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Rate of and factors associated with indications for cesarean deliveries: Results of a national review in Burkina Faso

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ABSTRACT

Objective: To determine the prevalence of cesarean deliveries in Burkina Faso, analyze the indications for them and the outcomes, and identify factors associated with non-absolute maternal indications for the procedure, as opposed to major obstetric interventions performed to save a woman's life. *Methods:* In a cross-sectional study, we selected and analyzed cesarean deliveries among those most recently performed between May 2009 and April 2010 in all facilities in Burkina Faso. To identify the factors associated with non-absolute maternal indications, we used generalized estimating equations to take into account the clustering of data at the hospital level. *Results:* The proportion of births by cesarean delivery was 1.5%, with regional variations ranging from 0.8% to 4.5%. They were performed mainly for absolute maternal indications (54.8%). Cesarean deliveries for non-absolute maternal indications were statistically more frequent in private hospitals (OR 2.2; 95% CI, 1.2–4.0), among women in urban areas (OR 1.6; 95% CI, 1.0–2.4), during scheduled cesareans, and in the absence of use of the partogram. *Conclusion:* This study confirms the small proportion of cesarean deliveries in Burkina, the disparity between urban and rural areas, and the relative preponderance of absolute maternal indications for cesarean delivery.

1. Introduction

In 2013, 62% of the 289 000 maternal deaths that occurred in the world took place in Sub-Saharan Africa [1], where less than half of all deliveries are assisted and the proportion of deliveries performed by cesarean is 4% [2]. The globally accepted cesarean rate at a population level is less than 10%, and a medically justified cesarean is considered as a strategy to prevent maternal and perinatal mortality and morbidity [3].

This small proportion of cesarean deliveries may explain why very few studies have focused on the indications for cesareans in Sub-Saharan Africa [4–10]. However, these studies are important to us for several reasons. First, such studies would explain if the low proportion of cesareans negatively affects the women who need this intervention to save their lives or those of their babies. Moreover, they would explain whether a cesarean delivery is associated with increased maternal and neonatal morbidity and mortality in subsequent pregnancies [3,11–13]. In Sub-Saharan Africa, where the health systems are weak and the index of fertility is high, no medically justified cesarean delivery should be avoided to reduce the risk of mortality and morbidity for future pregnancies. In Burkina, three previous audits of cesarean delivery [10,14–15] found that between 12% and 23.6% of cesareans were not medically justified. The first study included only women with a low risk of cesarean delivery in 10 hospitals, while the last two had limited themselves to cesareans in a teaching hospital.

The present study was conducted as part of the assessment of need for emergency obstetric and neonatal care (EmONC) organized in 2010 in Burkina Faso. Our main objectives were: (1) to determine the proportion of cesarean deliveries among deliveries during the 12 months preceding a survey at the national level and by health regions; (2) to analyze the indications for cesarean delivery and the outcomes of mothers and newborns; and (3) to determine the factors associated with non-absolute maternal indications for cesarean delivery. Absolute maternal indications are for major obstetric interventions performed to save a woman's life [16].

2. Materials and methods

2.1. Study setting

Burkina Faso is a country characterized by high maternal mortality, with 341 deaths per 100 000 live births, a rate of skilled birth attendance of 67%, and a cesarean delivery rate of 2% in 2010 [17]. Cesarean deliveries

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are performed in district hospitals, nine regional hospitals (CHR), and three of the four teaching hospitals (CHU) in the country. Private health centers, located mainly in the two biggest cities (Ouagadougou and Bobo-Dioulasso), also offer this service. Cesareans are performed by gynecologist-obstetricians (mainly in regional, teaching, and private hospitals) and by general practitioners trained in essential surgery or by nurses specialized in surgery in the district hospitals.

2.2. Study design

This was a cross-sectional study that covered the period from May 1, 2009, to April 30, 2010. We used the methodology and tools proposed by Adverting Maternal Death and Disability (AMDD) to evaluate needs in EmONC [18]. These tools were adapted during a workshop by a national team of researchers who were assisted by maternal healthcare professionals from the Ministry of Health, professional orders (i.e. gynecologists, pediatricians, pharmacists, and midwives), some agencies of the United Nations (UNICEF, UNFPA, WHO), and AMDD. The tools were then tested in several health centers in Ouagadougou.

2.3. Population and sampling

The study population was composed of women who were delivered by cesarean in any health center in Burkina between May 1, 2009, and April 30, 2010. Ten cases of cesarean delivery were selected from every regional, district, and private hospital. To analyze by level of structure of care, 30 cases were selected from each teaching hospital. We first selected the most recent cesarean deliveries performed by any healthcare provider that practiced in the health center during the period of study. Then, if the number of cases to be selected was not reached, we began the process again by starting with the providers who performed the most recent cesareans. For a health center, if the number of performed cesareans was lower than the required number, then all of the cases were examined. By doing so, we ensured the examination of at least one cesarean from every provider that performed this service in the country during the previous 12 months.

2.4. Data source and collection

The data were collected from June 7, 2010, to August 30, 2010, by 149 interviewers organized into teams of three people and spread throughout all 13 health regions of Burkina. The interviewers were medical doctors, doctoral candidates in medicine, nurses, and midwives who had been trained during the seven-day workshop by the research team supported by AMDD and agencies of the United Nations. Before data collection, the exhaustive list of health centers, available at the Ministry of Health, was updated with contributions from regional health departments, health districts, and officials of the association of private health centers. For every selected case of cesarean delivery, a questionnaire was filled in using the medical record, the partogram, the register of the operating room, and the register of delivery. The monthly number of deliveries (i.e. spontaneous vaginal delivery, assisted by a vacuum or a pair of forceps, craniotomies, cesareans, and laparotomies for uterine break) performed in all the health centers of Burkina Faso were also collected for the same period.

To ensure data quality, one or two local supervisors (depending on the size of the area) for an affected health region read back each day the completed questionnaires and had them corrected. Then, in every region, two supervisors, one from maternal health services (i.e. a gynecologist-obstetrician or midwife) and the other from child health services (i.e. a pediatrician or health assistant in pediatrics), facilitated the exhaustive access to all the documents and also ensured the supervision of data collection.

Two coordinators in the field ensured that there was a permanent liaison between the team of interviewers and the research team. Finally, a national supervisory team of 18 people, consisting of the research team and trainers (from the Ministry of Health and United Nations agencies), also conducted 10 supervision days during the data collection.

The study was approved by the Ethics Committee of the Ministry of Health of Burkina Faso. The collection forms were anonymous and did not disclose the identity of the women in labor or the healthcare providers.

2.5. Definition of variables

Variables in the study included:

- Sociodemographic characteristics of the pregnant woman: age, parity, and place of residence (urban vs rural).
- The details and outcome of the delivery: mode of admission (referred vs not referred), the classification of the cesarean (scheduled vs emergency), the qualification of the surgeon (obstetrician, general practitioner, or nurse specialized in surgery), use of a partogram (yes, no, and not indicated), the indications for cesarean delivery, the fetal heart rhythm (continuous), the vital status of the newborn and of the mother, and the cause of death in case of maternal death.
- The health region and the type of health center (district, regional, teaching, or private hospital).

All of the indications found in the medical records of the pregnant women were identified in the questionnaire. They were then recoded based on the classification proposed by Stanton et al. [16] for low-resource countries. This classification distinguishes two groups: absolute maternal indications (i.e. obstructed labor, major antepartum hemorrhage, malpresentation, and uterine rupture) and non-absolute maternal indications (i.e. failure to progress, maternal medical diseases, fetal compromise, breech presentation, and other indications). However, it does not prioritize non-absolute indications and does not specify decision rules when multiple non-absolute indications occur. In cases where several non-absolute indications arose for the same woman, we followed Anderson et al. [19] and assigned a single main indication. Thus, we encoded "previous cesarean" for pregnant women with a previous cesarean in addition to other non-absolute indications. In a case with breech presentation, dystocia, and fetal distress, the indication was encoded "breech presentation" because it was considered to be responsible for the dystocia that was itself the cause of fetal distress. Cases with binomial dystocia and fetal distress were designed "dystocia," and we kept "fetal distress" only if it was the only indication. Indications such as preventive cesarean, without additional precision were grouped under the term "others," which included multiple gestation and post-term. Cases of cesarean without indications specified were excluded from the analysis of indications and associated factors.

A dependent binary variable for cesarean indications, such that the value 0 was assigned for absolute maternal indications and 1 otherwise, was then created. Age was grouped in three categories: younger than 20 years, 20–34 years, and 35 years or older. These categories of age were created because we consider those aged 20–34 years to have the best maternal outcomes, while those aged 35 years and older are considered at higher risk for several maternal health indicators [20]. Pregnant women were also categorized according to whether they were multiparous or nulliparous.

2.6. Data entry and analysis

The data were entered in CSPro 4.1 (US Census Bureau) by a team of 10 agents trained by the institute responsible for the conduct of the evaluation. The analysis was performed with SPSS version 22 (IBM, Armonk, NY, USA). Proportions were used to describe the characteristics of the sample. The proportion of births by cesarean was calculated by dividing the total number of cesareans performed during the period of study by the number of expected live births. This proportion was calculated at the national level and by health region. The number of expected live births was equal to the number of women of reproductive