

A cost-minimization and budget impact analysis to evaluate the introduction of an acellular hexavalent vaccination for pediatric population in Dominican Republic

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INTRODUCTION

The incorporation of multivalent vaccines in vaccination schedules, provides favorable impact on coverage, vaccination time and number of injections. The substitution of the current whole cell pentavalent vaccine (DTwP-Hib-HepB) + IPV scheme for an acellular hexavalent vaccine (DTaP-IPV-Hib-HepB) represents an opportunity to improve health outcomes with reduced adverse events.

OBJECTIVE

Estimate the economic impact of introducing an acellular hexavalent vaccine in the national immunization program (NIP) in Dominican Republic.

METHODS

- A cost-minimization analysis comparing both vaccination schemes was developed including vaccine acquisition, adverse reactions (AEs) management, logistic operation and activities, and social costs associated with time spent by parents, for a 3-dose and 4-dose (booster dose included) vaccination scenarios:
 - 3+0 Pentavalent Scheme¹: 3 pentavalent vaccines (DTwP-HB-Hib) + 2 IPV + 1 OPV
 - 3+0 Hexavalent Scheme: 3 hexavalent vaccines (DTaP-HB-Hib-IPV)
 - 3+1 Hexavalent Scheme: 4 hexavalent vaccines (DTaP-HB-Hib-IPV)
- Costs for vaccines and waste factors were obtained from published literature²⁻⁴ (**Table 1**) and costs of AEs were calculated by micro costing from local sources (**Table 2**). All costs are expressed in \$Dominican Pesos.
- A budget impact analysis assessed the economic impact of the hexavalent vaccine introduction on the NIP budget, assuming a 100% substitution of the pentavalent vaccine + IPV scheme, for an estimated target population of ~190.000 individuals⁵.
- One-way sensitivity analysis was performed for the main inputs in the cost-minimization analysis with a 20% variation value.



POSTER HIGHLIGHT: Introducing the liquid combined acellular hexavalent vaccine into Dominican Republic’s NIP represents investment to attain better health outcomes with reduced adverse events, reduced logistic operation costs and increased social benefits.

Table 1: Vaccine Costs and Waste Factor

Vaccine	Cost per dose	Waste Factor
DTwP	\$9	30%
DTwPHibHepB	\$52	5%
IPV	\$159	10%
OPV	\$9	30%
DTaP-IPV-Hep B-Hib	\$1,083	5%

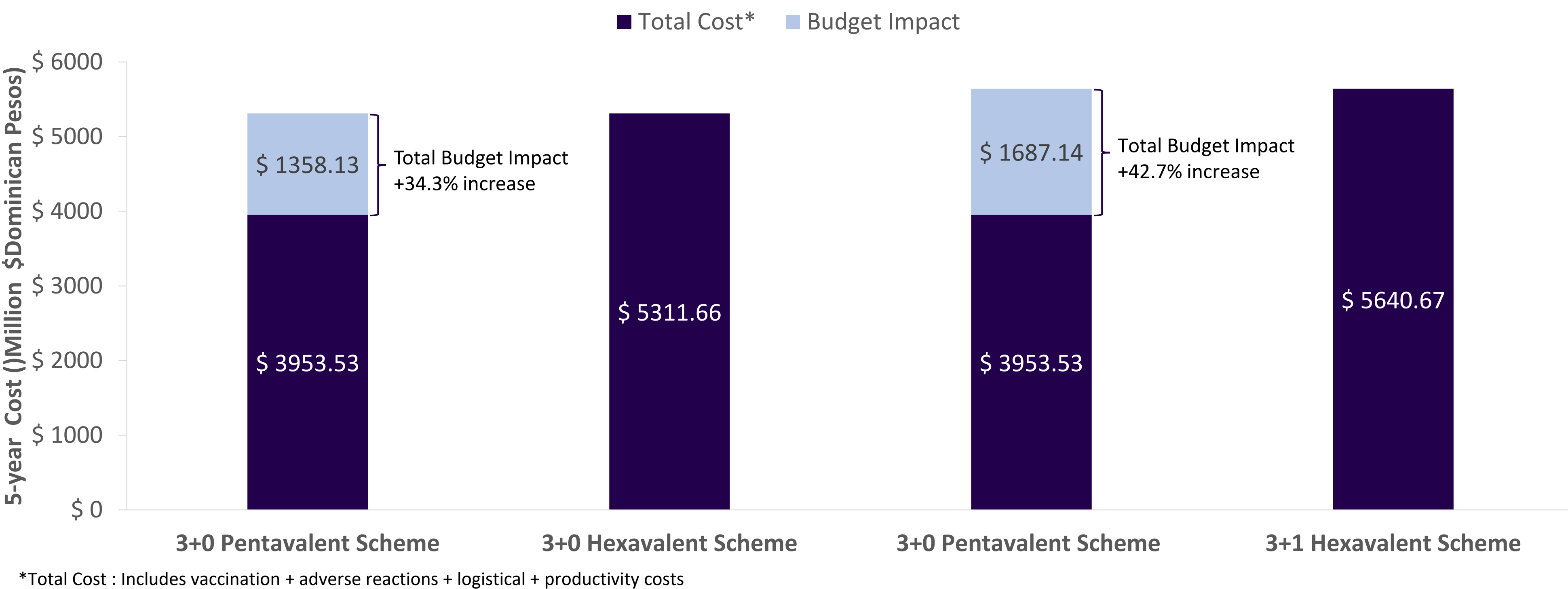
Table 2: Adverse Events Cost

Event	Cost per event
Convulsions	\$11,766
Hypotonic Hyporesponsive Episode	\$24,254
Fever	\$39
Irritability	\$183
Prolonged Crying	\$183
Anorexia	\$183
Drowsiness	\$183
Vomiting	\$183
Pain/tenderness	\$46
Redness	\$76
Swelling/induration	\$156
Bradycardia + desaturation	\$23,140
Bradycardia + desaturation + apnea	\$23,140

Table 3: Cost-minimization results per vaccinated child

Cost category	Pentavalent	Hexavalent (3+0)	Difference	% Diff. w/ Pentavalent	Hexavalent (3+1)	Difference	% Diff. w/ Pentavalent
Vaccination	\$ 547	\$ 3,433	\$ 2,886	527.61%	\$ 4,547	\$ 3,999	731.26%
Adverse Reactions	\$ 1,525	\$ 734	-\$ 791	-51.87%	\$ 382	-\$ 1,143	-74.95%
Logistical	\$ 1,176	\$ 735	-\$ 441	-37.50%	\$ 595	-\$ 579	-49.32%
Productivity	\$ 852	\$ 592	-\$ 260	-30.52%	\$ 455	-\$ 397	-46.60%
Total	\$ 4,100	\$ 5,494	\$ 1,394	34.00%	\$ 5,980	\$ 1,880	45.85%

Figure 1: 5-year Budget Impact for 3+0 and 3+1 comparisons



RESULTS

In the cost-minimization analysis the hexavalent vaccine produced an increase in total costs of 34.0% and 45.8% for the 3-dose and 4-dose scenarios respectively (**Table 3**). This was mainly explained by the vaccine acquisition costs.

However, the adverse events, logistic and social costs would be reduced by 51.87%–74.87%, 37.50%–49.23%, and 30.52%–46.60% (3-dose–4-dose) respectively (**Table 3**).

The budget impact analysis showed an overall budget increase of 34.4% and 42.7% with a 37.5% and 50% reduction in total vaccine doses administered, for the 3-dose and 4-dose scenarios respectively (**Figure 1**).

CONCLUSIONS

- Incorporating a hexavalent vaccine in the Dominican Republic NIP would result in a net increase in spending with a large mitigation from reduced adverse events, logistic and social costs, to 34.0% and 45.8% for the 3-dose and 4-dose scenarios respectively
- The opportunity cost of liberating vaccine storage capacity could imply a supply chain optimization to allow the introduction of newer vaccines.
- The increased spending can be regarded as an investment for overall better health outcomes and modernization of the NIP in Dominican Republic.

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