

# Avoidable maternal and neonatal deaths associated with improving access to caesarean delivery in countries with low caesarean delivery rates: an ecological modelling analysis

Published Online  
Month date, year  
Surgical outcomes

George Molina, Micaela M Esquivel, Tarsicio Uribe-Leitz, Stuart R Lipsitz, Tej Azad, Neel Shah, Katherine Semrau, William R Berry, Atul A Gwande, Thomas G Weiser, Alex B Haynes

Poster 36

## Abstract

Ariadne Labs at Brigham and Women's Hospital and the Harvard T H Chan School of Public Health, Boston, MA, USA (G Molina MD, Prof S R Lipsitz ScD, N Shah MD, K Semrau PhD, W R Berry MD, Prof A A Gawande MD, A B Haynes MD); Massachusetts General Hospital, Department of Surgery, Boston, MA, USA (G Molina, A B Haynes); Stanford University School of Medicine, Stanford, CA, USA (M M Esquivel MD, T Uribe-Leitz MD, T G Weiser MD, T Azad BA); and Beth Israel Deaconess Medical Center, Department of Obstetrics and Gynecology, Boston, MA, USA (N Shah MD);  
Correspondence to: Alex B Haynes, Ariadne Labs, Boston, MA 02215, USA  
abhaynes@mgh.harvard.edu

**Background** Reducing maternal and neonatal deaths are important global health priorities. We have previously shown that up to a country-level caesarean delivery rate (CDRs) of roughly 19·0%, caesarean delivery rates and maternal mortality ratio (MMR) and neonatal mortality rate (NMR) were inversely correlated. We investigated the absolute reductions in maternal and neonatal deaths if countries with low CDR increased their rates to a range of greater than 7·2% but less than or equal to 19·1%.

**Methods** We calculated maternal and neonatal deaths in 2013 and 2012, respectively, for countries with CDR 7·2% or less (N=45) with available data from the World Bank Development Indicators. We modelled the expected reduction in deaths in these countries if they had the 25th and 75th MMR and NMR percentiles observed for countries (N=48) with CDRs ranging from greater than 7·2% but less than or equal to 19·1%. This model assumes that if countries with low CDRs increased their rates of caesarean delivery to greater than 7·2% but less than or equal to 19·1% they would achieve levels of MMR and NMR observed in countries with those CDRs.

**Findings** We estimate 176 078 (95% CI 163 258– 188 898) maternal and 1117 257 (95% CI 1033 611– 1200 902) neonatal deaths occurred in 45 countries with low CDRs in 2013 and 2012, respectively. If these countries had the 25th and 75th MMR and NMR percentiles (MMR, IQR 36–190; NMR, 9–24) observed in countries (N=48) with a CDR ranging from greater than 7·2% but less than or equal to 19·1%, there would be a potential reduction of 109 762–163 513 and 279 584–803 129 maternal and neonatal deaths, respectively.

**Interpretation** Increasing caesarean delivery in countries with low CDRs could avert as many as 163 513 maternal deaths and 803 129 neonatal deaths annually. These findings assume that as health systems develop the capacity to deliver surgical care there is a concurrent improvement in the quality of care and in the ability to rescue women and neonates who would otherwise die. Improving access to safe caesarean delivery should be a central focus in surgical care globally.

**Funding** None.

## Contributors

GM, TGW, and ABH conceived of the study. GM, TGW, MME, TUL, TA, and ABH acquired the data. GM, TGW, SRL, NS, KS, WRB, AAG, and ABH analysed and interpreted the data. GM, TGW, and ABH drafted the Abstract. All authors have seen and approved the final version of the Abstract for publication.

## Declaration of interests

We declare no competing interests.