



Original Investigation | December 1, 2015

Relationship Between Cesarean Delivery Rate and Maternal and Neonatal Mortality

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JAMA. 2015;314(21):2263-2270. doi:10.1001/jama.2015.15553.

Text Size: [A](#) [A](#) [A](#)

ABSTRACT

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Importance Based on older analyses, the World Health Organization (WHO) recommends that cesarean delivery rates should not exceed 10 to 15 per 100 live births to optimize maternal and neonatal outcomes.

Objectives To estimate the contemporary relationship between national levels of cesarean delivery and maternal and neonatal mortality.

Design, Setting, and Participants Cross-sectional, ecological study estimating annual cesarean delivery rates from data collected during 2005 to 2012 for all 194 WHO member states. The year of analysis was 2012. Cesarean delivery rates were available for 54 countries for 2012. For the 118 countries for which 2012 data were not available, the 2012 cesarean delivery rate was imputed from other years. For the 22 countries for which no cesarean rate data were available, the rate was imputed from total health expenditure per capita, fertility rate, life expectancy, percent of urban population, and geographic region.

Exposures Cesarean delivery rate.

Main Outcomes and Measures The relationship between population-level cesarean delivery rate and maternal mortality ratios (maternal death from pregnancy related causes during pregnancy or up to 42 days postpartum per 100 000 live births) or neonatal mortality rates (neonatal mortality before age 28 days per 1000 live births).

Results The estimated number of cesarean deliveries in 2012 was 22.9 million (95% CI, 22.5 million to 23.2 million). At a country-level, cesarean delivery rate estimates up to 19.1 per 100 live births (95% CI, 16.3 to 21.9) and 19.4 per 100 live births (95% CI, 18.6 to 20.3) were inversely correlated with maternal mortality ratio (adjusted slope coefficient, -10.1 ; 95% CI, -16.8 to -3.4 ; $P = .003$) and neonatal mortality rate (adjusted slope coefficient, -0.8 ; 95% CI, -1.1 to -0.5 ; $P < .001$), respectively (adjusted for total health expenditure per capita, population, percent of urban population, fertility rate, and region). Higher cesarean delivery rates were not correlated with maternal or neonatal mortality at a country level. A sensitivity analysis including only 76 countries with the highest-quality cesarean delivery rate information had a similar result: cesarean delivery rates greater than 6.9 to 20.1 per 100 live births were inversely correlated with the maternal mortality ratio (slope coefficient, -21.3 ; 95% CI, -32.2 to -10.5 , $P < .001$). Cesarean delivery rates of 12.6 to 24.0 per 100 live births were inversely correlated with neonatal mortality (slope coefficient, -1.4 ; 95% CI, -2.3 to -0.4 ; $P = .004$).

Conclusions and Relevance National cesarean delivery rates of up to approximately 19 per 100 live births were associated with lower maternal or neonatal mortality among WHO member states. Previously recommended national target rates for cesarean deliveries may be too low.