

Exercise: Estimating immunization program costs (~60 minutes)

Overview

Information on the cost of procuring vaccines and of running national immunization program is a key factor in planning and managing an effective immunization program. This information is also needed to conduct a cost-effectiveness analysis of a new vaccine.

Vaccine program costs are context specific and not generalizable from one country to another: vaccination schedules, target populations, vaccine introduction strategies and prices may vary.

You will now estimate how much it would cost to introduce a new vaccine into routine immunization, to produce information that can be used as input into a rough cost-effectiveness assessment, or to assist with planning and budgeting. The objectives of the exercise are to:

- Gain deeper understanding on the cost components of a cost-effectiveness analysis and the types and sources of data required
- Practice some of the basic process and logic of estimating immunization program costs
- Learn some ways to generate cost estimates that can inform decisions on whether to adopt a new vaccine (or change program strategies)
- Be able to interpret cost data, and understand their usefulness and challenges – you can produce some estimates with the data provided, but note what the limitations may be.

You can work in small groups to pool the expertise of different people to answer various questions. (There is seldom one “right” answer).

Exercise

You will be a planner in the team which has been asked to investigate the introduction of pneumococcal conjugate vaccine (PCV) into the national routine immunization program in the lower middle income country Contagia. The country has a total population of 14 752 000 and a crude birth rate of 38/1000. An estimated 81% of children are fully immunized. The country is a lower middle income country which has been receiving GAVI support but expects to have to fund more of its immunization program over the next few years. The current routine childhood immunization schedule is given below.

Antigen	Age
OPV0	At birth up to 13 days
BCG	At birth or first contact
OPV1, DTP-HepB-Hib1	6 Weeks of age
OPV2, DTP-HepB-Hib2	10 Weeks of age
OPV3, DTP-HepB-Hib3	14 Weeks of age
Measles – MCV1	9 Months of age
Measles – MCV2	18 Months of age

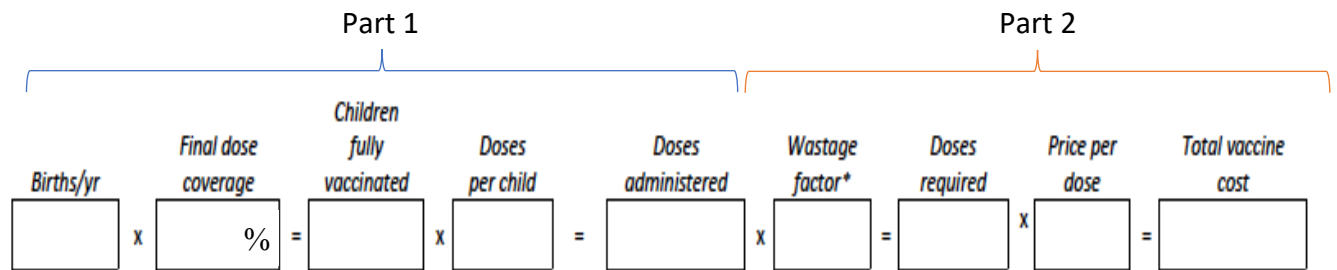
PCV will be in single dose vials and administered by injection at the same time as DTP at 6, 10 and 14 weeks of age.

Assess Figure 1 (below) which shows a method for calculating total vaccine cost/ child.

The first parts of the “model” calculate the number of doses *administered* by using the coverage and demographic projections. The second part estimates the total number of doses that need to be *purchased*. To do this we need to estimate how many vaccine doses would be lost to wastage (expired / damaged / partial use of vials containing more than one dose).

Fill in the cells that you can with the information presented above, then proceed to the next questions which give you more information.

Figure 1: Annual vaccine costs



* The wastage factor should be a constant > 1.

1. Calculate the number of doses administered in Contagia, before the introduction of PCV (Part 1).
2. What do you think the % wastage of the PCV vaccine would be based on experience in your own country? How could you more accurately estimate the potential wastage of the PCV?

3. The cost of PCV, under an agreement with manufacturers to give them incentive to develop vaccines, will be \$7 per dose for the first 3 years when it will be donor funded. After that it will be \$3.50 per dose when funded by the country. What cost would you use when completing your total vaccine cost calculation and why?

4. Use your estimates of vaccine price from Q3 and wastage from Q2 to update your “model” and calculate total PCV vaccine costs.

Table 1: Total costs of routine immunization program in Contagia before PCV introduction (2016)

Capital costs	Cost (\$, 000)	% of cost
Cold chain	570	1.5%
Vehicles	2 000	5.2%
Buildings	1 085	2.8%
Other	557	1.5%
Sub-total	4 212	11.0%
Recurrent costs		
Vaccine and supplies	6 168	16.2%
Vaccine injection and safety supplies	186	0.5%
Paid labor	18 130	47.5%
Volunteers/ community health workers	730	1.9%
Allowances for travel/ subsistence	4 390	11.5%
Cold chain (energy)	120	0.3%
Vehicles (maintenance, fuel)	2 770	7.3%
Communications,	725	1.9%
Building maintenance, utilities	350	0.9%
Other supplies and printing	372	1.0%
Sub-total	33 941	89.0%
Total	38 153	100%

5. Table 1 above shows the total costs of delivering all vaccines in the country's routine immunization program in 2016 (before PCV introduction). How are the results useful from a program planning and management perspective?

6. What are the major cost drivers of the existing immunization program in the country?

7. Which costs of introducing PCV will be most important to estimate accurately for a cost effectiveness evaluation?

Would any of these be less important for program budgeting?

8. For national programs, an important estimate is the *cost per fully immunized child (FIC)*. The simplest way to estimate this is to divide the total costs of the program by the number of children with a complete vaccine schedule.

Using information from Table 1, what is the cost per fully vaccinated child in the country? What do you think may be 1-2 limitations on using estimates of the cost per FIC?

9. Records indicate that the country delivered 1 362 199 doses of DTP in 2016.
- What is your best estimate the average *total cost per dose of vaccine* in the program?

- What is your best estimate of the service *delivery cost per dose* i.e. non-vaccine cost?

- What is your rough estimate of the expected *total cost/dose of PCV*? Note any limitations of your estimate

10. Do you think that the total cost per dose estimated in question 9 will vary within a country? Where would you expect cost per dose to be higher or lower?

11. PCV is usually administered alongside DTP at 2, 4 and 6 months. Some countries now use a 2+1 schedule (i.e. 2 doses alongside the DTP series + 1 booster later - usually around 12 months). What would be the implications (financial, logistical) of implementing the new schedule?

12. What are the most important components that need to be taken into consideration to calculate the cost of introducing PCV into **your own country's** routine immunization program? List up to 5 major inputs of this program. For each type indicate the most likely source(s) of data in your country.

Type	Source(s)

Further reading: Griffiths et al. *Costs of introducing pneumococcal, rotavirus and second dose measles vaccine into the Zambian Immunization program: are expansions sustainable?* Vaccine (2016)

END OF EXERCISE