Title: Cesarean Section Rates in India: A Retrospective Analysis of Districts and States in 2019

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Aim: This India-wide retrospective analysis using Health Management and Information System (HMIS) data estimated CS rates and public-private differences at different geographic levels.

Methods: HMIS count data was obtained for total, public, and private CS surgeries for the 2019-20 financial year for 737 districts across 37 states from the National Data and Analytics Platform. CS rates were defined per 100 live births. Based on the WHO statement, the above 10% CS rate was defined as excess. Public-private CS rates were compared with paired Wilcox tests. Ethics approval was not needed since the research was conducted on publicly available aggregate data.

Results: In 2019, total, public, and private CS rates were 19.56%, 14.20%, and 34.47%, respectively. Thirty-two states crossed the excess threshold for total CS rates. 455 districts had excess CS surgeries. The private and private facilities in 530 and 390 districts had excess CS rates, respectively. Zero CS uptake was noted in 24 districts mostly belonging to northeastern states. Most districts with excess sections were clustered in the southern states of Telangana, Tamil Nadu, and Kerala. District-level comparison depicted significantly greater CS rates in private compared to public facilities ($W = 290873$, $p < 2.2e-16$).

Conclusion: Excess cesarean sections in India are driven largely by the private sector in districts clustered in south and central India while several states in North and Northeast India lack CS delivery capacity in public facilities. India needs a targeted policy approach with regulation over the private sector and simultaneous public system strengthening.
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BACKGROUND
- Cesarean section (CS) rates are rising globally. The minimum population-normalized (p0) rates required to be 10% are 11% (3). While 10% is found to be an adequate rate (3).
- Household surveys have shown that rising trends in the large population in the non-urbanized age group, India will soon have the most cesarean sections, globally (3).
- However, greater health risk analysis, justifying cesarean sections for the population is critical. This paper is focused on investigating the correlation of Health Management Information System (HMIS) data.

METHODS
- Public, private, and non-governmental CS surgeons, total live births, and deliveries to public and private facilities were considered for the Indian states of states.
- A sample of institutional deliveries were taken for 2019 - 2020 from the first wave of National Family Health Survey 5 (NFHS-5) districts in states across India.
- All data was extracted from the National Database and Research Institute (NDRI) of India.

Outcomes & Analysis:
- For the main analysis, CS rates were defined as the number of CS surgeries per 1000 live births.
- For public and private CS rates, since sector-wise live births were unavailable, we used the sector-wise deliveries. These rates were then used to calculate the overall rates.
- District-level data were aggregated for obtaining state and national rates. CS rates from less than 10% were defined as adequate; needing scale-up. Rates over 10% were defined as excessive.
- For the Cox-regression analysis, age and annual percent changes were considered for CS rates.
- For the validation analysis: CS rates (2019) were compared with NFHS-5.
- Total CS deliveries as % of total institutional deliveries were considered.
- Transition of CS deliveries in different states and districts were considered.
- Using Pearson’s correlation coefficient, it was used as a measurement of association.

RESULTS
- Excessive cesarean sections in India are driven largely by the public sector in the northeastern states and southern states.
- In northern India, the private sector and institutional public facilities.
- There is a correlation between CS rates that are not better assessed in public and private sector.

CONCLUSIONS
- Institutional CS rates need to be reviewed and public and private sector data need to be appropriately managed.
- Public sector needs to focus on reducing CS rates and improving quality.
- Strengthening the public sector CS guidelines is critical to improve cesarean sections.

REFERENCES