

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

Introduction:

Cataract is the most significant cause of curable blindness. We estimated the scale-up costs for universal cataract coverage, the benefits of averting the economic burden of disease, and the net benefits of universal coverage in India.

Method:

We conducted a retrospective analysis for 2018. Data came from multiple sources - Global Burden of Disease, National Health Profile, and National Health Accounts. Ten per capita surgery costs were used to calculate the scale-up costs. For total needs, we multiplied cataract prevalence with per capita surgery costs. For the unmet needs, the difference between prevalence and surgeries achieved was used. For the economic benefits of averting the cataract burden, we multiplied disability-adjusted life-years (DALYs) with non-health GDP per capita (i.e., GDP - government health expenditure). DALYs for the unmet need were calculated by multiplying the DALYs with the unmet-to-total needs ratio. For net benefits, we subtracted the scale-up costs for meeting total and unmet needs from economic benefits. Ethics approval was not needed since the research was conducted on publicly available aggregate data.

Results:

Annual scale-up costs for meeting total and unmet cataract needs were 0.92 - 4.9 and 0.72 - 3.8 billion USD, respectively. The economic benefits of averting the total and unmet cataract disease burden were 12.4 (95%UI: 8.9 - 16.7) and 9.7 (95%UI: 6.93 - 13) billion USD, respectively. Annual net benefits for covering total and unmet needs are 7.53 - 11.5 and 5.9 - 9 billion USD, respectively (Figure 1).

Conclusion:

Universalizing cataract care through increased government expenditure would be economically beneficial for India.



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. **Cataracts cause most of the world's blindness, posing a significant healthcare challenge. Unlike many diseases, it can only be treated through surgery. Hence, scaling up cataract surgeries is an essential component of global surgery.**

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. We used ten cataract surgical package costs in two cataract needs scenarios. 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

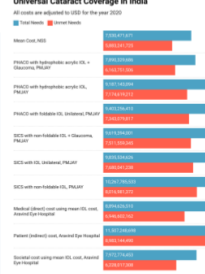
Minimum & Maximum Scale-Up Costs for Meeting Total Needs



Economic Benefits (VLYs) of Averting Total Cataract Burden



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



The economic benefit of averting the total cataract burden for India was **12.4 (95%UI: 8.9 - 16.7) billion USD**, while that of averting unmet cataract burden was **9.7 (95%UI: 6.93 - 13) billion USD**. The economic benefits for averting the total and unmet burden were highest for **Maharashtra** and lowest for **Sikkim**.

The annual net benefits from covering total needs in India ranged from **7.53 to 11.5 billion USD** while those from covering unmet needs ranged from **5.9 to 9 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.

Conclusion

Universal cataract coverage would be cost-beneficial for India. 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

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Scale-up cost analysis

Scale-up costs for total needs = (cataract prevalence) * (cataract surgical package cost)

Scale-up costs for unmet needs = (cataract prevalence - cataract surgeries conducted) * (cataract surgical package cost)

Analysis of Economic Benefits of Averted Disease Burden

Economic Benefits (Value of Life-Year or VLY) = [(GSDP - THE) * 2.8] * DALY

Benefits Analysis

Mean net benefits for total needs = Mean VLY - scale-up costs for total needs

Mean net benefits for unmet needs = Mean VLY - scale-up costs for unmet needs

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**.