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# Incidence of abortion-related near-miss complications in Zambia: cross-sectional study in Central, Copperbelt and Lusaka Provinces☆,☆☆

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## Abstract

**Objectives:** To describe the magnitude and severity of abortion-related complications in health facilities and calculate the incidence of abortion-related near-miss complications at the population level in three provinces in Zambia, a country where abortion is legal but stigmatized.

**Study design:** We conducted a cross-sectional study in 35 district, provincial and tertiary hospitals over 5 months. All women hospitalized for abortion-related complications were eligible for inclusion. Cases of abortion-related near-miss, moderate and low morbidity were identified using adapted World Health Organization (WHO) near-miss and the prospective morbidity methodology criteria. Incidence was calculated by annualizing the number of near-misses and dividing by the population of women of reproductive age. We calculated the abortion-related near-miss rate, abortion-related near-miss ratio and the hospital mortality index.

**Results:** Participating hospitals recorded 26,723 births during the study. Of admissions for post-abortion care, 2406 (42%) were eligible for inclusion. Near-misses constituted 16% of admitted complications and there were 14 abortion-related maternal deaths. The hospital mortality index was 3%; the abortion-related near-miss rate for the three provinces was 72 per 100,000 women, and the near-miss ratio was 450 per 100,000 live births.

**Conclusions:** Abortion-related near-miss and mortality are challenges for the Zambian health system. Adapted to reflect health systems capabilities, the WHO near-miss criteria can be applied to routine hospital records to obtain useful data in low-income settings. Reducing avoidable maternal mortality and morbidity due to abortion requires efforts to de-stigmatize access to abortion provision, and expanded access to modern contraception.

**Implications:** The abortion-related near-miss rate is high in Zambia compared with other restrictive contexts. Our results suggest that near-miss is a promising indicator of unsafe abortion; can be measured using routine hospital data, conveniently defined using the WHO criteria; and can be incorporated into the frequently utilized prospective morbidity methodology.



*Keywords:* Abortion-related near-miss; Abortion-related mortality; WHO near-miss criteria; Prospective morbidity methodology; Termination of pregnancy; Induced abortion

## 1. Introduction

Unsafe abortion is a leading and easily preventable cause of maternal mortality and morbidity [1,2]. Globally, the highest regional estimate of abortion-related mortality (90 per 100,000 live births) comes from sub-Saharan Africa, where most abortion laws are restrictive, abortion may bear greater societal stigma, poverty is common, and comprehensive abortion care services are limited [1]. Unsafe abortion remains a contentious, poorly measured and largely neglected health problem in this region.

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Obtaining accurate population-representative data on unsafe abortions is more challenging in such high-burden contexts [3,4]. Women having terminations of pregnancy (TOPs) are unlikely to report them in surveys and providers are unlikely to maintain accurate reports.

Hospital records on post-abortion care (PAC) admissions are the most frequently used source of data [5], but have limitations. Although national mortality may be high, numbers of deaths are often small at individual hospitals. All admissions for abortion-related morbidity in hospitals may not be representative of morbidity in the community [6,7], and it is difficult to distinguish miscarriages (spontaneous abortions) from induced abortions (TOPs) when morbidity is of low severity, as a means of identifying unsafe TOPs [8].

The idea of near-miss morbidity aims to address some of these measurement challenges. The World Health Organization (WHO) operational definitions of maternal near-miss [9] define a level of morbidity so severe that, in women with abortion-related complications, it is most likely the result of a TOP rather than a miscarriage [10], such that survival requires hospital treatment. By extension, documented near-misses at health facilities can be assumed to represent all cases within the population [11], providing an indicator of the most severe unsafe TOPs that can be tracked over time. Since it has similar characteristics, near-miss can be used as a proxy for mortality. It occurs more frequently [12–14], and allows for larger samples and increased statistical power in quantitative analyses [15]. To the best of our knowledge, no studies have yet estimated the incidence of abortion-related near-miss at the population level [5].

Zambia has one of the most liberal abortion laws in sub-Saharan Africa. Implementation is, however, impeded by a requirement for three signatories to support an elective TOP, except in an emergency. No recent studies have described the burden of TOPs or miscarriages in Zambia [16], but unsafe TOPs have been previously estimated to account for 30% of maternal deaths and 50% of gynecological admissions [17,18]. Our study describes the magnitude and severity of moderate and severe complications from both miscarriage and TOP, and the incidence of abortion-related near-miss in three provinces.

## 2. Methods

### 2.1. Design, setting and population

We conducted a cross-sectional study in Central, Copperbelt and Lusaka Provinces. Lusaka and Copperbelt account for 69% of Zambia's total urban population [19], while Central Province is more rural. Forty-three level one (district), level two (provincial) and level three (tertiary and national) hospitals — which serve as public ($n$=30) or private ($n$=13) referral facilities and provide comprehensive care for severe complications — were eligible for inclusion and were invited to participate.

We used the Zambian Ministry of Health definition of abortion (Appendix A) [18]. All women admitted with an *International Classification of Diseases* (*ICD-10*) diagnosis of incomplete, complete, missed, septic, inevitable or spontaneous abortion, who were hospitalized for greater than 24 h or had a complication classified as moderate (Table A1) or near-miss morbidity, or died between 1st December 2013 and 31st April 2014, were eligible for inclusion.

We defined morbidity categories by adapting the prospective morbidity methodology (PMM) initially proposed by WHO to determine whether abortion complications were related to miscarriages or unsafe TOPs, adapted by South African researchers, and subsequently used in other studies to collect data on abortion-related morbidity and management [8,10,20–23]. We changed the morbidity categories from low, moderate and severe [20] to low, moderate, near-miss and suspected near-miss. We introduced anemia cutoff levels for each category using the WHO cutoffs for pregnant women [24], except in the near-miss category in which we used a level of 4 g/dL. This decision was based on discussions with clinicians and experts on maternal near-miss during the design of our adapted criteria. Four grams per deciliter is also the cutoff for severe anemia requiring urgent transfusion according to the Zambia Transfusion Service. We also revised the infection definition for the moderate category and replaced the high-severity category with a near-miss category. We introduced anemia into our classification because hemorrhage is a major complication of unsafe abortion [25], but the PMM does not include in its categories criteria other than shock to assess severity of blood loss. Many women and hospitals are unable to objectively quantify blood loss after an abortion, but it is possible to assess the effect of blood loss by measuring hemoglobin levels in such settings. We also adapted the WHO near-miss criteria to reflect a middle-income country context (Table A1). We included as criteria anemia alone (<4 g/dL) and anemia in combination with blood transfusion (4–7 g/dL with any blood transfused). These criteria are important adaptations because clinical information in medical records is often incomplete in low- and middle-income countries, and parameters to identify severe bleeding objectively and classify cases as hypovolemic shock are often not readily available. We lowered the WHO near-miss threshold for a massive blood transfusion from 5 units of blood to 2 units in our adapted criteria. This is because of the scarcity of blood products in Zambia and was endorsed by our local investigator, B.V. It has also been reported by maternal near-miss studies in similar settings such as Malawi [26] and Tanzania [27]. Both studies suggest 2 units of blood as the optimal threshold for massive transfusion in such contexts. The suspected near-miss category was based on our experience in a pilot study in which cases were considered to be near-miss by clinicians, but the case file contained insufficient information to classify it objectively as such (information on the pilot study is included in Appendix B). We included the suspected near-miss cases in the near-miss category in the final analysis.