Cost Minimization Analysis of the Switch to a New Immunization Schedule with a Hexavalent (DTaP-HBV-Hib-IPV) Vaccine in Algeria

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INTRODUCTION & OBJECTIVE

- The objective of this cost minimization analysis is to estimate the impact switching from the current immunization schedule with a tetravalent vaccine (DTwP-Hib)+ HBV+OPV/IPV to a new schedule with a hexavalent vaccine (with/without OPV), on vaccine delivery costs in Algeria (Figure1)

METHODS

- The cost minimization analysis was designed with a 1-year time horizon for all new births per year (1.2 million) in Algeria. Demographic data references were taken from the national register, current immunization schedule from the Ministry of Health (MoH) 2016 decree and two scenarios were simulated for the new schedule: one from MoH's 2018 decree « with hexavalent/not yet applied » and the second one is an assumption « 2018 schedule without OPV doses » (figure 1).
- The costs included are delivery costs: Labor (paid and volunteer human resources); Supply chain (costs for cold chain equipment, vehicles, transport, and fuel); Service delivery (costs for program management, training, social mobilization, and disease surveillance); Capital (buildings, utilities, other overheads/capital costs).
- Vaccine acquisition costs were not taken into consideration.
- All costs were reported in US dollars and collected from the literature.
- A one-way sensitivity analysis was performed, using the 3 parameters : population of study, number of vaccine doses per schedule & total delivery cost per vaccine dose.

RESULTS

The potentially new schedule including a hexavalent vaccine showed a potential budget saving of :

- Considering the new schedule with hexavalent vaccine: of 23 M $ / year (-35 % of delivery costs).
- Considering the new schedule with hexavalent and without VPO : of 30 M $ (-45 % of delivery costs).
- From sensitivity analysis and across all the scenarios analysed the budget impact always remain negative.

Figure 1: National immunization programme schedules in Algeria

Current immunization schedule in Algeria

Vaccine	0 birth	02 months	03 months	04 months	11 months	12 months	18 months	6 years
BCG	✓							
HBV	✓	✓		✓		✓		
Tetravalent DTwP Hib		✓		✓		✓		✓
VPI			✓					
OPV	✓	✓		✓		✓		✓
DT adulte								
Pneumo		✓		✓		✓		
MMR					✓		✓	

Acronyms:

OPV: oral polio vaccine/**IPV**: injectable polio virus/**HiB** Haemophilus influenzae type B vaccine/**HBV** : hepatitis B vaccine/**DTaP** : Diphtheria, Tetanus, and acellular Pertussis/**DTwP** : Diphtheria, Tetanus, and whole cell Pertussis/**MMR** : measles, mumps, and rubella vaccine/ **Peunemo:** pneumococcal vaccine

New immunization schedule in Algeria

Vaccins	birth	02 months	03 months	04 months	11 months	12 months	18 months	6 years
BCG	✓							
Hexavalent HBV	✓							
Hexavalent DTaP		✓		✓		✓		✓
Hexavalent Hib								
Hexavalent VPI								
OPV				✓		✓		
DT adulte								
Pneumo		✓		✓		✓		
MMR					✓		✓	

For the second scenario :the two doses of OPV (4 months & 12 months) are deleted

Table 2: Study design

Time Horizon	1 year
Study population	Births per year : 1,2 millions
Vaccination Schedule Scenarios	1. **Current schedule** : Ministry of health decree 2016 (applied now) 2. **New schedule** : Ministry of health decree of 2018 (with hexavalent/not yet applied) 3. **New Schedule without OPV doses (WHO recommendations)**
Costs	1. Costs included (costs of vaccine delivery) • Labor : paid and volunteer human resources • Supply Chain : costs for cold chain equipment, vehicles, transport, and fuel • Service Delivery : costs for program management (i.e., supervision and monitoring), training, social mobilization, and disease surveillance • Capital : buildings, utilities, other overheads and/or capital costs 2. Costs not included (costs of vaccine acquisition & adverse events)

Figure 3: Results

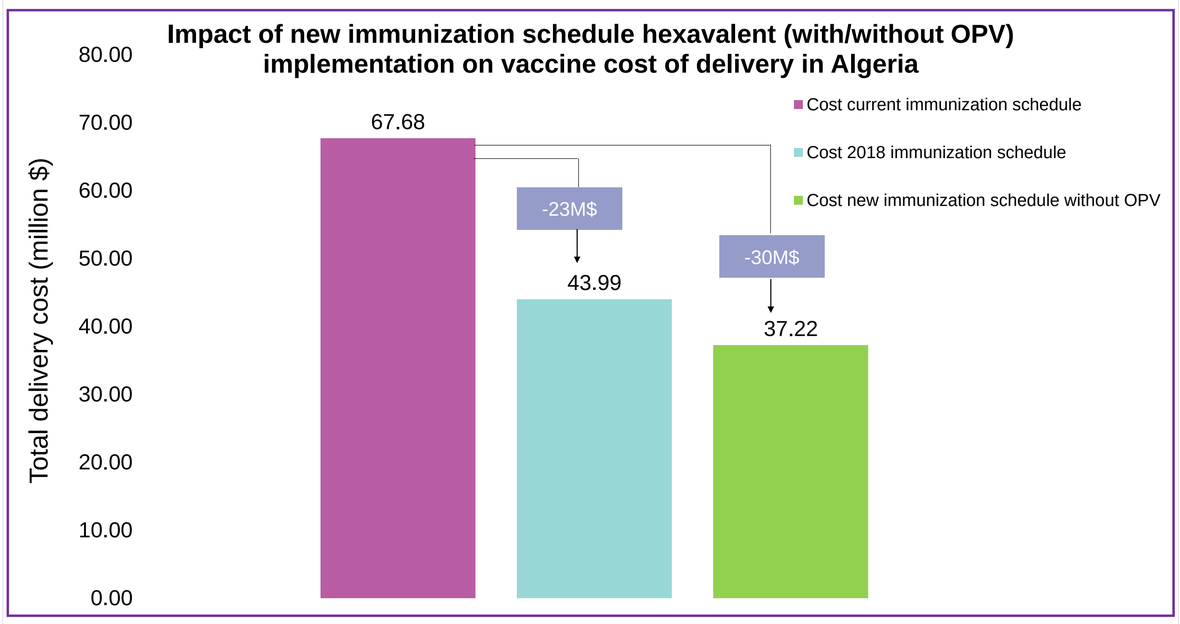
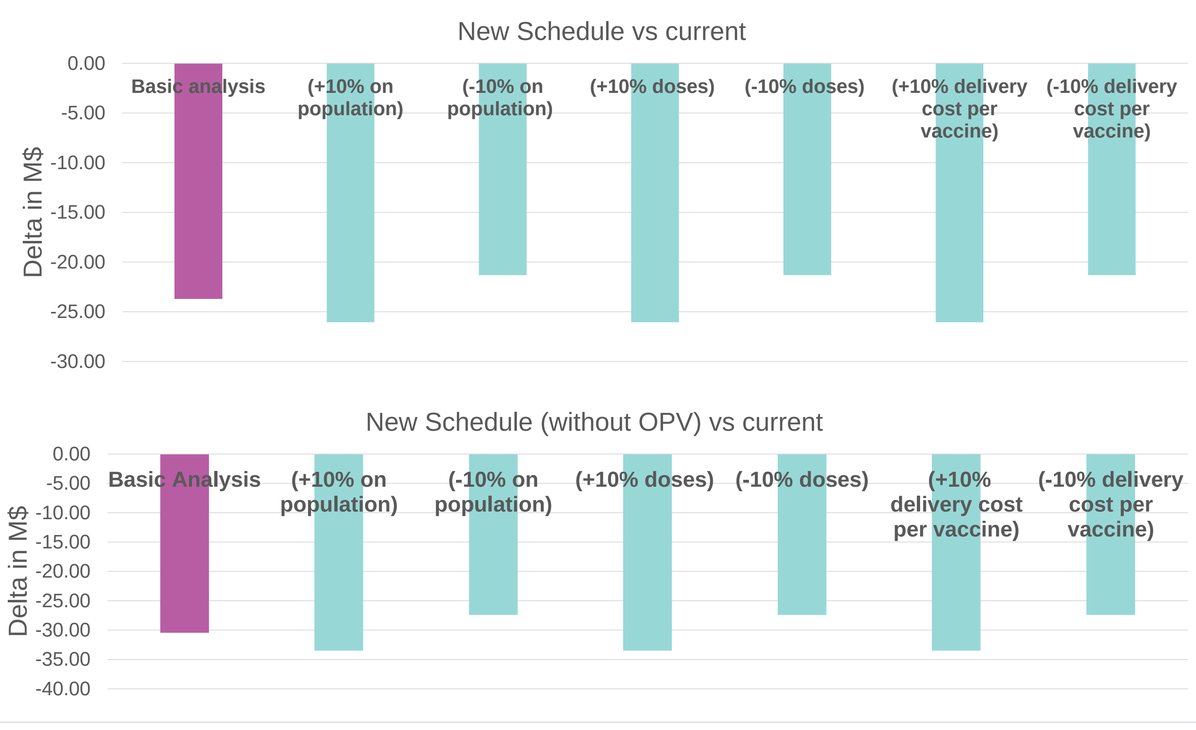


Figure 4: Sensitivity analysis



DISCUSSION

- Combination vaccines can help to overcome the challenges associated with multiple administration of monovalent vaccines.
- Introduction of hexavalent vaccine to national immunization program 'NIP' in Algeria will allow for considerable savings on vaccine delivery costs.
- Adherence to WHO recommendations in terms of deleting OPV doses from vaccine schedules will allow for more savings.
- The introduction of vaccine procurement costs, is likely to increase the total budget, and this is consistent with the data obtained from studies in Latin America: Chile, Colombia, Brazil.

Limitations & Perspectives

- The study focuses only on vaccine delivery costs providing an insightful yet partial view of the total cost of immunization.
- A local cost minimization analysis including more costs (adverse events, vaccine procurement , waste) is ongoing

CONCLUSIONS

- The total vaccine delivery budget for the application of a new immunization schedule (introduction of a hexavalent vaccine) in Algeria has a considerable savings potential on health expenses and MoH budget (-23 M€ per year).
- Furthermore, the application of the WHO recommendations in terms of OPV withdrawal from the schedule would allow significant savings (-30M€ per year) on health expenses.

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DISCLOSURES

Author Name :

- **Laichour Abdelmalek :** Employee of Sanofi
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