

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 Wilcoxon 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.

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

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BACKGROUND

- Cesarean section (CS) rates are rising globally. The minimum population-level rate (per 1000 live births) is considered to be 10% [1]. While 19% is found to be an adequate rate [2].
- Household surveys have shown that with rising trends and a large population in the reproductive age group, India will soon have the most cesarean sections, globally [3].

- However, granular multi-year analyses are missing. This gap can be fulfilled by using Health Management Information System (HMIS) data.

- In this India-wide retrospective analysis we had following aims:

- To estimate CS rates at different geographic levels to identify places needing scale-up and scale-down
- To calculate annual percent changes for understanding rising trends
- To investigate public-private health sector differences
- To understand validity of HMIS data for cesarean sections

METHODS

Variables & Data Sources:

- Total, public, and private CS surgeries, total live births, and deliveries in public and private sectors for nine financial years (2011-2019) for 737 districts across 37 states were taken from the HMIS.
- CS deliveries as % of institutional deliveries were taken for 2019-20 from the first wave of National Family Health Survey-5 (NFHS-5) for 733 districts across 37 states.
- All data was extracted from the National Data and Analytics Platform [4,5].

Outcomes & Analysis:

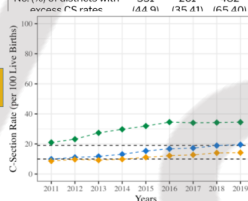
- For the main analysis, CS rates were defined as the number of CS surgeries per 100 live births.
- For public and private CS rates, since sector-wise live births were unavailable, we used the sector-wise deliveries multiplied by the ratio of total deliveries to the total live births.
- District-level data were aggregated for estimating state and national rates. CS rates less than 10% were defined as inadequate - needing scale-up. Rates over 19% were defined as excess.
- For trends over time, unweighted average annual percent changes were computed for CS rates.
- Public v. private sector differences were assessed by unpaired Wilcoxon tests.
- For validation analysis -
 - HMIS 2019-20 was compared with NFHS-5.
 - Total CS deliveries as % of total institutional deliveries was used as the outcome.
 - 782 districts where data was available in both HMIS and NFHS were included.
 - Lin's concordance correlation coefficient was used as a measure of agreement.

- All analyses were conducted in R using validated packages

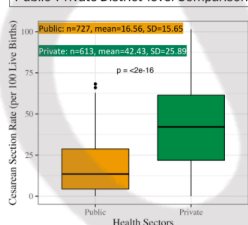
FINDINGS

National Estimates & Trends

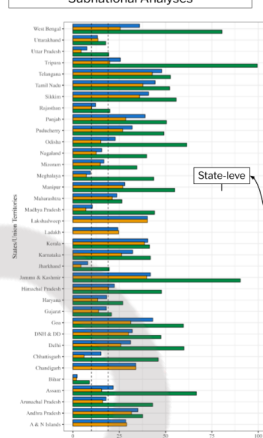
Variable	Overall Estimate	Public Sector Estimate	Private Sector Estimate
CS rate per 100 live births in 2019	19.56	14.20	34.37
Average annual percent change in CS rate	8.00	5.83	5.86
No. (%) of districts with inadequate CS rates (37.6)	277 (45.73)	337 (11.26)	83
No. (%) of districts with excess CS rate (14.4%)	331 (54.27)	261 (75.41)	482 (165.47)



Public-Private District-level Comparison



Subnational Analyses



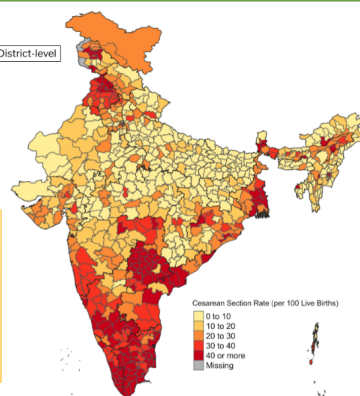
Zero cesarean section surgeries were noted in 24 districts mostly belonging to north-eastern states.

Most districts with excess sections were clustered in the southern states of Telangana, Tamil Nadu, and Kerala.

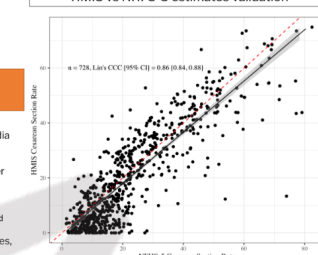
In 2019, 32 states crossed the excess threshold for total CS rates while 4 states - Uttar Pradesh, Bihar, Jharkhand, and Meghalaya had inadequate CS rates.

Excess CS was present in the private sector in 30 states.

The public sector in six states had inadequate CS rates.



HMIS vs NFHS-5 estimates validation



CONCLUSIONS

- 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.
- We use administrative HMIS data that is routinely collected at a high geographic resolution that can be better accessed by policymakers and health planners.
- Limitations include: Data completeness and coverage issues, lack of disaggregation by rural-urban regions, levels of care, and emergency vs. elective surgeries.

References

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