

Title: Surgical Rates and Need in Rural India: Retrospective Analysis of 666 Districts and 36 States and Union Territories

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Conflicts of Interest: None for both

Background:

According to the Lancet Commission on Global Surgery (LCoGS), 5.3 billion people globally lack timely access to surgical care, with over a fifth of them living in India. Unmet surgical need, given by suboptimal surgical volumes and rates, is disproportionately large in rural areas where two-thirds of the country's population resides. While limited national data from global analyses and small-scale cross-sectional and cohort studies are present for India, comprehensive national-level analysis spanning across states and districts that provide recent estimates for surgical need are missing. We primarily aimed to estimate the surgical rates and needs of rural areas across districts and states/union territories (UTs). Secondly, we compared rural and urban counterparts to point to disparities.

Methods:

District- and state-level rural and urban aggregates were acquired from Health Management and Information System (HMIS) for April 2017- March 2018 for counts of major surgeries i.e., those requiring general and spinal anesthesia. District- and state-level total, rural, and urban populations were estimated through raster-based analysis using data from WorldPop, Urban-Rural Catchment Areas, and GADM v3.6. Rates were calculated as surgery count per 100,000 people while met need was determined relative to the LCoGS prescribed threshold of 5000 major surgeries per 100,000. Wilcoxon tests adjusted for multiple comparisons (Holm-Bonferroni correction) were used to investigate rural-urban differences at 5% significance level.

Findings:

Nationally, the average rate of major surgeries in rural areas was 341 per 100,000 people with the met surgical need of 6.8%. There were marked differences in the surgical rates and met need at state and district-levels. Chandigarh with its small rural population had the highest rate of 608,595 while rural Sikkim had the lowest rate of 25.4

major surgeries per 100,000. Several districts had a zero surgical rate. Most districts and states below under the 20% mark for the met need with central and north Indian states and districts performing worse than those in the southern parts. District-level analysis of rural-urban differences revealed significantly lower surgical rates and met surgical need ($n= 1145$, effect size= 0.245, $p<0.001$) for rural areas.

Interpretation:

In the first-ever comprehensive high-resolution analysis, we found that rates for major surgeries in rural India were well below the prescribed threshold. Limitations include quality issues in source data and limited classification of surgical procedures. Findings can act as a baseline assessment for India's National Surgical, Obstetric, and Anesthesia Plan.

Funding:

None

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- According to the Lancet Commission on Global Surgery (LCoGS), 5.3 billion people globally lack timely access to surgical care, with over a fifth of them living in India^[1] Unmet surgical need, given by suboptimal surgical volumes and rates, is disproportionately large in rural areas where two-thirds of the country's population resides.
- While limited national data from global analyses and small-scale cross-sectional and cohort studies are present for India, comprehensive national-level analysis spanning across states and districts that provide recent estimates for surgical need are missing.
- We primarily aimed to estimate the surgical rates and needs of rural areas across districts and states/union territories (UTs). Secondly, we compared rural and urban counterparts to point to disparities.

Methodology

Data Sources:

- Health Management and Information System (HMIS), April 2017- March 2018 data for counts of major surgeries
- WorldPop, Urban-Rural Catchment Areas, and GADM v3.6. for populations estimation through raster-based analysis
- District- and state level rural - urban data was acquired

Data Variables:

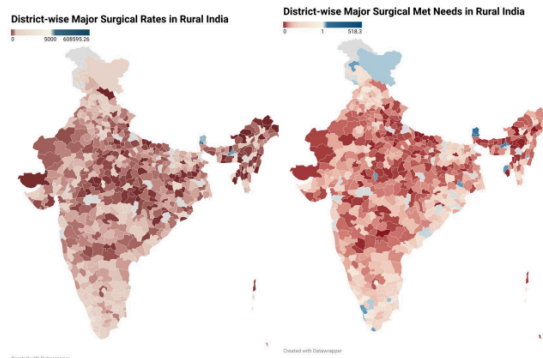
- Major Surgical Rates:** calculated as major surgical operations (requiring general or spinal anesthesia) count per 100,000 people
- Major Surgical Met need:** determined relative to the LCoGS prescribed threshold of 5000 major surgeries per 100,000.

Statistical Analysis:

- Done using R Studio
- Wilcoxon tests adjusted for multiple comparisons

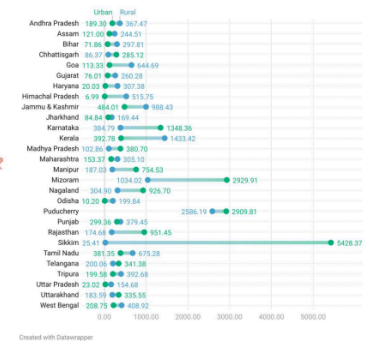
Results

In Rural India, Major Surgical Rates were 341 and Major Surgical Met Need were 6.81%



Variable	Rural regions (Median (IQR))	Urban Regions (Median (IQR))	Test Statistic	p value
Major Surgical Rate	379.45 (631.90)	194.44 (359.11)	808	0.011
Major Surgical Met Need	0.076 (0.126)	0.039 (0.072)	808	0.011

State wise comparison of Major Surgical rates in Urban and Rural India



Conclusion

In the first-ever comprehensive high-resolution analysis, we found that rates for major surgeries in rural India were well below the prescribed threshold. Limitations include quality issues in source data and limited classification of surgical procedures. Findings can act as a baseline assessment for India's National Surgical, Obstetric, and Anesthesia Plan.

References

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