

Cesarean Section and Maternal Mortality Rates in A High-Risk Maternity Ward**Carlos Roberto de Resende Miranda***, Douglas Manuel Carrapeiro Prina, Joao Paulo Maximiano Favoreto, Kleber Rodrigues e Silva, Inacio Teruo Inoue*Department of Obstetrics and Gynecology, Londrina State University, Brazil****Corresponding Author**

Dr. Carlos Roberto de Resende Miranda, Department of Obstetrics and Gynecology at the Londrina State University, Londrina, Parana, Brazil

Submitted: 2024, Mar 25; **Accepted:** 2024, Jun 05; **Published:** 2024, Jul 08**Citation:** Miranda, C. R. D.R., Prina, D. M. C., Favoreto, J. P. M., Silva, K. R. E., Inoue, I. T. (2024). Cesarean Section and Maternal Mortality Rates in A High-Risk Maternity Ward. *J Gynecol Reprod Med*, 8(2), 01-04.**Abstract****Objective:** To test the hypothesis that a higher number of cesarean sections would decrease maternal mortality rates, we correlated cesarean section rates with mortality rates in a high-risk maternity environment in the Regional University Hospital of Northern Paraná (HURNP).**Methods:** We reviewed the records of 22,013 women who gave birth at the HURNP between 1995 and 2015 and analyzed the variation in the rate of delivery methods and maternal mortality rates, which was defined as the number of maternal deaths per 10,000 deliveries.**Results:** There was a significant increase in cesarean section rates from 33.5% in 1995 to 69% in 2015. Over these 21 years, 46 women died (20.9 per 10,000 women who gave birth). However, mortality rates increased rather than decreased during the study period.**Conclusion:** Despite we cannot confirm causality, the significant increase in the cesarean section rate matched an increase rather than decreased maternal mortality rates.**Keywords:** Cesarean Section, Vaginal Delivery, Epidemiology, Delivery Method, Maternal Mortality**1. Introduction**

The increased cesarean section rate is a very prevalent phenomenon in Brazil that currently accounts for 56.7% of all births (85% in private services, 40% in public services) [1]. The World Health Organization (WHO) reported recently that rates >10% do not contribute to reducing maternal, perinatal, or neonatal mortality rates [2]. The WHO calculated an acceptable cesarean section rate of 25–30% for the Brazilian population [1-4].

Cesarean section rates nearly doubled over the past two decades in Brazil, and there is currently no record of the impact of this trend on maternal mortality [1].

Our hypothesis questions whether the change in cesarean section rate over the years decreased maternal mortality.

2. Patients and Methods

We studied all patients who gave birth between 1995 and 2015 in the Regional University Hospital of Northern Paraná (HURNP)

by examining cases in the Medical Records and Statistics Service (SAME).

A total of 22,013 cases were divided by delivery type (vaginal or Caesarean section), the annual maternal mortality rate (MMR) was established as the number of maternal deaths per 10,000 deliveries, and cesarean section rate was defined based on the calculation of the number of cesarean deliveries by total deliveries, in percentage.

To analyze trends, we assessed whether the annual variation in cesarean section and vaginal delivery rates differed in the 1995–2001 period compared with the 2002–2015 period. This division was based on the inflection point of the delivery methods curve.

Maternal mortality was defined as the death of a woman during pregnancy or within 42 days postpartum regardless of pregnancy duration and location, from any cause related to or aggravated by

pregnancy or its management but not from accidental or incidental causes [5].

Descriptive statistics are presented as mean \pm SD unless stated otherwise. The comparison of continuous variables was performed using Student's t-test. The association between categorical variables was assessed using the chi-square test. Relative risk (RR) and its limits were calculated at the 95% confidence interval. The level of significance was stipulated as 5%.

3. Results

Figure 1 shows that the predominance of vaginal deliveries over time, with an increase in cesarean section rate, varying from 33.5% in 1995 to 69% in 2015. The shift in the curve occurred in 2001, when cesarean sections became more frequent than normal delivery, a trend that has been maintained ever since. The cesarean section rate in the initial period (1995-2001) was 42.62%, and in the final period (2002-2015) was 63.45%.

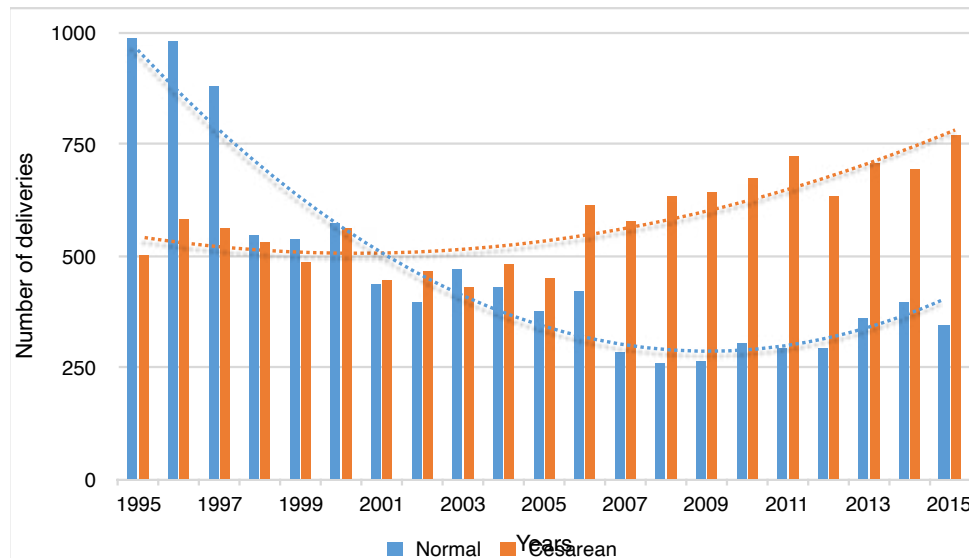


Figure 1: Total number of cesarean sections and normal deliveries at HURNP, 1995–2015

The relative risk of a woman undergoing a cesarean in HURNP is 1.65 times larger than performing a normal delivery (95% CI 1.60 – 1.70).

Over the 21 years, a total of 46 women died among 22,013 births, resulting in a mortality rate of 20.9 deaths per 10,000 deliveries

(Figure 2). The maternal mortality rate was 11.3 ± 8.9 per year between 1995 and 2001 versus 26.9 ± 17.2 in 2002–2015, thus, there was a significant increase in the second study period that happened to coincide with increasing cesarean section rates ($p < 0.01$).

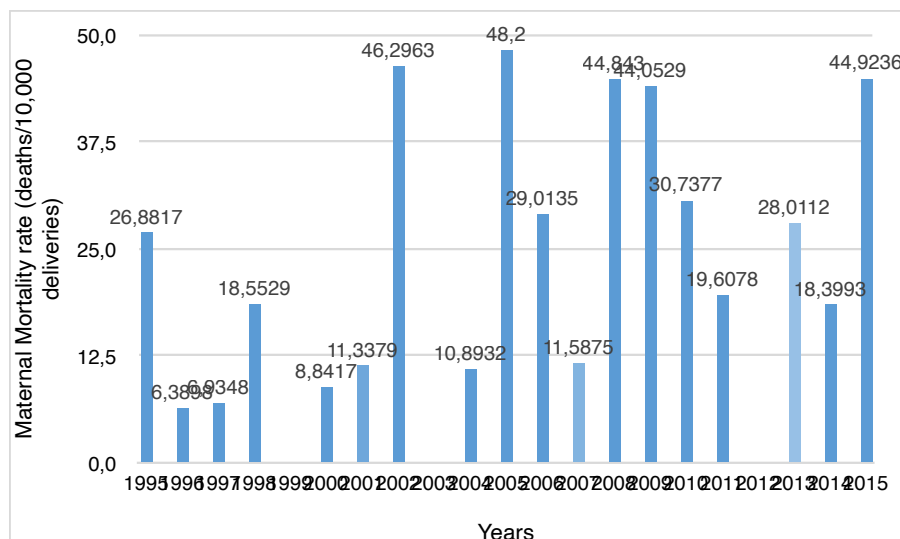


Figure 2: Maternal mortality rate in HU per 10,000 births. Note: No cases of maternal death were recorded in 1999, 2003, or 2012, so each was omitted from the chart for illustrative purposes.

Figure 3 shows an increase in annual maternal mortality despite the obvious increase in the rate of cesarean deliveries, as emphasized by the trend line denoting an increase in both variables. This trend

becomes abundantly clear in Table 1, where maternal mortality is shown to more than double while the cesarean section rate increases by 43.22%.

	1995-2001	2002-2015
CAESAREAN SECTION RATE	42.62%	63.45%
MATERNAL MORTALITY RATE	11.3/10,000	26.9/10,000

Table 1: Cesarean section vs. maternal mortality rates

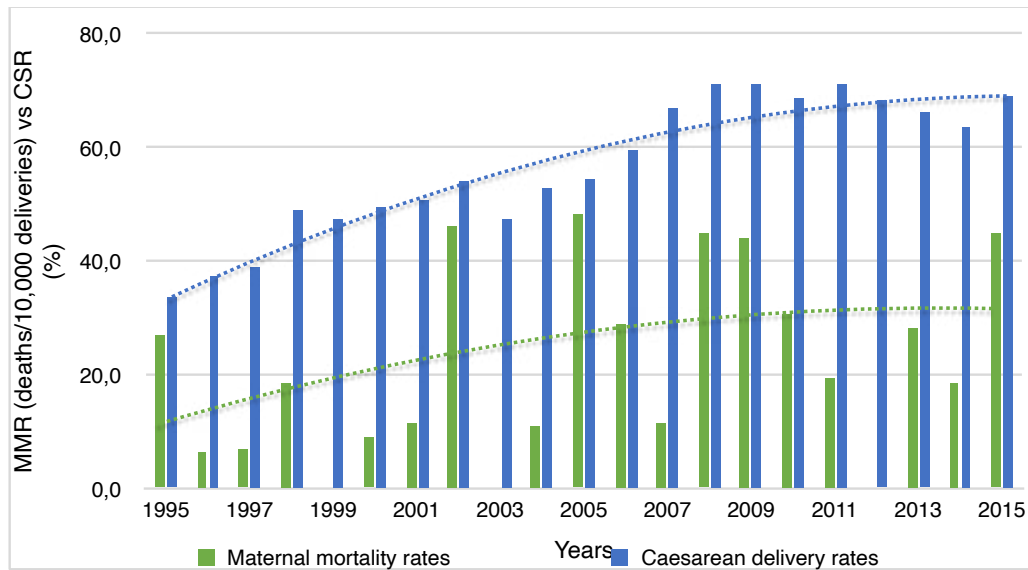


Figure 3: Maternal mortality vs. cesarean section rates with trend lines

4. Discussion

Our study showed that the cesarean section rate (CSR) doubled in 21 years (to 69%), a finding that is inconsistent with the worldwide increase of this index [6,7]. Both the WHO and the National Guidelines of the Brazilian Ministry of Health recommend a rate of 25–30% [1,2]. Individual (structural or systemic) and subjective factors are common indications for cesarean section [6, 8-10]. The cesarean section rate values vary with each country’s level of development, being generally higher in developing countries [11].

The fact that the study site is a reference for highly complex cases in the 17th Regional Health Division in the State of Paraná as well as a teaching hospital, and due to its wider range of cases and larger resource availability, could lead to an increase in the cesarean rate compared to low-risk maternity hospitals. However, other authors found no significant relationship between these variables [12, 13].

In the present study, maternal mortality rates continued to increase, more than doubling between the first and second observation periods.

The Brazilian maternal mortality rate is 5.2 cases/10,000, which is above the worldwide target. The maternal mortality rate in our hospital in 2015 was 45 cases/10,000 deliveries. One can argue that the rate could be due to the high complexity and risk of the patients

(Intensive Care Unit), but it is still considered a disproportionately high rate [14, 15]. The current main causes of maternal death worldwide remain hemorrhage, hypertensive disorders, and sepsis [16].

Our study showed an increase in maternal mortality over the studied period, although cesarean section has become the most common method for pregnancy resolution. Some authors observed a significant increase (three times or more) in the risk of maternal mortality after cesarean section delivery compared with vaginal delivery, whereas others found no relationship between mortality and delivery method [17-23]. A study similar to ours performed in Ireland described an increasing cesarean section rate but no significant impact on maternal mortality, which remained within the internationally recommended standards [22].

However, we cannot state that the high maternal mortality rate observed here is related to the increased cesarean section rate.

5. Conclusion

The significant increase in cesarean section rates was accompanied by a constant rise in maternal mortality rates, which should have a declining tendency. However, we cannot attribute causality to maternal mortality rate to the practice of cesarean sections.

References

1. BRASIL. Ministério da Saúde. Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Comissão Nacional de Incorporação de Tecnologias no SUS (CONITEC). (2015). Diretrizes de Atenção à Gestante: a operação Cesariana.
2. Institutional publication: World Health Organization (WHO). Human Reproduction Programme: WHO Statement on Caesarean Section Rates. Diretrizes de Atenção à Gestante: a operação Cesariana. Geneva, Switzerland: Department of Reproductive Health and Research World Health Organization; 2016.
3. Souza, J. P., Betran, A. P., Dumont, A., De Mucio, B., Gibbs Pickens, C. M., Deneux-Tharaux, C., ... & Gülmezoglu, A. M. (2016). A global reference for caesarean section rates (C-Model): a multicountry cross-sectional study. *BJOG: An International Journal of Obstetrics & Gynaecology*, 123(3), 427-436.
4. Cecatti, J. G. (2014). Beliefs and misbeliefs about current interventions during labor and delivery in Brazil. *Cadernos de Saúde Pública*, 30, S33-S35.
5. Ministério da Saúde, & Ministério da Saúde. (2009). Guia de vigilância epidemiológica. *caderno 6: aids, Hepatites virais, Sífilis congênita, Sífilis em gestantes*, 1-22.
6. Barber, E. L., Lundsberg, L. S., Belanger, K., Pettker, C. M., Funai, E. F., & Illuzzi, J. L. (2011). Indications contributing to the increasing cesarean delivery rate. *Obstetrics & Gynecology*, 118(1), 29-38.
7. Declercq, E., Young, R., Cabral, H., & Ecker, J. (2011). Is a rising cesarean delivery rate inevitable? Trends in industrialized countries, 1987 to 2007. *Birth*, 38(2), 99-104.
8. Béhague, D. P., Victora, C. G., & Barros, F. C. (2002). Consumer demand for caesarean sections in Brazil: informed decision making, patient choice, or social inequality? A population based birth cohort study linking ethnographic and epidemiological methods. *Bmj*, 324(7343), 942.
9. Barber, E. L., Lundsberg, L., Belanger, K., Pettker, C. M., Funai, E. F., & Illuzzi, J. L. (2011). Contributing indications to the rising cesarean delivery rate. *Obstetrics and gynecology*, 118(1), 29.
10. Fabri, R. H., Silva, H. D. S. L., Lima, R. V. D., & Murta, E. F. C. (2002). Estudo comparativo das indicações de cesariana entre um hospital público-universitário e um hospital privado. *Revista Brasileira de Saúde Materno Infantil*, 2, 29-35.
11. Thomas, S., Meadows, J., & McQueen, K. K. (2016). Access to cesarean section will reduce maternal mortality in low-income countries: a mathematical model. *World journal of surgery*, 40, 1537-1541.
12. Pádua, K. S. D., Osis, M. J. D., Faúndes, A., Barbosa, A. H., & Moraes Filho, O. B. (2010). Fatores associados à realização de cesariana em hospitais brasileiros. *Revista de Saúde Pública*, 44, 70-79.
13. Grytten, J., Monkerud, L., Hagen, T. P., Sørensen, R., Eskild, A., & Skau, I. (2011). The impact of hospital revenue on the increase in Caesarean sections in Norway. A panel data analysis of hospitals 1976-2005. *BMC health services research*, 11, 1-10.
14. Leal, M. D. C. (2008). Desafio do milênio: a mortalidade materna no Brasil. *Cadernos de Saúde Pública*, 24, 1724-1724.
15. Ferraz, L., & Bordignon, M. (2012). Mortalidade materna no Brasil: uma realidade que precisa melhorar. *Revista Baiana de Saúde Pública*, 36(2), 527-527.
16. Hill, K., Thomas, K., AbouZahr, C., Walker, N., Say, L., Inoue, M., & Suzuki, E. (2007). Estimates of maternal mortality worldwide between 1990 and 2005: an assessment of available data. *The Lancet*, 370(9595), 1311-1319.
17. Esteves-Pereira, A. P., Deneux-Tharaux, C., Nakamura-Pereira, M., Saucedo, M., Bouvier-Colle, M. H., & Leal, M. D. C. (2016). Caesarean delivery and postpartum maternal mortality: a population-based case control study in Brazil. *PLoS one*, 11(4), e0153396.
18. Kamilya, G., Seal, S. L., Mukherji, J., Bhattacharyya, S. K., & Hazra, A. (2010). Maternal mortality and cesarean delivery: an analytical observational study. *Journal of Obstetrics and Gynaecology Research*, 36(2), 248-253.
19. Deneux-Tharaux, C., Carmona, E., Bouvier-Colle, M. H., & Bréart, G. (2006). Postpartum maternal mortality and cesarean delivery. *Obstetrics & Gynecology*, 108(3 Part 1), 541-548.
20. Hall, M. H., & Bewley, S. (1999). Maternal mortality and mode of delivery. *The Lancet*, 354(9180), 776.
21. Betrán, A. P., Merialdi, M., Lauer, J. A., Bing-Shun, W., Thomas, J., Van Look, P., & Wagner, M. (2007). Rates of caesarean section: analysis of global, regional and national estimates. *Paediatric and perinatal epidemiology*, 21(2), 98-113.
22. O'Dwyer, V., Hogan, J. L., Farah, N., Kennelly, M. M., Fitzpatrick, C., & Turner, M. J. (2012). Maternal mortality and the rising cesarean rate. *International Journal of Gynecology & Obstetrics*, 116(2), 162-164.
23. Sachs, B. P., YEH, J., ACKER, D., DRISCOLL, S., BROWN, D. A., & JEWETT, J. F. (1988). Cesarean section-related maternal mortality in Massachusetts, 1954-1985. *Obstetrics & Gynecology*, 71(3), 386-388.

Copyright: ©2024 Dr. Carlos Roberto de Resende Miranda, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.