

# The Full Vaccine Value Assessment for Group A Streptococcus Vaccines

David E. Bloom Harvard T.H. Chan School of Public Health Global Vaccine and Immunization Research Forum March 29, 2023





Mission: "to ensure that safe, effective and affordable Strep A vaccines are available and implemented to decrease the burden of Strep A disease in the most in need."

#### Agenda

- Background and theoretical basis
- Comprehensive valuation framework
- Implications for Strep A vaccination

### Comprehensive valuation framework

|                  |  | Distribution |                      |                               |                      |
|------------------|--|--------------|----------------------|-------------------------------|----------------------|
|                  | Vaccination benefits   | Individual   | Family/<br>household | Society<br>(health<br>sector) | Society<br>(general) |
| Health benefits  | <ul> <li>Direct health effects</li> <li>Reduced morbidity &amp; mortality due to target pathogen</li> <li>Adverse effects of vaccination (negative benefit)</li> </ul>   | ¥            |                      |                               |                      |
|                  | <ul> <li>Prevention of secondary individual (physical) health effects</li> <li>Off-target pathogens</li> <li>Aggravation of comorbidities</li> <li>Nosocomial infections</li> <li>Microbiome disruption</li> </ul> | ~            |                      |                               |                      |
|                  | <ul> <li>Mitigation of secondary population-level health effects</li> <li>Disease transmission</li> <li>Antimicrobial resistance</li> <li>Healthcare congestion</li> </ul>   |              |                      | ✓                             | V                    |
|                  | Improved mental health   | $\checkmark$ | $\checkmark$         |                               |                      |
|                  | Reduced healthcare costs   | ✓            | $\checkmark$         | $\checkmark$                  |                      |
|                  | Reduced caregiving costs   | ✓            | ✓                    | ✓                             |                      |
|                  | Reduced transportation costs   | ✓            | ✓                    |                               |                      |
| conomic benefits | Increased labor force participation, hours worked, and income Increase in productive non-market activities   | $\checkmark$ | $\checkmark$         |                               | $\checkmark$         |
|                  | Improved educational attainment, school attendance, and cognition  | $\checkmark$ |                      |                               | $\checkmark$         |
|                  | Fiscal impact <ul> <li>Increased tax receipts</li> <li>Reduced public health spending</li> </ul>   |              |                      | ✓                             | $\checkmark$         |
| ш                | Increased wealth/savings   | ✓            | ✓                    |                               |                      |
|                  | Reduced risk and severity of impoverishment  | ✓            | ✓                    |                               | ✓                    |
|                  | Reduced risk of economically disruptive outbreaks  |              |                      | $\checkmark$                  | $\checkmark$         |
| benefits         | Improved social equity   |              |                      |                               | $\checkmark$         |
|                  | Intergenerational benefits   |              | $\checkmark$         |                               |                      |
|                  | General risk reduction   | ✓            | ✓                    | ✓                             | ✓                    |
|                  | Improved quality of life   | ✓            | $\checkmark$         |                               | ✓                    |
|                  | Reduced stigma   | ✓            | ✓                    | ✓                             | ✓                    |
|                  |  |              |                      |                               |                      |

|   | Distribution |                      |                               |                      |
|---|--------------|----------------------|-------------------------------|----------------------|
| Vaccination benefits  | Individual   | Family/<br>household | Society<br>(health<br>sector) | Society<br>(general) |
| <ul> <li>Direct health effects</li> <li>Reduced morbidity &amp; mortality due to target pathogen</li> <li>Adverse effects of vaccination (negative benefit)</li> </ul>  | ✓            |                      |                               |                      |
| <ul> <li>Prevention of secondary individual</li> <li>(physical) health effects</li> <li>Off-target pathogens</li> <li>Aggravation of comorbidities</li> <li>Nosocomial infections</li> <li>Microbiome disruption</li> </ul> | $\checkmark$ |                      |                               |                      |
| <ul> <li>Mitigation of secondary population-level<br/>health effects</li> <li>Disease transmission</li> <li>Antimicrobial resistance</li> <li>Healthcare congestion</li> </ul>  |              |                      | $\checkmark$                  | $\checkmark$         |
| Improved mental health  | $\checkmark$ | $\checkmark$         |                               |                      |

|   | Distribution |                      |                               |                      |  |
|---|--------------|----------------------|-------------------------------|----------------------|--|
| Vaccination benefits  | Individual   | Family/<br>household | Society<br>(health<br>sector) | Society<br>(general) |  |
| Reduced healthcare costs  | $\checkmark$ | $\checkmark$         | $\checkmark$                  |                      |  |
| Reduced caregiving costs  | $\checkmark$ | $\checkmark$         | $\checkmark$                  |                      |  |
| Reduced transportation costs  | $\checkmark$ | $\checkmark$         |                               |                      |  |
| Increased labor force participation, hours<br>worked, and income<br>Increase in productive non-market<br>activities | $\checkmark$ | ✓                    |                               | ~                    |  |
| Improved educational attainment, school attendance, and cognition   | $\checkmark$ |                      |                               | $\checkmark$         |  |
| <ul><li>Fiscal impact</li><li>Increased tax receipts</li><li>Reduced public health spending</li></ul>               |              |                      | $\checkmark$                  | $\checkmark$         |  |
| Increased wealth/savings  | $\checkmark$ | $\checkmark$         |                               |                      |  |
| Reduced risk and severity of<br>impoverishment  | $\checkmark$ | $\checkmark$         |                               | $\checkmark$         |  |
| Reduced risk of economically disruptive outbreaks   |              |                      | $\checkmark$                  | ~                    |  |

|                            | Distribution |                      |                            |                      |
|----------------------------|--------------|----------------------|----------------------------|----------------------|
| Vaccination benefits       | Individual   | Family/<br>household | Society<br>(health sector) | Society<br>(general) |
| Improved social equity     |              |                      |                            | $\checkmark$         |
| Intergenerational benefits |              | $\checkmark$         |                            |                      |
| General risk reduction     | $\checkmark$ | $\checkmark$         | $\checkmark$               | $\checkmark$         |
| Improved quality of life   | $\checkmark$ | $\checkmark$         |                            | $\checkmark$         |
| Reduced stigma             | $\checkmark$ | $\checkmark$         | $\checkmark$               | $\checkmark$         |

### Comprehensive valuation framework

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|                  | <ul> <li>Mitigation of secondary population-level health effects</li> <li>Disease transmission</li> <li>Antimicrobial resistance</li> <li>Healthcare congestion</li> </ul>   |              |                      | ✓                             | V                    |
|                  | Improved mental health   | $\checkmark$ | $\checkmark$         |                               |                      |
|                  | Reduced healthcare costs   | ✓            | $\checkmark$         | $\checkmark$                  |                      |
|                  | Reduced caregiving costs   | ✓            | ✓                    | ✓                             |                      |
|                  | Reduced transportation costs   | ✓            | ✓                    |                               |                      |
| conomic benefits | Increased labor force participation, hours worked, and income Increase in productive non-market activities   | $\checkmark$ | $\checkmark$         |                               | $\checkmark$         |
|                  | Improved educational attainment, school attendance, and cognition  | $\checkmark$ |                      |                               | $\checkmark$         |
|                  | Fiscal impact <ul> <li>Increased tax receipts</li> <li>Reduced public health spending</li> </ul>   |              |                      | ✓                             | $\checkmark$         |
| ш                | Increased wealth/savings   | ✓            | ✓                    |                               |                      |
|                  | Reduced risk and severity of impoverishment  | ✓            | ✓                    |                               | ✓                    |
|                  | Reduced risk of economically disruptive outbreaks  |              |                      | $\checkmark$                  | $\checkmark$         |
| benefits         | Improved social equity   |              |                      |                               | $\checkmark$         |
|                  | Intergenerational benefits   |              | $\checkmark$         |                               |                      |
|                  | General risk reduction   | ✓            | ✓                    | ✓                             | ✓                    |
|                  | Improved quality of life   | ✓            | $\checkmark$         |                               | ✓                    |
|                  | Reduced stigma   | ✓            | ✓                    | ✓                             | ✓                    |
|                  |  |              |                      |                               |                      |

#### **Overarching conclusions**

- Strep A vaccination would plausibly:
  - Prevent billions of cases of superficial illness and millions of deaths over several decades
  - Be cost-effective at all income levels assuming total costs in line with other new vaccines
  - Produce a wide range of health, economic, and social benefits, including potentially significant AMR mitigation
  - Yield trillions of dollars in global societal benefits
  - Generate full societal returns many times reasonable investment into their development

# Thank you! dbloom@hsph.harvard.edu