

# **Title: Population-level Surgical Incidence in India: Analysis of Nationally-representative Survey of 113,823 Households**

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**Conflicts of Interest:** None

## **Background:**

Surgical procedures play an essential role in reducing population disease burden. Previous studies have indicated low surgical incidence in low- and middle-income countries (LMICs) including India. However, comprehensive understanding of distribution of surgeries across patient demographics and different healthcare providers is missing for India. We attempt to fill this gap by describing the incidence of inpatient surgeries using nationally-representative survey data.

## **Methods:**

We used data from the National Sample Survey 75<sup>th</sup> Round on Social Consumption in Health. This is a nationally-representative cross-sectional survey with >95% geographical coverage conducted between July 2017 to June 2018 that collected data from 113,823 households. We measured the incident surgical rates (surgeries per 100,000 population) in the inpatient settings with respect to the following factors: age, sex, disease categories, public/private facility of care-seeking, and rural/urban residence. National-level sample estimates were derived for total and subgroups as per the above factors.

## **Findings:**

National surgical rate was 1121.741 (95% CI: 992.698, 1250.784) per 100,000 people in India. The rate increased by around 37.391 surgeries ( $R^2 = 0.925$ ) for every one year of age. We observed a significant gender gap for surgical procedures. For the age group 1-5 years, the surgical rate for females was 109.416 (97.124, 121.709) compared to 388.043 (359.233, 388.043) for males. Due to childbirth-related surgeries, the trend reverses briefly in the reproductive age groups (20-40 years), but similar trends can be observed in older age groups. Childbirth, gastrointestinal surgeries, and injuries are the top three contributors to surgical procedures in females. While injuries, gastrointestinal surgeries, and genito-urinary surgeries are the top three contributors among males. We

found a significant gap between the surgical incidence in rural (1005 per 100,000 population) and urban (1402 per 100,000 population) India, while both the sectors lag behind the Lancet Commission's recommended threshold of 5000 surgeries per 100,000 people. Private hospitals in urban areas contribute 3 times more surgical procedures than their public counterparts, while in rural India, the similar ratio is around 2:1.

### Interpretation:

Incident rates of inpatient surgeries are low in India and vary substantially across patient demographics and health sectors. Urgent attention is needed towards rural public surgical systems serving vulnerable pediatric and geriatric populations at low costs. These findings can inform equity considerations in India's national surgical plan.

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None



## Population-level Surgical Incidence in India:

### Analysis of Nationally-representative Survey of 113,823 Households

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#### BACKGROUND

- o Lancet Commission on Global Surgery (LCoGS)
  - o Found low surgical volumes in LMICs
  - o Recommended 5000 surgeries with general/spinal anesthesia per 100,000 people
  - o India lags behind with <1000 surgeries per 100k people (Weiser et al. 2016, Shaikh et al. 2015)
  - o Recent urban UHC cohort (n=88,273 admissions) study found a higher surgical rate of 3646

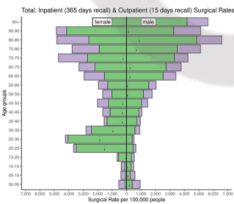
Aggregates are a starting point but equity is the endgame

#### METHODS

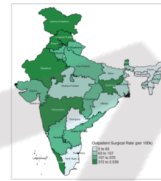
- o Design: Retrospective cross-sectional analysis
- o Data source: National Sample Survey 75th Round (NSS-75) on Social Consumption in Health
- o Nationally-representative survey using the Census 2011, India sampling frame
- o >95% geographical coverage
- o 113,823 households surveyed between July 2017 – June 2018
- o Outcomes: Surgical rate per 100,000 people in a given region/geography
  - o Inpatient procedures in last 365 days
  - o Outpatient procedures in last 15 days

#### FINDINGS

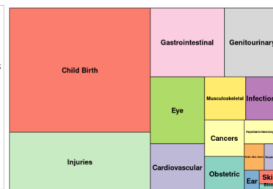
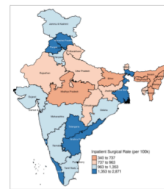
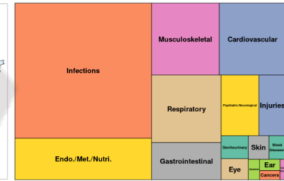
- o Outpatient surgical rate per 100k (15 days recall): 389.612 [346.215, 433.008]
- o Inpatient surgical rate per 100k (365 days recall): 1121.741 [1089.015, 1154.468]



	Rural	Urban
<b>Surgical rate per 100k (95% CI)</b>		
<b>Inpatient</b>	1004 [964, 1044]	1401 [1345., 1458]
<b>Outpatient</b>	326 [274, 377]	541 [460, 621]



Left: map displaying the total outpatient surgical rate by state; Right: treemap showing the proportion of each disease category in outpatient care provided



Left: map displaying the total inpatient surgical rate by state; Right: treemap showing the proportion of each disease category in inpatient care provided

#### CONCLUSION

We calculated the national-level estimates for the surgical rates using the NSS 75 social consumption in health survey. We analyzed the surgical volumes in context of gender, age group, geolocation, rural/urban classification, and disease categories. We also have a more detailed study including more dimensions which can be used for to direct the health equity for AB-PMJAY and National Surgical Planning.

#### REFERENCES

1. Omling, E et al. "Population-based incidence rate of inpatient and outpatient surgical procedures in a high-income country." The British journal of surgery vol. 105,1 (2018): 86-95. doi:10.1002/bjs.10643