

Budgetary Impact of PCV20 Use Among Privately Insured Adult Patients Living in Dubai who are at Elevated Risk of Pneumococcal Disease



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INTRODUCTION

- Dubai Health Authority (DHA) currently recommends pneumococcal vaccination among adults at elevated risk of disease, including those aged 19-49 years with underlying medical or immunocompromising conditions and all adults aged ≥50 years¹
- Current recommendations include use of 13-valent pneumococcal conjugate vaccine (PCV13) followed by 23-valent pneumococcal polysaccharide vaccine (PPV23; PCV13→PPV23)¹
- Novel 20-valent PCV (PCV20)—which has potential to further reduce pneumococcal disease and associated mortality—recently received regulatory approval in Dubai²

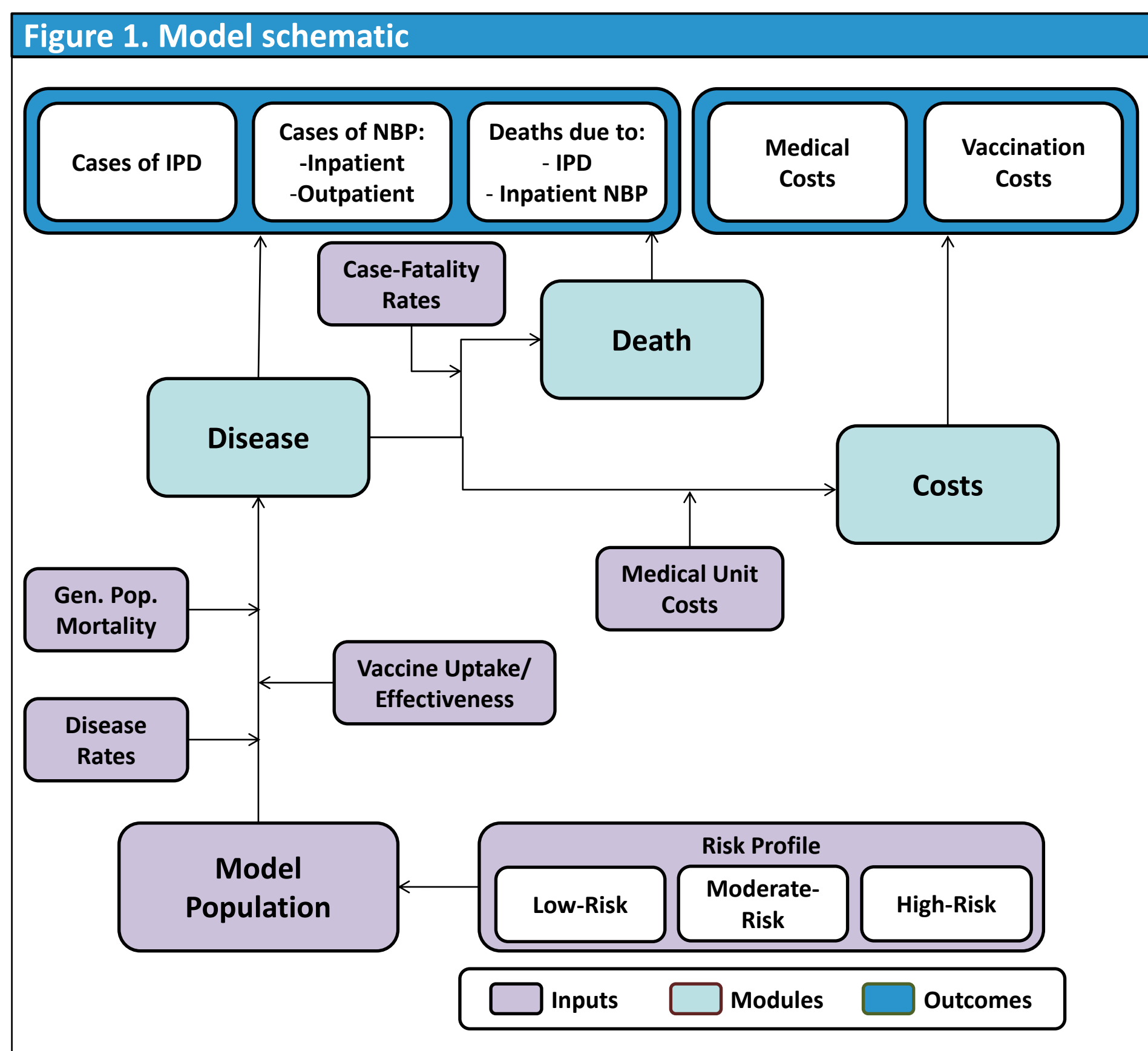
OBJECTIVE

- To evaluate budgetary impact (BI) of PCV20 compared with current DHA recommendations among expatriates living in Dubai who are currently eligible for pneumococcal vaccination

METHODS

Model Structure

- Model employs deterministic framework to depict clinical risks and economic costs of pneumococcal disease over 5-year modelling horizon (Figure 1)
- Model population was characterized by age (1-year increments) and risk profile (high [immunocompromised], moderate [immunocompetent with underlying conditions], low [immunocompetent without underlying conditions])
- Persons in model population were either vaccinated at model entry, vaccinated in subsequent years of the modelling horizon, or never vaccinated:
- Clinical outcomes and economic costs included:
 - Cases of invasive pneumococcal disease (IPD) and inpatient and outpatient all-cause non-bacteremic pneumonia (NBP)
 - Disease-attributable deaths
 - Disease-related medical care costs and vaccination costs



Model Parameters

- Model population (N=390,536) included expatriates living in Dubai aged 19-49 years with moderate- or high-risk conditions and those aged 50-99 years (irrespective of risk profile)^{3,4}
- Inputs were estimated using published literature or publicly available data, when possible, or unpublished data or assumption, as necessary (Table 1)
- Vaccine serotype coverage was as follows:
 - IPD: PCV13, 43.3%; PCV20, 77.9%; PPV23, 86.6%^{5,6}
 - NBP: PCV13, 11.8%; PCV20, 21.3%⁵⁻⁷
- Vaccine prices were: PCV20, \$96.79; PCV13, \$91.34, and PPV23, \$39.34^{8,9}; administration was assumed to cost \$20
- Lacking robust data on uptake of pneumococcal vaccines among adults in Dubai, annual vaccine uptake of both PCV20 and the current strategy was conservatively assumed to be 5% in base case analyses:
 - Sensitivity analyses considering annual vaccine uptake of 10% and 15%, respectively, also were conducted

Analyses

- BI of PCV20 (vs. current recommendations) was calculated as the difference in total costs over a 5-year period
- All costs are in US dollars and were discounted at 3.5% annually

METHODS (CONT.)

Table 1. Base case model input values, by age and risk group

	19-49 years		50-64 years		65-74 years			≥75 years		
	Mod	High	Mod	High	Low	Mod	High	Low	Mod	High
No. of adults (in hundreds) ^{3,4}	1,264.5	58.8	435.1	25.7	140.7	51.1	5.1	48.0	11.3	2.5
Incidence of IPD (per 100K) ^{4,7}	13.9	38.4	10.4	52.6	21.1	29.7	112.2	116.0	86.2	145.1
Incidence of inpt all-cause NBP (per 100K) ^{4,7}	191.4	528.8	143.0	724.0	290.9	408.4	1,545.2	1,597.4	1,187.6	1,997.8
Incidence of outpt all-cause NBP (per 100K) ⁴	1,612.2	1,340.6	1,071.7	1,694.3	873.0	1,314.1	1,381.2	1,116.3	1,592.4	2,142.9
Gen. population mortality (per 100) ¹⁰	0.0	0.0	0.3	0.3	1.4	1.4	1.4	4.9	4.9	4.9
CFR for IPD (per 100) ¹¹	4.9	4.9	11.3	11.3	16.0	16.0	16.0	29.5	29.5	29.5
CFR for inpt all-cause NBP (per 100) ¹²	2.5	2.5	3.1	3.1	20.5	20.5	20.5	20.5	20.5	20.5
CFR for outpt all-cause NBP (per 100)	0	0	0	0	0	0	0	0	0	0
Cost of IPD and inpt all-cause NBP treatment ⁴	\$3,193	\$31,336	\$6,168	\$5,563	\$8,239	\$3,642	\$19,086	\$12,206	\$6,595	\$26,458
Cost of outpt all-cause NBP treatment ⁴	\$221	\$304	\$223	\$640	\$246	\$254	\$133	\$233	\$208	\$250
VE-PCV vs. VT-IPD, yrs 1-5 ^{13,14}	81.5%	65.2%	79.2%	63.3%	75.0%	75.0%	60.0%	75.0%	75.0%	60.0%
VE-PCV vs. VT-NBP, yrs 1-5 ^{13,14}	55.6%	44.5%	51.3%	41.1%	45.0%	45.0%	36.0%	45.0%	45.0%	36.0%
VE-PPV23 vs. VT-IPD, yr 1 ¹⁵	32.8%	17.0%	32.5%	16.9%	56.0%	31.1%	16.2%	47.7%	26.5%	13.8%
VE-PPV23 vs. VT-IPD, yr 5 ¹⁵	25.0%	13.0%	24.8%	12.9%	42.7%	23.7%	12.3%	36.4%	20.2%	10.5%
VE-PPV23 vs. VT-NBP, yr 1 ¹⁶	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

RESULTS

Base Case Analyses

- Use of PCV20 would result in fewer cases of pneumococcal disease (IPD: 13; inpatient NBP: 31; outpatient NBP: 139) and fewer disease-attributable deaths (5) than currently recommended vaccines (Table 2)
- Medical care costs would decrease by \$353.8K; vaccination costs would decrease by \$4.4M
- Thus, PCV20 use would yield total savings of \$4.8M or \$2.47 per-person per-year (PPPY)

Scenario Analyses

- Assuming higher uptake (i.e., 10% or 15%) for both PCV20 and PCV13→PPV23, use of PCV20 would result in greater reductions in cases, deaths, and costs (Table 3)

Table 2. Base case results

	PCV13→PPV23	PCV20	Difference
Health outcomes			
Cases of IPD	1,181	1,168	-13
Cases of inpt all-cause NBP	4,731	4,699	-31
Cases of outpt all-cause NBP	20,052	19,914	-139
No. of Deaths	653	648	-5
Costs (in millions)			
Medical care costs			
IPD	\$9.3	\$9.2	-\$0.1
All-cause inpt NBP	\$37.7	\$37.5	-\$0.2
All-cause outpt NBP	\$4.4	\$4.4	-\$0.0
Subtotal	\$51.4	\$51.1	-\$0.4
Vaccination costs			
Vaccine	\$10.8	\$8.0	-\$2.8
Administration	\$3.3	\$1.6	-\$1.6
Subtotal	\$14.1	\$9.6	-\$4.4
Total costs	\$65.5	\$60.7	-\$4.8
Cost per-person per-year	\$33.75	\$31.28	-\$2.47

Table 3. Results from scenario analyses considering higher vaccine uptake

	10% Uptake				15% Uptake		
	PCV13→PPV23	PCV20	Difference		PCV13→PPV23	PCV20	Difference
Health outcomes							
Cases of IPD	1,096	1,072	-24		1,023	989	-34
Cases of all-cause inpt NBP	4,697	4,638	-59		4,667	4,584	-83
Cases of all-cause outpt NBP	19,901	19,642	-260		19,770	19,404	-365
No. of Deaths	633	624	-10		616	602	-13
Costs (in millions)							
Medical care costs							
IPD	\$8.6	\$8.4	-\$0.2		\$8.1	\$7.8	-\$0.2
All-cause inpt NBP	\$37.5	\$37.0	-\$0.4		\$37.2	\$36.6	-\$0.6
All-cause outpt NBP	\$4.4	\$4.4	-\$0.1		\$4.4	\$4.3	-\$0.1
Subtotal	\$50.5	\$49.8	-\$0.7		\$49.7	\$48.7	-\$0.9
Vaccination costs							
Vaccine	\$19.6	\$14.5	-\$5.1		\$26.7	\$19.8	-\$6.9
Administration	\$6.0	\$3.0	-\$3.0		\$8.2	\$4.1	-\$4.1
Subtotal	\$25.6	\$17.5	-\$8.1		\$34.9	\$23.9	-\$11.0
Total costs	\$76.1	\$67.3	-\$8.7		\$84.6	\$72.6	-\$12.0
Cost per-person per-year	\$39.19	\$34.69	-\$4.50		\$43.57	\$37.42	-\$6.16

Figure 2. Differences in clinical outcomes with PCV20 vs. PCV13→PPV23 over modeling horizon

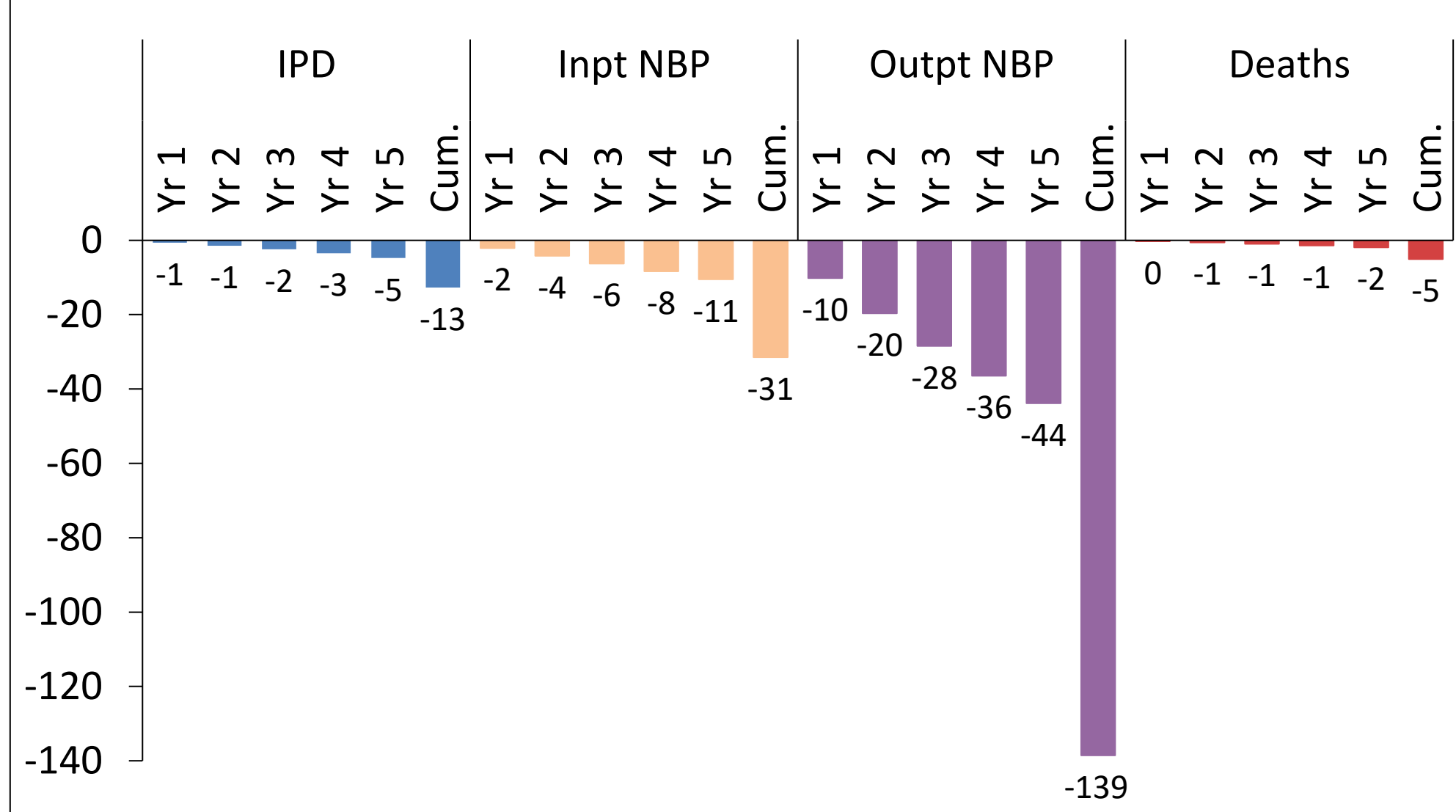
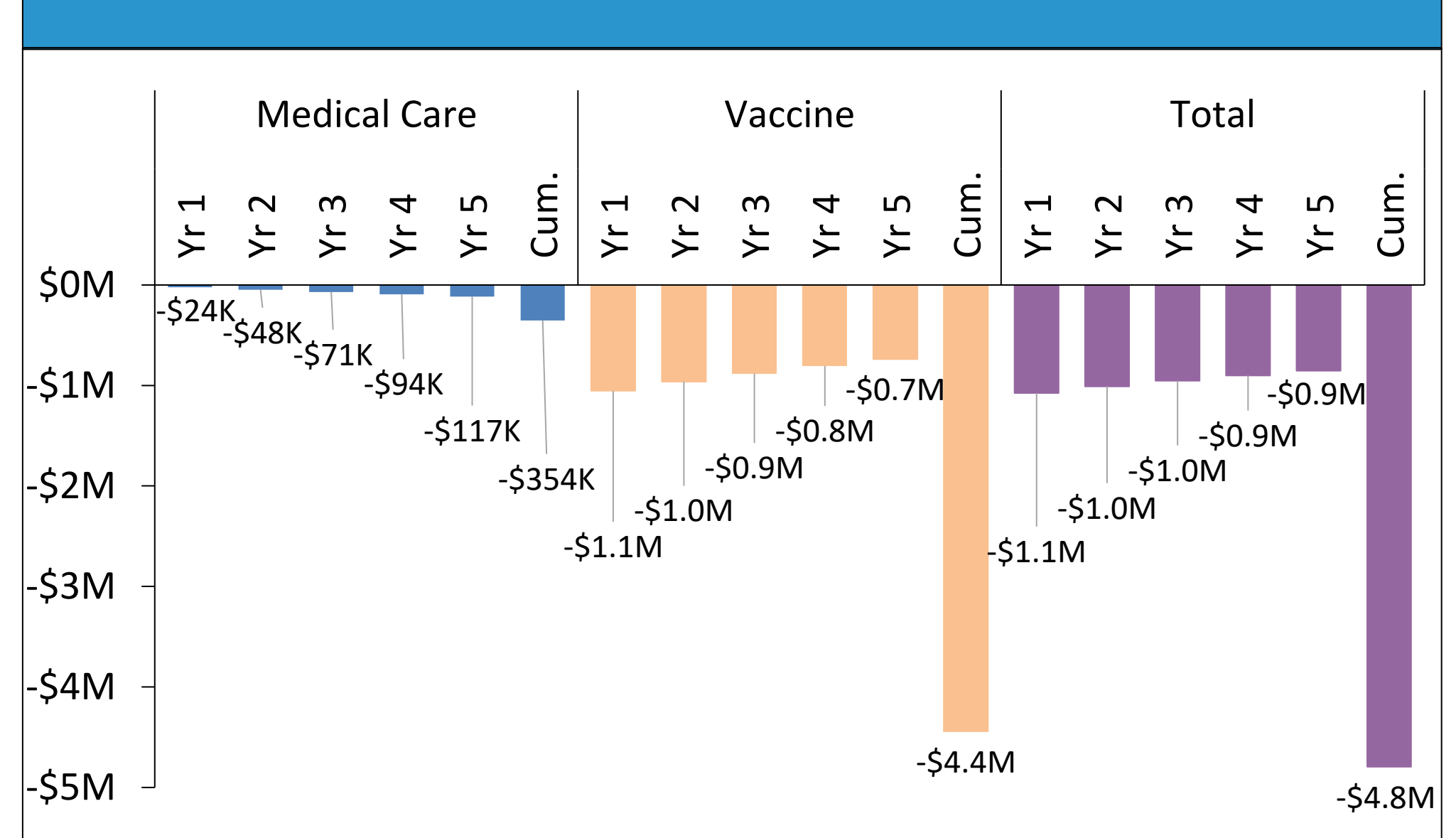


Figure 3. Differences in economic costs with PCV20 vs. PCV13→PPV23



CONCLUSIONS

- Use of PCV20 among privately insured expatriates living in Dubai who are at elevated risk of pneumococcal disease would reduce cases pneumococcal disease, associated deaths, and medical care and vaccination costs**
- PCV20 would therefore be a budget-reducing alternative to currently recommended PCV13→PPV23**
- If vaccine uptake levels are higher than assumed in base case analysis (i.e., 5% annually), reductions in cases, deaths, and expenditures would be even greater**

LIMITATIONS

- Due to lack of Dubai-specific data, some model inputs were populated using data from other countries
- Model population comprised expatriates living in Dubai, most of whom are privately insured, thus findings may not be generalizable to Emiratis with government sponsored insurance

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