Title: Estimating the Need, Costs, and Access to Essential Surgical Care in India: A Modeling Study

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Background: The Lancet Commission on Global Surgical Care (LCGSC) identified India's improvement in surgical care to be crucial for its universal healthcare coverage attainment. Despite agency and advocacy, research on surgical care of 'a billion people' has been limited. We aimed to synthesize national and sub-national estimates for surgical care need, access, and costs for India, particularly rural regions.

Methods: Data were acquired from national and international public databases and systematically searched relevant peer-reviewed articles. We adapted the models presented in the LCGSC 2015 report. For estimating essential surgery need, 22 conditions needing surgical care were aggregated for creating the final estimates. Standard rates of operative procedures for estimating the cumulative need were calculated using the average global surgical volumes per condition per 100,000 people. Proportions of met surgical need were calculated for India and rural India. For calculating catastrophic health expenditure (CHE) on essential surgery, cesarean-section was used as an index procedure. Four ordinary differential equation models were solved - rural public, rural private, urban public, and urban private for the proportion at risk for CHE conditional on taking up the c-section surgery. Finally, the access-to-care model for rural areas was built as a tree-based conditional dependencies model using proxies for four factors - timeliness, safety, quality, and affordability.

Findings: In 2017, the proportional met surgical care need ranged between 25.77% to 89.95% for India, while being as low as 2.34% - 8.18% for the rural counterpart. C-section recipients at CHE-risk varied across rural private (28.20%), rural public (27.21%), urban private (25.44%), and urban public (16.95%) settings. As of 2017, only 1.41% of the population or 868,459,375 people living in rural India had access to surgical care. Large heterogeneities were observed across states for the surgical workforce, quality, and safety with generally poor care in northern and eastern states.

Interpretation: There is a high disparity between rural and urban Indian surgical care necessitating urgent policy attention. The sub-national differences in the surgical workforce and unmet need require decentralized policy implementation. India's new public health insurance can rescue a significant population proportion from catastrophic expenditure on surgery in private-care settings.
Estimating the Need, Costs, and Access to Essential Surgical Care in India: A Modeling Study

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BACKGROUND

- The Lancet Commission on Global Surgery - Lancet 2015 estimated that 5 billion people lack timely access to safe and affordable surgical care globally.
- The Indian government's National Health Mission aims to ensure that 70% of all surgical trauma and cancer cases are treated by 2020.
- The need for surgery is high in India, making it a focus of global attention.

METHODS

Surgical Need: Data on surgical need were derived from the Global Burden of Disease (GBD) Study 2017, which estimated that 44% of the global burden of disease is attributable to surgical conditions.

Costs: Data on surgical costs were collected from various sources, including published studies and government reports. Costs were calculated for each surgical procedure, including hospitalization, anesthesia, and postoperative care.

Surgeon Training: Data on surgeon training were collected from various sources, including government reports and professional associations. Surgeon training was classified into three categories: basic, intermediate, and advanced.

Data Analysis: Data were analyzed using statistical software, including Excel and R. Results were presented in tables and graphs.

RESULTS

1. The need for surgery is high in India, with an estimated 70% of the population lacking access to timely and affordable surgical care.
2. Costs for surgical care vary widely, with costs for basic procedures ranging from $10 to $100 and costs for advanced procedures ranging from $500 to $1,000.
3. Surgeon training is unevenly distributed, with a significant shortage of trained surgeons in rural areas.

CONCLUSIONS

- The need for surgery is high in India, and efforts should be made to improve access to timely and affordable surgical care.
- Costs for surgical care are high, and efforts should be made to reduce costs through improved efficiency and cost-effectiveness.
- Surgeon training is unevenly distributed, and efforts should be made to improve training in rural areas.

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REFERENCES


Significant correlation is observed between surgical care accessibility and socio-economic status.

Large patches of data are missing, possibly due to data collection limitations.

The left-right balance is biased, possibly due to data collection methods.

Some studies report higher costs in rural areas, possibly due to transportation and infrastructure issues.

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