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

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Conflicts of Interest:
None

Background:
Cataract is the most significant cause of curable blindness necessitating universal coverage. 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 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 economic benefits of averted 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.

Findings:
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 by 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.

Interpretation:
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. This study looked at annual net benefits. Future studies should investigate projected benefits for the future.

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INTRODUCTION

- Cataract is the most common cause of visual impairment necessitating universal coverage in India.
- What we know: According to the Global Burden of Disease Study (GBD), India had a cataract burden of 30.44 million in 2017-18. A substantial number of cataract surgeries were performed under national programs.
- What we don’t know: The amount of money government and private entities invest in universal cataract coverage.
- Our main aim: To calculate scale-up costs for meeting total and unmet cataract coverage needs.
- To realize the economic benefits of discarding cataracts by cataract surgeries.
- The net benefits for cataract coverage scale-up.

METHODS

We conducted a retrospective analysis for India and its 30 states for 2018.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Data Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract prevalence and disability-adjusted life-years (DALYs)</td>
<td>GBD 2019</td>
</tr>
<tr>
<td>No. of free/subsidized cataract surgeries in a year conducted under national program</td>
<td>National Health Profile 2020</td>
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<td>Cost of cataract surgeries</td>
<td>PMJAY Benefits Package List 2.0. National Sample Survey 2017-18, American Eye Care Models1</td>
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<tr>
<td>Gross Domestic Product per Capita (GDP), Total Health Expenditure per Capita (THE), Government Health Expenditure (GHE), and Gross Domestic Product (GDP)</td>
<td>National Health Accounts (NHA) 2021</td>
</tr>
</tbody>
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Scale-Up Costs Analysis

We used the cataract surgical package costs in two cataract needs scenarios.
- Scale-up costs for total needs = (cataract prevalence x cataract surgical package cost)
- Scale-up costs for unmet needs = (cataract prevalence x cataract surgeries conducted x cataract surgical package cost)

Analysis of Economic Benefits of Averted Disease Burden

- Economic Benefits (Value of Averted Life-Year or VLY) = (GDP - THE) x 2.11 x DALY

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

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

All costs were adjusted from INR to USD at USD 58.80 per USD in year 2020. 95% uncertainty intervals were propagated from DALYs to VLYs.

FINDINGS

- Economic benefits of cataract coverage for India are 12.4 (95%CI: 8.9 – 16.7) billion USD.

CONCLUSIONS

- 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.
- Cataracts. 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 2018.

REFERENCES

2. GBD Compare. Institute for Health Metrics and Evaluation http://ghdx.healthdata.org/gbd-compare

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