



Mortality of pediatric surgical conditions in low and middle income countries in Africa



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ABSTRACT

Background: There are ongoing efforts to improve the quality of surgical care for children in low and middle-income countries (LMICs) in Africa. The purpose of this study was to review the recent literature and estimate the mortality associated with pediatric surgical conditions in this setting.

Methods: We completed a comprehensive search for studies that: (1) reported outcomes associated with pediatric surgical conditions; (2) were conducted in LMICs in Africa; and (3) were published between 2007 and 2012. Abstract screening, full-text review, and data abstraction were completed in duplicate. Mortality rates were pooled using a random effects model.

Results: Out of 2085 abstracts, 292 were selected for textual review, and 107 underwent complete data abstraction. Only 74 (68%) of these reported mortality explicitly. The highest pooled mortality rates were seen with esophageal atresia (72%), midgut volvulus (36%), and jejunoileal atresia (35%). Pooled mortality was 17% for congenital conditions and 9% for acquired disease. The overall mortality rate for all conditions was 12%.

Conclusions: Mortality following pediatric surgical conditions in LMICs in Africa remains high, especially for congenital conditions in neonates. Future studies should report mortality explicitly and provide accurate follow-up data whenever possible.

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Surgical care is increasingly being recognized as a cost-effective intervention in low and middle-income countries (LMICs) in Africa [1]. This is supported by a growing body of evidence that suggests that surgery should receive more support on the global health agenda [2,3]. A recent edition of the Disease Control Priorities in Developing Countries review (DCP-2) estimated that 11% of global disease can be treated with surgery [4]. Unfortunately, there are ongoing inequities in access to care, with only 3.5% of all operations globally being performed in LMICs [5].

Inequities in access to care are especially evident among children in LMICs in Africa [6–10]. A recent population-based survey in Rwanda, for example, reported that 40% of surgical conditions in this country affect children less than 15 years old [11]. Congenital surgical conditions are particularly problematic and are often cited as one of the reasons for high rates of mortality seen among children in LMICs in Africa [1,8,9]. Unfortunately, many healthcare systems are limited by access to clinical resources and shortages of trained healthcare workers [9,10].

Before specific recommendations can be made to address these issues, further study is needed to quantify the burden of disease caused by surgical conditions among children in LMICs in Africa. There is a paucity of quantitative research in this area, and so it is difficult to recommend specific healthcare policy changes or improvements. Documenting outcomes of pediatric surgical interventions in LMICs in Africa will provide further information to policy makers, and will help empower healthcare workers with the data needed to advocate effectively for patients [1].

The purpose of this study was to review the recent literature and summarize outcomes of pediatric surgical conditions in LMICs in Africa. We decided to undertake a scoping review, which involves a comprehensive search of the literature and description of published data. Unlike a systematic review, a scoping review makes no attempt to grade the quality of evidence and typically does not assess the effectiveness of one treatment over another [12]. This type of study is often the first step in determining the value of exploring a particular research question, and is completed prior to a full systematic review, population-based study, or randomized controlled trial. Given the limited literature in this area, as well as the broad nature of this topic, we decided to undertake a scoping review focused on mortality among pediatric surgical conditions in LMICs in Africa.

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1. Methods

1.1. Search strategy

We conducted a comprehensive search of 8 databases (Medline, PubMed, Embase, The Cochrane Library, Global Health, Zambia Forum for Health Research, ProQuest Dissertations & Theses, and PapersFirst). An experienced medical librarian developed a search strategy for Medline that captured the following concepts: (1) pediatric surgery; (2) Africa; and (3) children. The syntax was then translated and applied to the remaining databases. Relevant abstracts were also obtained from the 7th, 8th and 9th Pan-African Pediatric Surgical Association (PAPSA) conferences and the 13th Annual General Meeting of the College of Surgeons of East, Central, and Southern Africa (COSECSA).

Inclusion criteria were: (1) participants less than 18 years; (2) 5 or more participants; (3) low or lower middle-income country as defined by the World Bank [13]; (4) reported outcomes following a major surgical procedure; (5) minimum 30 days of follow-up; and; (6) published between 2007 and 2012. We included all studies that reported outcomes for congenital and acquired conditions typically treated by pediatric surgeons in Africa. Conditions within the domains of obstetrics, cardiac surgery, ophthalmology, orthopedic surgery, plastic surgery, trauma, and neurosurgery were excluded. The only exceptions were shunt insertion for hydrocephalus and surgical repair of spina bifida, as these conditions are treated by pediatric surgeons in many parts of Africa. We included all studies published in English and French. Commentaries, technical reports, and reviews were excluded.

1.2. Study selection

Titles and abstracts were reviewed independently and in duplicate by two reviewers (JD, AS). Disagreements were resolved by a third reviewer with international surgery experience (DP/DO). The remaining

records then underwent full-text review. Data abstraction forms were developed, piloted, and then loaded online using Research Electronic Data Capture (REDCap) software [14]. Studies selected for inclusion following full-text review underwent data abstraction independently and in duplicate. All-cause mortality rates for specific conditions were abstracted whenever possible. Following this, REDCap was used to merge independent records into a single entry for each study.

1.3. Statistical analysis

All data were pooled using a random effects model in StatsDirect Version 2.8.0 [15]. We anticipated moderate heterogeneity between studies. As a result, we decided to use the DerSimonian Laird approach to pool the proportion of participants from each study who experienced a mortality [16]. These values were reported as frequencies (i.e., percentages) with 95% confidence intervals. Quantitative assessments of heterogeneity were reported using I^2 whenever we pooled data from three or more studies. This statistic represents the amount of variance caused by study heterogeneity and can be interpreted as follows: 0–40% might not be important, 30%–60% may represent moderate heterogeneity, 50%–90% may represent substantial heterogeneity, and 75%–100% considerable heterogeneity [17].

2. Results

2.1. Search results

An overview of the search results and study selection is depicted in Fig. 1. A total of 2085 abstracts were screened after duplicates were removed, 292 underwent full-text review, and 107 underwent complete data abstraction. Many studies were excluded during the full-text review because no outcomes were reported or because length of follow-up was less than 30 days.

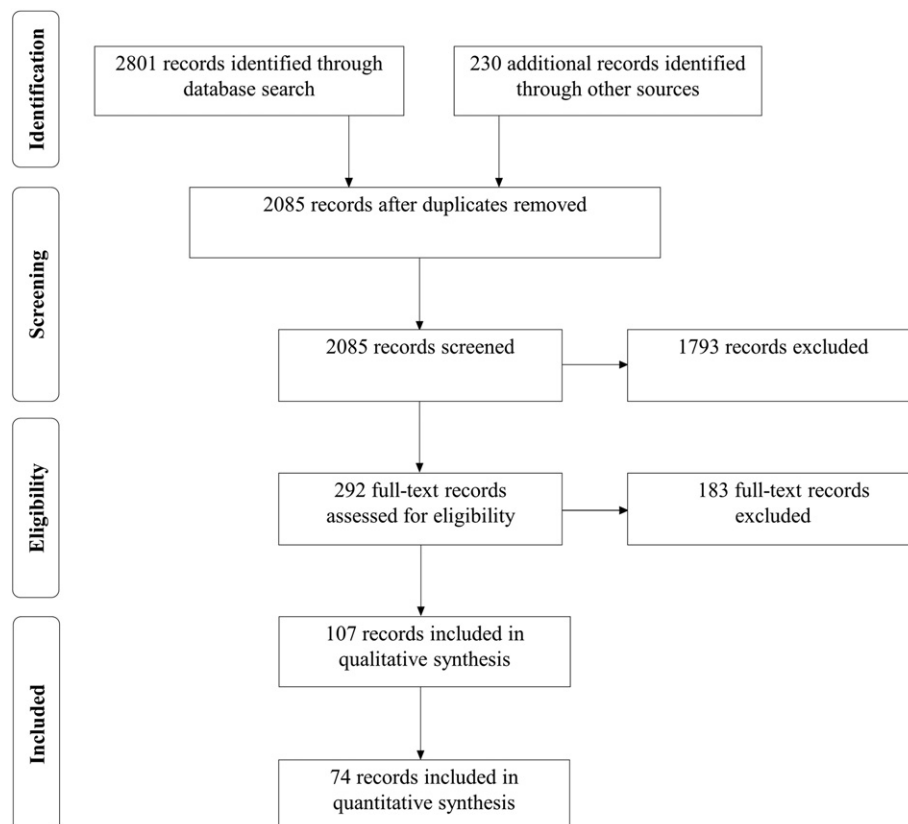


Fig. 1. Study selection using Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) format [25].

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