

Clinical and economic benefits of adjuvanted and high-dose influenza vaccines in the elderly in Argentina

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Objective

This study evaluates the clinical and economic outcomes of adjuvanted and high dose influenza vaccines for the elderly in Argentina.

Background

- Enhanced influenza vaccines are the best option for the elderly.¹
- In 2021, Argentina introduced the MF59-adjuvanted inactivated influenza vaccine (aIV) in the national immunization calendar for individuals aged 65yrs and above.²
- High dose inactivated influenza vaccine (HD-IIV) is only available in the Argentinian private sector.

Methods

- The assessment used a static decision-tree model from the payer's perspective during an average influenza season. (Figure 1)
- The analysis incorporated influenza epidemiological data from pre-pandemic Argentinian seasons (2014–2019), strain distribution, vaccination uptake, influenza-related costs, and Quality-Adjusted Life-Years (QALYs) gained. (Table 1)
- aIV acquisition cost was sourced directly from the manufacturer, whereas the price of HD-IIV was calculated by averaging its incremental cost over standard dose quadrivalent influenza vaccine (SD-QIV)⁵, utilizing data from both local private sector sources (40%)⁶ and international data (156-238%).⁷⁻⁹ (Table 1)
- Results include two relative vaccine effectiveness (rVE) scenarios from two published meta-analyses due to reported variability without statistical significance expected. (Table 2)
 - Scenario 1 considered a 24.2% relative vaccine efficacy of HD-IIV over the standard dose inactivated influenza vaccine (SD-IIV)¹¹ and a 3.2% rVE of aIV over HD-IIV.¹²
 - Scenario 2 considered 13.9%¹² and 15.9%¹³ incremental effectiveness of aIV and HD-IIV over the SD-IIV.
- Theoretical cost-effectiveness threshold was assumed as one gross domestic product per capita (1GDPpc≈USD 13,650, year 2022).¹⁴
- The assessment includes deterministic and probabilistic sensitivity analyses (10,000 simulations).

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Figure 1. Decision tree model.

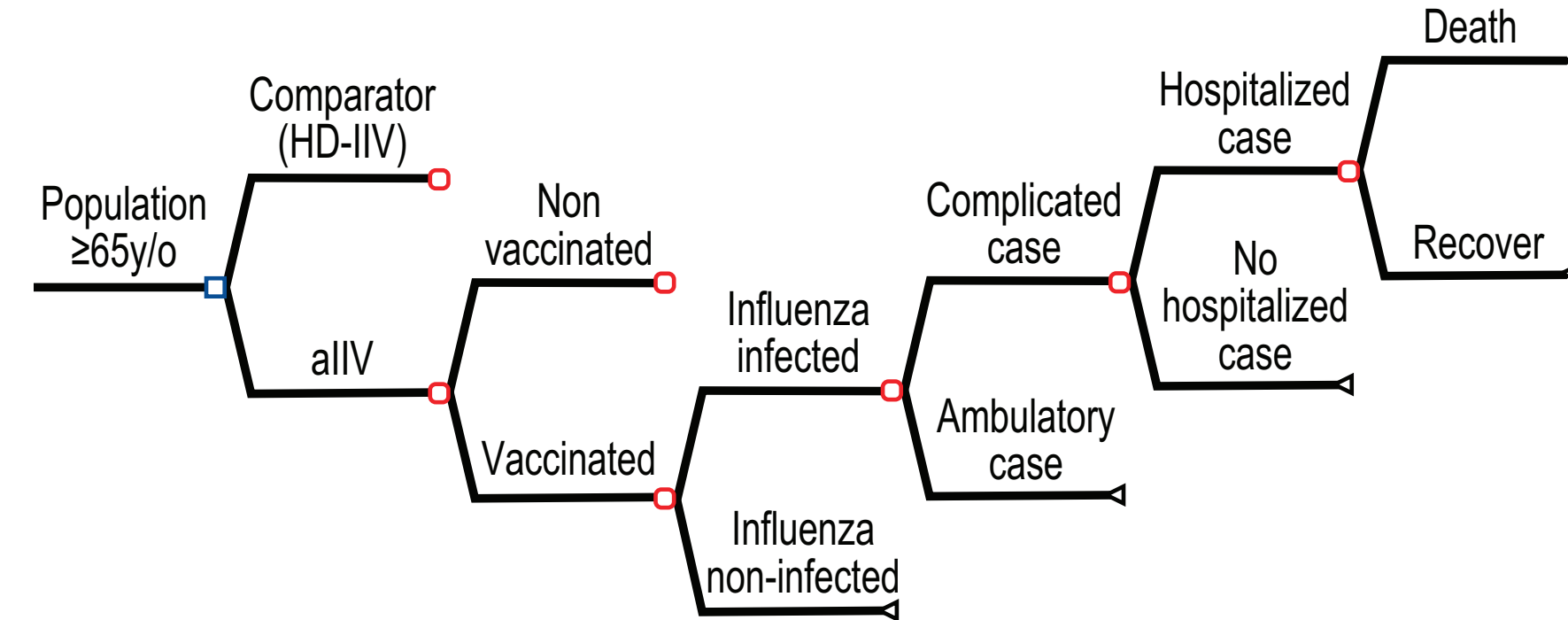


Table 1. Main model inputs.

Variable	Input	Reference
Population ≥65 years	5,103,968	INDEC. Censo 2022 ³
Influenza incidence rate, %	6.3%	Urueña et al. Vaccines 2021 ⁴
Complicated cases, %	9.4%	Urueña et al. Vaccines 2021 ⁴
Hospitalizations, %	36.0%	Urueña et al. Vaccines 2021 ⁴
Case Fatality Ratio, %	32.0%	Urueña et al. Vaccines 2021 ⁴
Average strain B circulation (2013-2019), %	18.2%	Urueña et al. Vaccines 2021 ⁴
Vaccine coverage, %	55.3%	Urueña et al. Vaccines 2021 ⁴
Costs (US\$)*		
Ambulatory case	\$ 91.0	Updated from Urueña et al. Vaccines 2021 ⁴
Hospitalized case	\$ 1560.0	Updated from Urueña et al. Vaccines 2021 ⁴
aIV vaccine (per dose)	\$ 6.9	Seqirus Argentina 2023
SD-QIV vaccine (per dose)	\$ 6.0	PAHO revolving fund, 2023 ⁵
HD-IIV vaccine (per dose)	\$ 10.0	Author's estimation based on average value of international vaccine incremental cost relative to SD-QIV (40%-238%) ⁶⁻⁹

aIV: adjuvanted inactivated influenza vaccine (trivalent); HD-IIV: SD-QIV: standard dose quadrivalent influenza vaccine; high dose inactivated influenza vaccine. *Costs are expressed as 2023 US dollars.

Table 2. Absolute and relative vaccine efficacy/ effectiveness inputs.

Variable	Input	Reference
Vaccine efficacy against influenza A, %		
Trivalent and quadrivalent	58% (95%CI 34;73)	Clements et al. ¹⁰
Vaccine efficacy against influenza B, %		
Trivalent/Quadrivalent match	68% (95%CI 15; 99)	Clements et al. ¹⁰
Relative vaccine effectiveness Scenario 1		
HD-IIV vs SD-IIV, %	24.2% (95%CI 9.7;36.5)	Diaz Granados et al. ¹¹
aIV vs HD-IIV, %	3.2% (95%CI -2.5;8.9)	Coleman et al. ¹²
Relative vaccine effectiveness Scenario 2		
HD-IIV vs SD-IIV, %	15.9% (95%CI 4.2;23.5)	Lee et al. ¹³
aIV vs SD-IIV, %	13.9% (95%CI 4.1;23.6)	Coleman et al. ¹²

HD-IIV: high dose inactivated influenza vaccine; SD-IIV: standard dose inactivated influenza vaccine; aIV: adjuvanted inactivated influenza vaccine.

Conclusions

In Argentina, the use of enhanced influenza vaccines in the elderly can increase vaccine effectiveness, and reduce influenza-related medical encounters and disease-related costs.

Based on comparable vaccine effectiveness, significant economic advantages favor the MF59-adjuvanted inactivated influenza vaccine strategy due its expected lower acquisition costs.

Results

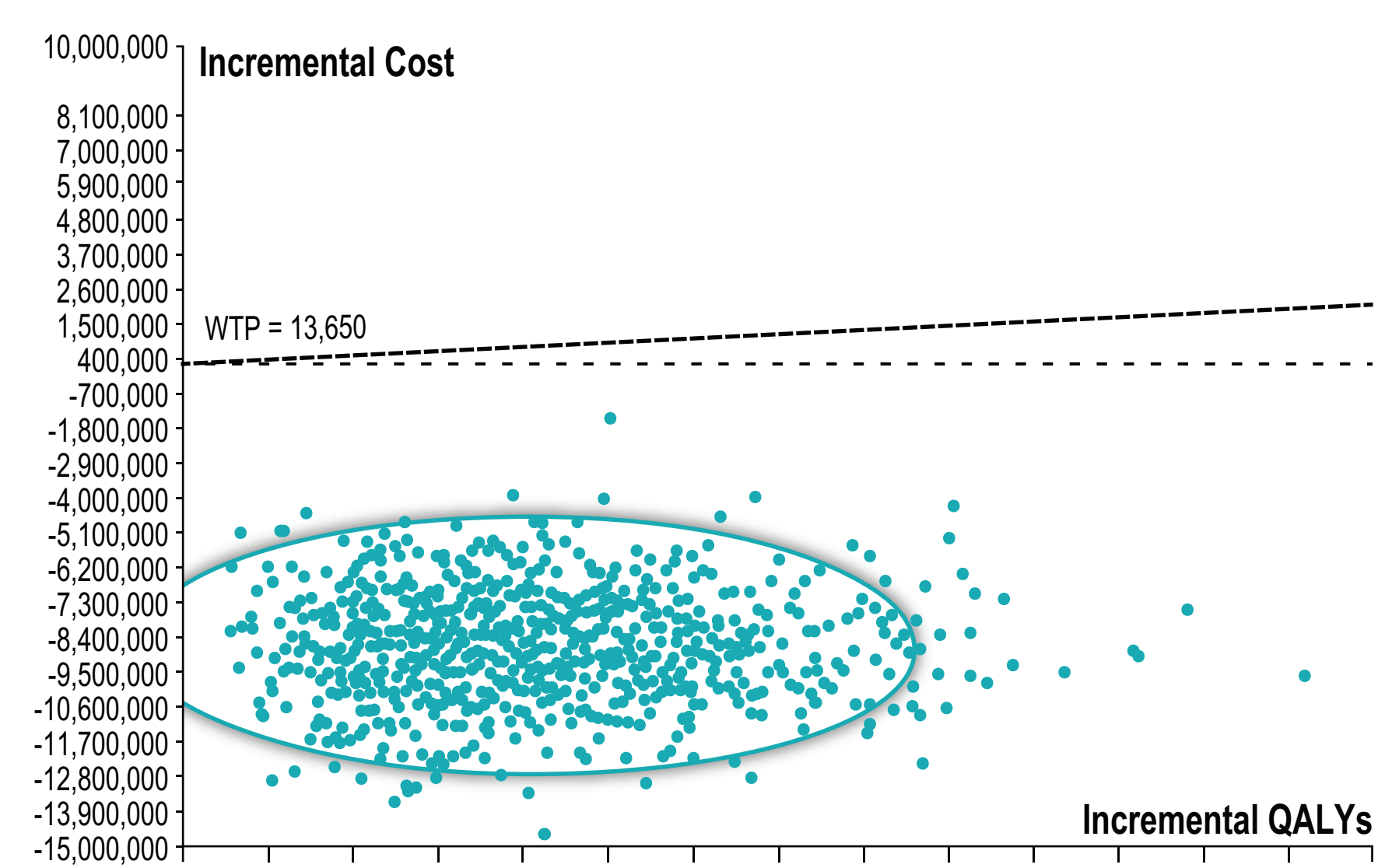
- With an expected lower vaccine cost and non-significant higher rVE for aIV (3.2%), aIV would increase the overall number of QALYs in 41 and generate (infinite) savings to the Argentinian public health system in US\$ 8.7M. In this scenario aIV would result a dominant strategy over HD-IIV (Table 3) with a 100% likelihood of aIV simulations falling below the willingness-to-pay threshold of one GDP per capita. (Figure 2)
- In a second scenario, were HD-IIV had a non-significant higher rVE compared to aIV, HD-IIV will prevent more influenza-related medical encounters and gain more QALYs than aIV. (Table 4) However, it will only result cost-effective compared to aIV if the incremental cost of HD-IIV for the public sector does not exceed 50% over the price of SD-IIV. (Figure 3). In this scenario, PSA showed 100% likelihood of HD-IIV simulations above the willingness-to-pay threshold of one GDP per capita. (Figure 4)
- In both scenarios vaccine acquisition costs were the only critical determinants of the ICER. (Figure 5)

Table 3. Main health and economic outcomes – scenario 1.

	Non vaccinated	HD-IIV	aIV	Difference aIV vs HD-IIV
Total influenza events	139,710	44,432	43,632	-800
Ambulatory cases				
Non-complicated	126,605	40,264	39,539	-725
Complicated	8,387	2,667	2,619	-48
Hospitalizations	4,717	1,500	1,473	-27
Deaths	1,509	480	471	-9
QALYs gained		24,438,476	24,438,517	41
Net costs (USD)		54,116,404	45,338,773	-8,777,631
Incremental Cost-Effectiveness Ratio				DOMINANT

HD-IIV: high dose inactivated influenza vaccine; aIV: adjuvanted inactivated influenza vaccine; QALYs: Quality Adjusted Life Years.

Figure 2. Probabilistic sensitivity analysis. Incremental cost-effectiveness aIV versus HD-IIV – scenario.



WTP: willingness to pay; QALYs: Quality adjusted life years

Table 4. Main health and economic outcomes – scenario 2.

	Non vaccinated	HD-IIV	aIV	Difference HD-IIV vs aIV
Total events	139,710	55,081	53,013	-2068
Ambulatory cases				
Non-complicated	126,605	48,041	49,914	-1873
Complicated	8,387	3,182	3,306	-124
Hospitalizations	4,717	1,790	1,859	-69
Deaths	1,509	572	595	-23
QALYs		24,438,031	24,437,924	107
Net costs (USD)		\$55,322,968	\$46,948,649	\$8,374,319
Incremental Cost-Effectiveness Ratio				\$78,245

HD-IIV: high dose inactivated influenza vaccine; aIV: adjuvanted inactivated influenza vaccine; QALYs: Quality adjusted life years.

Figure 3. One way sensitivity analyses, HD-IIV vaccine price and willingness to pay threshold (1 GDPpc = USD 13,650) – scenario 2.

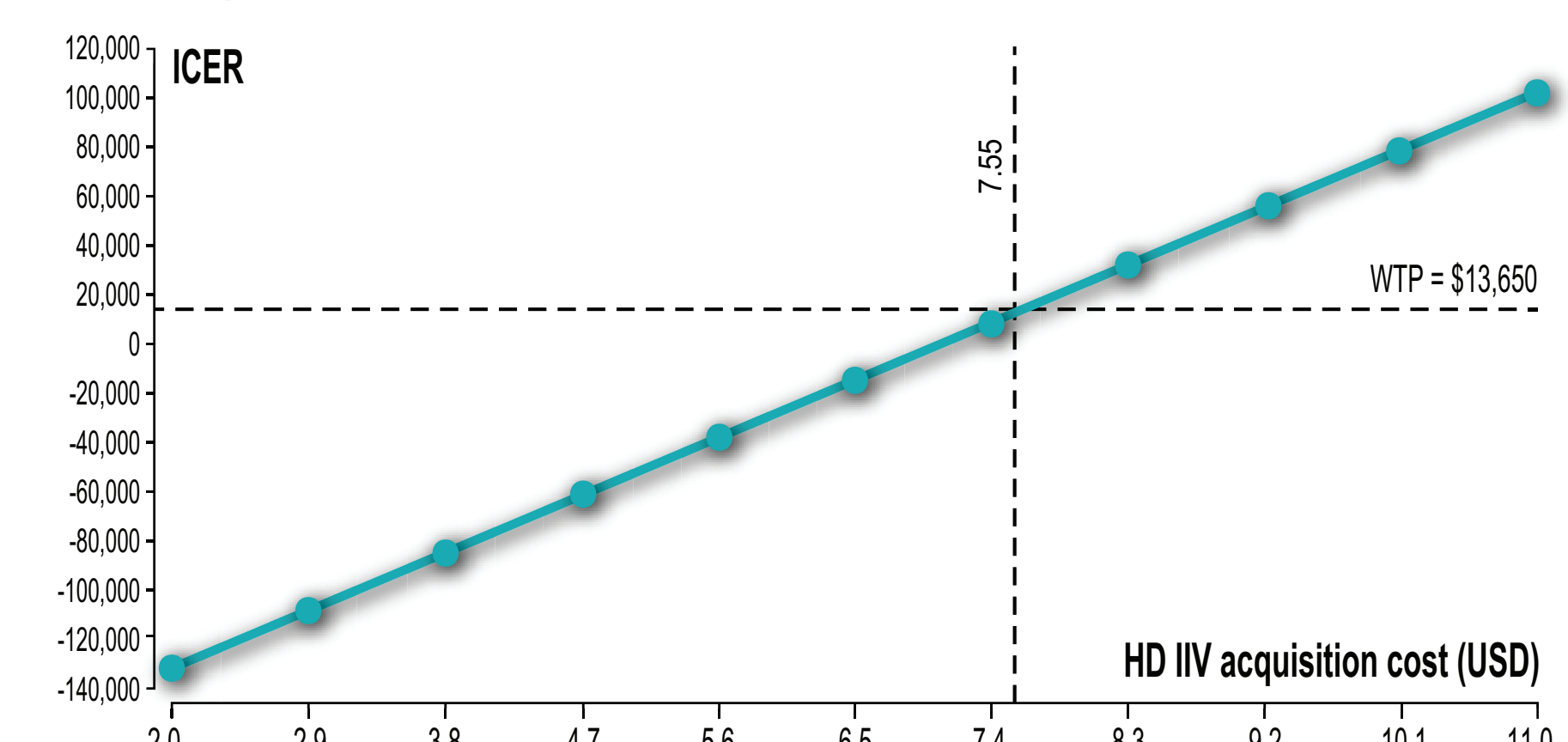
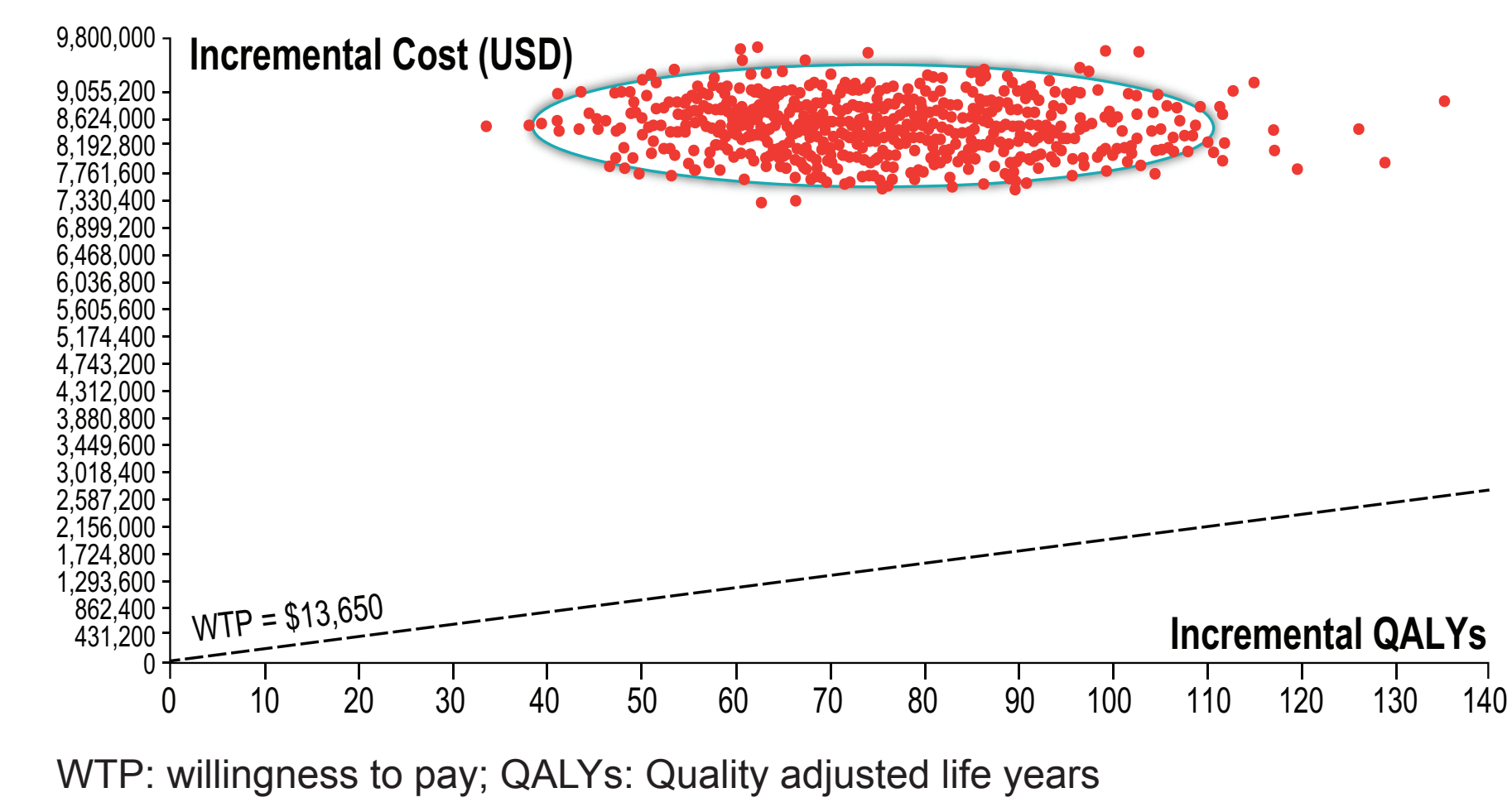
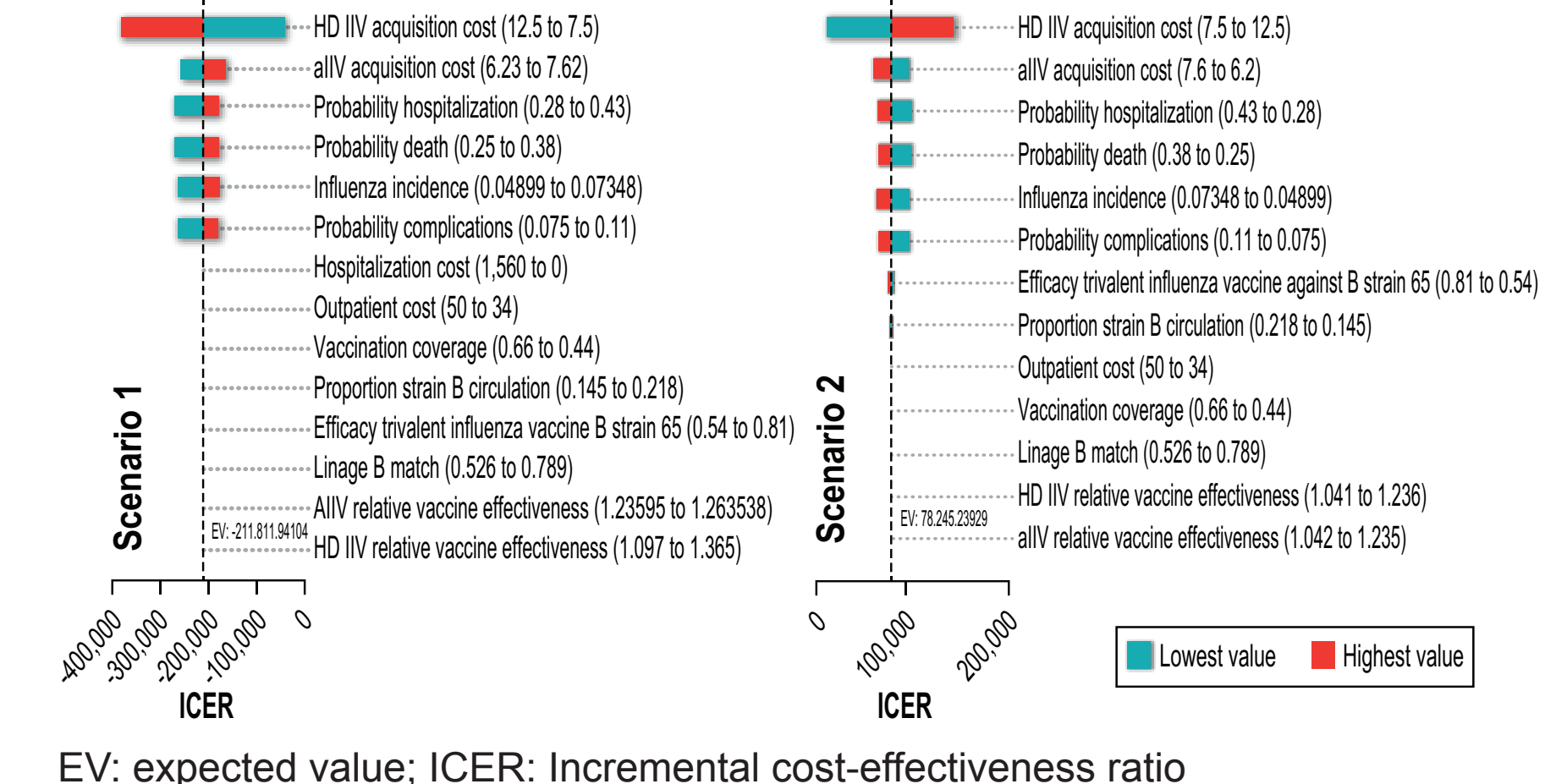


Figure 4. Probabilistic sensitivity analysis. Incremental cost-effectiveness HD-IIV versus aIV – scenario 2.



WTP: willingness to pay; QALYs: Quality adjusted life years

Figure 5. Deterministic sensitivity analyses. Tornado diagram Scenario 1: aIV versus HD-IIV; scenario 2: HD-IIV versus aIV.



EV: expected value; ICER: Incremental cost-effectiveness ratio

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