EXPLORING THE COST-EFFECTIVE PRICE THRESHOLD OF DENGUE VACCINATION PROGRAMS IN MALAYSIA: A VALUE-BASED PRICING ASSESSMENT

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BACKGROUND

• Malaysia is currently experiencing the most serious dengue epidemic in its history, with the number of dengue cases 5-7 times higher than the median between 2011-2015.
• On April 15th 2016, WHO-SAGE on Immunization recommended the use of dengue vaccine in countries with high endemicity.
• The first dengue vaccine, Dengvaxia by Sanofi Pasteur, has been registered in 4 countries.
• With the rapid advancement of dengue vaccine development and projected availability by this year, a Malaysia-specific economic evaluation of dengue vaccine is needed urgently to inform decision makers on the available options for controlling and preventing dengue disease with vaccines.

OBJECTIVES

1. To assess the potential health and economic impact of a 3 dose tetravalent dengue vaccine in Malaysia under different vaccination strategies.
2. To determine the cost-effective threshold price of the dengue vaccine for different vaccination strategies.

RESULTS OBJECTIVE 1

Table 1: Model inputs and simulation parameters

<table>
<thead>
<tr>
<th>Parameter</th>
<th>NR Vaccine Strategy</th>
<th>THS Vaccine Strategy</th>
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</thead>
<tbody>
<tr>
<td>Vaccine coverage</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Vaccine effectiveness</td>
<td>1.7</td>
<td>1.0</td>
</tr>
<tr>
<td>Vaccine wastage</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>Discount rate</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Vaccination duration</td>
<td>10 years</td>
<td>10 years</td>
</tr>
<tr>
<td>DALY averted per dengue case - hospitalised</td>
<td>0.93</td>
<td>0.91</td>
</tr>
<tr>
<td>DALY averted per dengue case - ambulatory</td>
<td>0.61</td>
<td>0.62</td>
</tr>
<tr>
<td>Treatment cost - hospitalised dengue case</td>
<td>US$ 872.33</td>
<td>US$ 326.25</td>
</tr>
<tr>
<td>Treatment cost - ambulatory dengue case</td>
<td>US$ 11,362.69</td>
<td>US$ 2,546.09</td>
</tr>
</tbody>
</table>

Both strategies showed a consistent reduction on dengue cases (40%) and dengue-related mortality (43%) compared to no vaccination.

Figure 1: Vaccination impact on dengue burden over 2015-2025

Both NW and THS vaccination strategies exhibited a reduction of year-of-life lost (YLL) and disability-adjusted-life-year (DALY) compared to no vaccination.

Figure 2: Vaccination impact on dengue treatment cost (ambulatory and hospitalised) and total dengue management cost

The model predicted that both NW and THS vaccination strategies would reduce the total dengue treatment cost and total dengue management cost over 10 years (2016-2025).

RESULTS OBJECTIVE 2

The threshold price from both vaccination strategies were most sensitive to the ambulatory underreporting factor, vaccine protection duration and hospitalised underreporting factor. It is least sensitive to the vaccine administration cost and vaccine coverage for catch-up cohort.

CONCLUSIONS

The results of this study were robust to a wide range of sensitivity. Our analysis demonstrated that introducing a dengue vaccination program in Malaysia has the potential to substantially reduce the disease and economic burden (40% and 43% respectively), especially if it is introduced during current dengue epidemic. Nationwide vaccination showed a bigger overall impact compared to targeted hotspot vaccination. Our study suggested that dengue vaccination is a potentially good investment if the purchaser could negotiate a price at or below the highest cost-effective threshold price, i.e. US$ 12.60 for nationwide vaccination and US$ 34.29 for targeted hotspot vaccination. We hope this study would inform the decision makers on the fair vaccine price and that it could be a medium for negotiations between stakeholders when considering the incorporation of the dengue vaccine into the National Immunization Program.

References: