

Title: Cost-Benefit Analysis for Universal Cataract Coverage in India

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Background: Cataract is the most significant cause of curable blindness necessitating universal coverage in India. Here, we have estimated the scaleup costs for universal cataract coverage and the benefits of averting the economic burden of disease in India.

Methods: We conducted a retrospective analysis for 2018. We used data for cataract prevalence and disability-adjusted life-years (DALYs) from the Global Burden of Diseases (GBD) study and surgeries conducted under the government-sponsored program from the National Health Profile (2020). We used 10 per capita surgical costs: National Sample Survey on health consumption, six cataract surgical packages under the national health insurance, and direct, indirect, and societal costs from Aravind Eye Care Model, Madurai. For the cataract scale-up costs, we calculated the total need by multiplying cataract prevalence with per capita costs and the unmet need by multiplying the difference between the prevalence and surgeries achieved with the same costs. For the economic benefits of averting the cataract burden in 2018, we multiplied DALYs with non-health gross domestic product (i.e., GDP - Government Health Expenditure) derived from the National Health Accounts (2021). For net benefits, we subtracted the scale-up costs for meeting total and unmet needs from economic benefits. All monetary values were adjusted for inflation and converted to USD 2020.

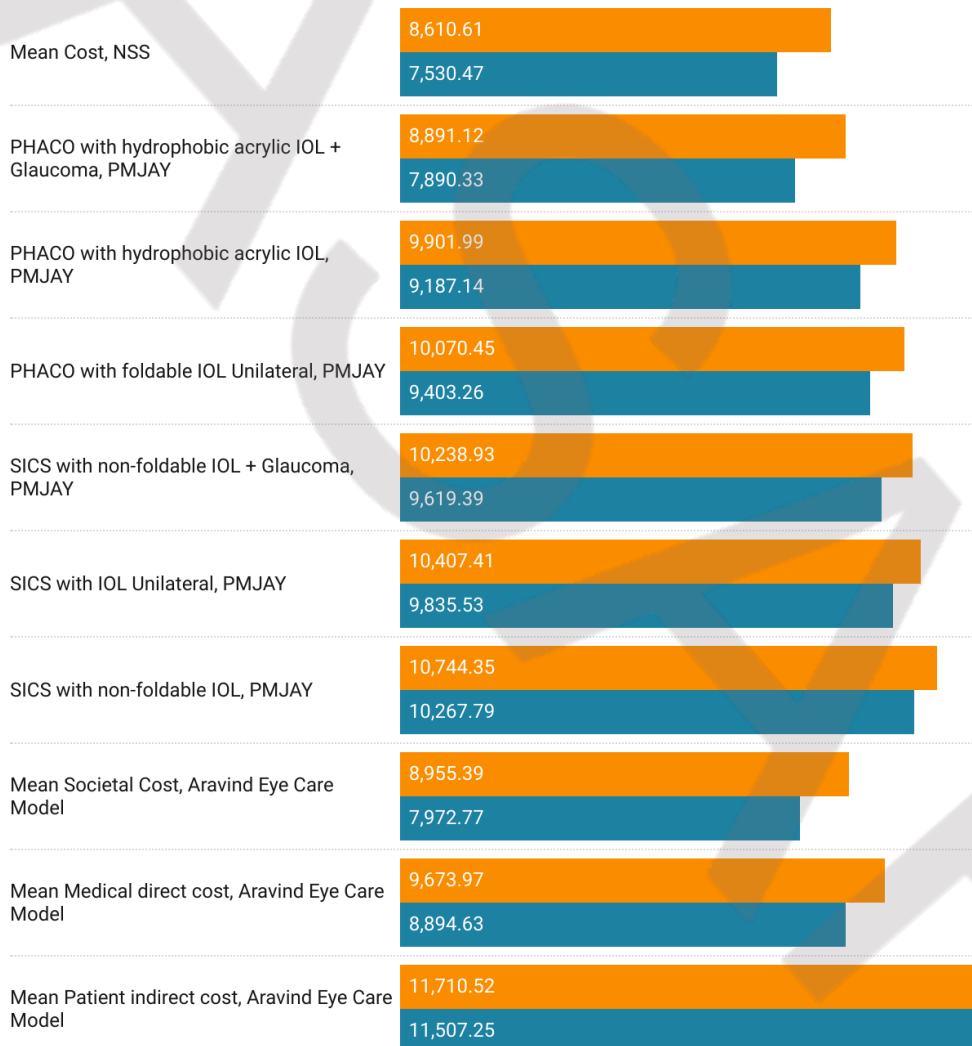
Results: Annual scale-up costs for meeting total cataract needs were 921,852,056-4,898,629,084 USD in 2018. Costs for covering unmet needs were 718,584,854- 3,818,487,619 USD. The economic benefit of averting the cataract disease burden was 12,429,100,755 [8,878,449,077, 16,662,568,954] USD. Annual net benefits for covering total needs are 7,530,471,671 to 11,507,248,698 USD. While those for covering unmet needs are 8,610,613,136 to 12,429,100,755 USD. All Indian states would benefit from cataract scale-up, i.e., positive net benefit values.

Conclusion: We found that universal cataract coverage would be cost-beneficial for India. Scale-up of cataract surgeries to cover unmet needs makes up a small percentage of the country's GDP.

Net Benefits for Meeting Total and Unmet Needs for Universal Cataract Coverage in India

All costs are adjusted to million USD for the year 2020

Unmet need Total need



NSS - National Sample Survey, PMJAY - Pradhan Mantri Jan Arogya Yojana, PHACO - Phacoemulsification, IOL - Intraocular lens, SICS - Small Incision Cataract Surgery

Chart: Association for Socially Applicable Research - Created with Datawrapper



Cost-Benefit Analysis for Universal Cataract Coverage in India

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INTRODUCTION

Despite cataract surgeries being subsidized under national program and government-funded health insurance- **Pradhan Mantri Jan Arogya Yojana (PMJAY)**, only 22 percent patients underwent cataract surgeries in 2018.

With an increasingly aging population, the gap between the cataract burden and no. of cataract surgeries conducted is bound to increase.

There is an emergent need to scale-up government funded programs and bridge this gap of curable blindness.

Our three main aims:

- To calculate scale-up costs for meeting total and unmet cataract coverage needs.
- To calculate the economic benefits of disease burden averted by cataract surgeries.
- The net benefits for cataract coverage scale-up.

METHODS

Study Design: Retrospective analysis for 2018.

Data Sources: Cataract prevalence and disability-adjusted life-years (DALYs) from Global Burden of Disease 2019, no. of free/subsidized cataract surgeries in a year conducted under national program from National Health Profile 2020, cost of cataract surgery packages from PMJAY Benefits Package List 2.0, National Sample Survey 2017-18, Aravind Eye Care Model, Gross State Domestic Product per Capita (GSDP), Total Health Expenditure per Capita (THE), Government Health Expenditure (GHE), and Gross Domestic Product (GDP) from National Health Accounts 2021.

Data Analysis: Three analyses were conducted

- Scale-up cost analysis
- We used ten cataract surgical package costs in two cataract needs scenarios.

$$\text{Scale-up costs for total needs} = (\text{cataract prevalence}) * (\text{cataract surgical package cost})$$

$$\text{Scale-up costs for unmet needs} = (\text{cataract prevalence} - \text{cataract surgeries conducted}) * (\text{cataract surgical package cost})$$

- Analysis of Economic Benefits of Averted Disease Burden

$$\text{Economic Benefits (Value of Life-Year or VLY)} = \{(\text{GSDP} - \text{THE}) * 2.8\} * \text{DALY}$$

For states, we consider GSDP and THE. For India, we consider GDP and GHE.

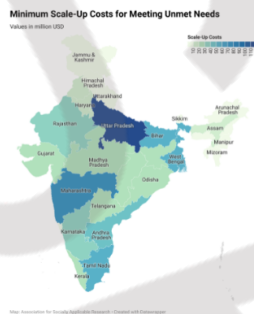
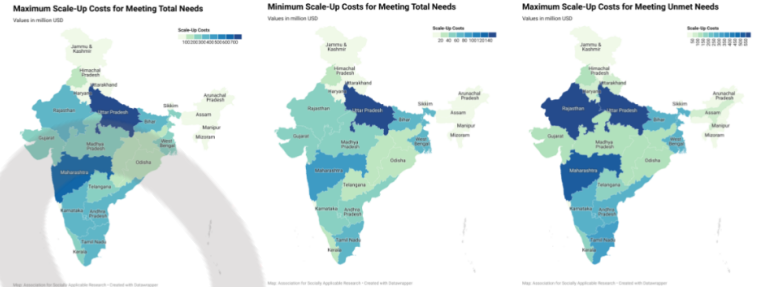
- Benefits Analysis

$$\text{Mean net benefits for total needs} = \text{Mean VLY} - \text{scale-up costs for total needs}$$

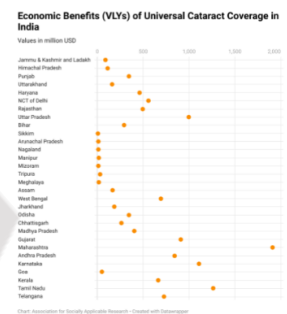
$$\text{Mean net benefits for unmet needs} = \text{Mean VLY} - \text{scale-up costs for unmet needs}$$

All costs were adjusted from INR to USD as per USD value in year 2020. 95% uncertainty intervals were propagated from DALYs to VLYs.

FINDINGS



Minimum & maximum scale-up costs for meeting total needs for India are 922 & 4899 million USD. Minimum & maximum scale-up costs for meeting unmet needs are 719 & 3824 million USD.



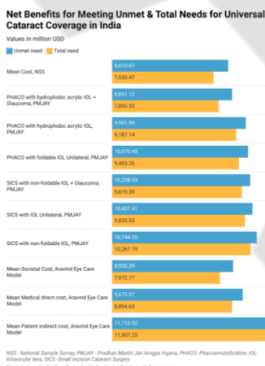
Economic benefits of averted burden for India are 12.4 (95%UI: 8.9 - 16.7) billion USD.

Except Bihar, Manipur & Meghalaya, all other states would see net benefits for meeting total needs. Maharashtra would have had the largest net benefit.

Except Manipur & Meghalaya, all other states would have net benefits for meeting unmet needs. Maharashtra would have had the largest net benefit.

Minimum & maximum net benefits for meeting total needs for coverage in India are 7.5 & 11.5 billion USD.

Minimum & maximum net benefits for meeting unmet needs for coverage in India are 8.6 & 11.7 billion USD.



CONCLUSION

- Universal cataract coverage would be cost-beneficial for India as the scale-up costs of covering unmet needs make up only a small percentage of India's GDP.
- Caveats: The study assumes that all cataract surgeries would prevent blindness. Moreover, it doesn't account for all causes of cataract, like congenital cataract and cataract due to metabolic reasons.
- This study looked at annual net benefits. Future studies should investigate projected benefits over years extending beyond 2030.

ACKNOWLEDGEMENTS

We thank everyone at ASAR for their support.