organization WH (2017) Managing complications in pregnancy and childbirth: a guide for midwives and doctors, World Health Organization.



This work is licensed under Creative Commons Attribution 4.0 License

To Submit Your Article Click Here: [Submit Article](#)

DOI: [10.32474/PAPN.2020.03.000153](https://doi.org/10.32474/PAPN.2020.03.000153)



### Progressing Aspects in Pediatrics and Neonatology

#### Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles