



Maternal Health, Obstetric Outcomes, and Access to Gynecological Services in Latin America: A Mixed-Methods Study with Simulated Data

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ABSTRACT

This paper analyzes simulated data on maternal health, obstetric outcomes, and access to gynecological services in Latin America between 2015 and 2023. Using a mixed-methods design, the study integrates simulated quantitative indicators with qualitative scenarios that reflect structural and institutional challenges in the region. Simulated findings show that maternal mortality ratios decreased overall from 142 to 111 per 100,000 live births but remain disproportionately high in rural and marginalized populations. Cesarean section rates increased from 32% to 49%, raising questions about medicalization, quality of care, and inequalities in health access. Simulated results suggest that 63% of pregnant women in rural areas faced barriers to prenatal care, while only 18% of women in urban zones reported comparable challenges. Qualitative scenarios highlight the impact of limited health infrastructure, cultural barriers in indigenous communities, and the growing role of digital obstetric monitoring. The discussion emphasizes the need to strengthen maternal health systems through investments in midwifery, emergency obstetric care, and digital health technologies. The paper concludes that forensic epidemiology of obstetric outcomes is essential to improving maternal health equity in Latin America.

KEYWORDS: Maternal mortality, obstetrics, Gynecology, Latin America, Cesarean section, Prenatal care, Health equity.

INTRODUCTION

Maternal health remains a pressing challenge in Latin America. Although significant progress has been achieved in reducing maternal mortality over the past two decades, regional disparities remain wide, particularly between urban and rural populations and across socio-economic groups. According to international estimates, maternal mortality in Latin America fell by nearly 40% between 2000 and 2020, but some countries continue to experience rates far above the global average, with complications related to hypertensive disorders, hemorrhage, and unsafe abortion still prevalent.¹

In addition to maternal mortality, obstetric and gynecological care in Latin America is characterized by contradictory patterns. On the one hand, some countries record excessively high rates of cesarean sections, raising concerns about over-medicalization and iatrogenic risks. On the other, millions of women in rural, indigenous, and marginalized communities still lack access to basic prenatal and obstetric services.² These contrasts highlight the complexity of maternal health governance in the region.

Forensic epidemiology, understood as the systematic analysis of health outcomes within social and institutional contexts, provides a useful perspective for obstetrics and gynecology. By simulating epidemiological trends, researchers can identify structural patterns, forecast risks, and evaluate the performance of maternal health systems.

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The present study simulates maternal health data for eight countries in Latin America (Mexico, Brazil, Colombia, Honduras, El Salvador, Guatemala, Argentina, and Chile) between 2015 and 2023. The purpose is to examine trends in maternal mortality, cesarean section rates, prenatal care access, and gynecological service coverage. The central research question is: How do simulated maternal health and obstetric indicators reflect inequalities in gynecological care in Latin America? The hypothesis is that despite overall improvements in maternal health, inequities in access, quality, and cultural appropriateness of care continue to shape obstetric outcomes in the region.

METHOD

The study employed a mixed-methods approach that integrated simulated quantitative data with qualitative scenario analysis. Simulation was chosen because reliable, standardized, and up-to-date maternal health data are unevenly reported across Latin America.

Quantitative datasets were generated to reflect maternal health outcomes between 2015 and 2023 for the eight countries included.

Key simulated variables included:

- Maternal mortality ratio (MMR, per 100,000 live births)
- Cesarean section rates (%)
- Prenatal care coverage (at least four visits)
- Gynecological service access (urban vs. rural)
- Primary causes of maternal death (hemorrhage, hypertensive disorders, sepsis, unsafe abortion, indirect causes)

Simulation parameters were based on WHO, PAHO, and national observatory averages. The base year (2015) was calibrated using regional averages and adjusted to simulate trends over time.

Four scenarios were constructed to capture structural challenges in obstetrics and gynecology:

- Access barriers for indigenous women in rural Guatemala.
- Cesarean section overuse in private hospitals in Brazil.
- Maternal mortality related to hypertensive disorders in Mexico.
- Telemedicine and digital prenatal monitoring in Chile and Argentina.

Quantitative data were analyzed through descriptive statistics, trend lines, and comparative country-level assessments. Qualitative data were coded thematically to identify recurring barriers and opportunities in obstetric and gynecological services.

RESULTS

The simulated maternal mortality ratio (MMR) for the eight countries declined from an average of 142 in 2015 to 111 in 2023. Honduras and Guatemala maintained the highest simulated ratios, with 214 and 196 respectively in 2023, while Chile and Argentina recorded the lowest with 58 and 62.

Primary simulated causes of maternal death were hemorrhage (29%), hypertensive disorders (23%), sepsis (15%), unsafe abortion (12%), and indirect causes such as pre-existing conditions (21%).

Unsafe abortion was more prevalent in El Salvador and Honduras, where legal restrictions remain strongest.

Cesarean section rates rose from 32% in 2015 to 49% in 2023, with the highest simulated rates in Brazil (62%) and Mexico (55%). The lowest rates were observed in Honduras (28%) and Guatemala (31%). Private hospitals showed significantly higher simulated cesarean frequencies compared to public hospitals.

Overall, 79% of pregnant women received at least four prenatal visits in 2023, up from 68% in 2015. However, rural coverage lagged significantly: only 57% in Guatemala and 61% in Honduras received adequate prenatal care, compared to 92% in Chile and 88% in Argentina.

Simulated data showed that 63% of rural women reported barriers to accessing gynecological services, including distance to facilities, shortage of specialists, and cultural-linguistic barriers. Urban women reported 18% prevalence of comparable barriers.

Scenario 1 emphasized structural exclusion, showing that indigenous women often relied on traditional birth attendants due to lack of culturally sensitive obstetric services. Scenario 2 highlighted how financial incentives and litigation concerns drove unnecessary cesarean deliveries in private hospitals. Scenario 3 revealed persistent high risk of eclampsia-related deaths in Mexico, particularly in states with limited intensive obstetric care. Scenario 4 illustrated how digital health platforms in Chile and Argentina expanded prenatal monitoring coverage, especially during the COVID-19 pandemic.

DISCUSSION

The simulated findings align with existing literature on maternal health disparities in Latin America. Despite overall declines in maternal mortality, inequities remain entrenched, with rural, indigenous, and marginalized women disproportionately affected. The persistence of hemorrhage and hypertensive disorders as leading causes of death highlights gaps in timely access to emergency obstetric care.³

The rising cesarean section rates raise critical questions. While cesarean delivery can be life-saving, its overuse represents both a clinical risk and a structural problem in health governance. Brazil, with simulated rates exceeding 60%, illustrates how privatization, economic incentives, and patient demand converge to normalize unnecessary procedures.⁴

Prenatal care expansion is encouraging, yet simulated barriers in rural areas reflect systemic inequalities. Cultural insensitivity, shortage of midwives, and infrastructural limitations continue to undermine service utilization. Incorporating intercultural approaches to obstetric care is vital to address these gaps.

Qualitative scenarios demonstrated that digital obstetrics holds promise but risks widening inequalities if limited to urban, technologically advanced settings. Telemedicine improved coverage in Chile and Argentina, but in Central America, digital solutions remained limited by infrastructure and literacy challenges.

The forensic epidemiology approach used in this study underscores the need for comprehensive maternal health surveillance.

Simulated data provided insights into where and how interventions are most needed, particularly in strengthening emergency obstetric care, reducing cesarean overuse, and expanding culturally appropriate services.

CONCLUSION

This simulated study concludes that Latin America continues to face significant maternal health challenges despite progress in reducing mortality and expanding prenatal coverage. The persistence of disparities by geography, socio-economic status, and ethnicity underscores the need for a comprehensive regional strategy in obstetrics and gynecology.

Key policy implications include the following:

- Strengthening emergency obstetric care systems to address hemorrhage and hypertensive disorders.
- Regulating cesarean section practices to reduce unnecessary procedures while ensuring timely access when clinically indicated.
- Expanding culturally sensitive obstetric services, especially in indigenous and rural communities.
- Leveraging digital health innovations while addressing infrastructural inequities.

The study highlights the value of simulated forensic epidemiology for understanding maternal health trends where real data are incomplete or fragmented. Future research should integrate simulation with primary field studies and promote regional cooperation in maternal health governance.

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CONFLICTS OF INTEREST

All author declare that they have no conflicts of interest.

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