# Economic Evaluation of Decennial Pertussis Vaccination with Tetanus, Diphtheria and Acellular Pertussis (Tdap) Vaccine in Adult Populations with Asthma or Chronic Obstructive Pulmonary Disease (COPD) in Brazil

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## Background

**Pertussis**, a respiratory disease caused by *Bordetella pertussis*, is **endemic in Brazil**[1].

Pertussis **vaccine is recommended for adults** in Brazil only for health professionals **in contact with newborns**, pregnant women from the 20th week of pregnancy, and **hematopoietic stem cell transplants recipients**[2].

**Asthma and COPD populations are at increased risk** of pertussis infection[3].

Pertussis incidence typically follows a **cyclical pattern** with a peak **every 3 to 5 years**[4].

**Aim**

To assess the **cost-utility of decennial pertussis vaccination** with Tdap vaccine versus no pertussis vaccination **in Brazil's adult asthma and COPD populations** in a high-incidence context.

## Cost-utility model of decennial Tdap boosters

- **Model:** **static cross-sectional** population-based cost-utility model of **decennial Tdap boosters**
- **Population:** **asthma patients ≥50 years** and **COPD patients ≥40 years**
- **Perspective:** **payer**
- **Input:** peak-year pertussis incidence; vaccine efficacy and coverage; and costs and outcomes from the **literature** and **public databases**
- **Discount:** **5%** for costs and outcomes

## Results for decennial Tdap vaccination versus no vaccination in Brazilian asthma and COPD patients

### Number of decennial Tdap vaccinations and pertussis cases in asthma and COPD patients

| | Asthma | | | COPD | | |
|---|---|---|---|---|---|---|
| | No vaccination | Decennial vaccination | Incremental | No vaccination | Decennial vaccination | Incremental |
| N vaccinations with Tdap | 0 | 188,964 | 188,964 | 0 | 1,039,309 | 1,039,309 |
| Total N pertussis cases | 32,854 | 20,791 | 12,063 | 151,940 | 96,080 | 55,860 |

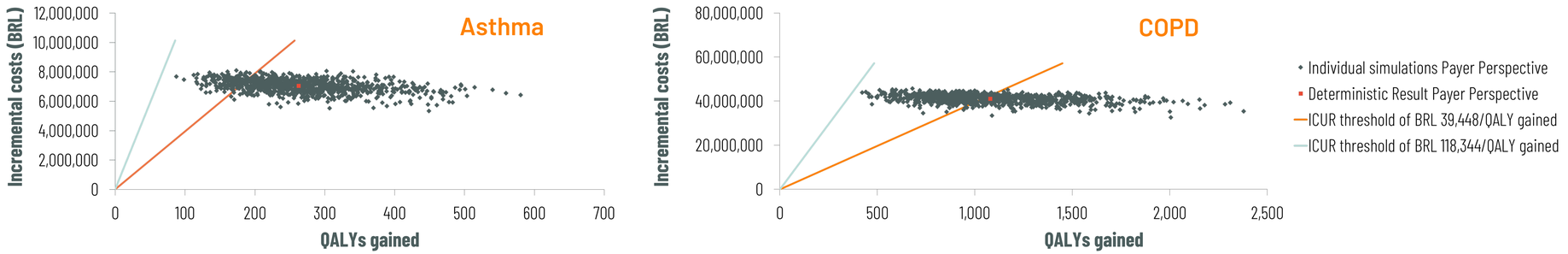
### Outcomes of Tdap vaccination for asthma and COPD patients

| Results | Asthma | COPD |
|---|---|---|
| Discounted direct incremental costs | 7,065,788 BRL | 41,102,844 BRL |
| Discounted QALYs gained due to avoided pertussis | 262.13 | 1,078.26 |
| ICUR (Cost per QALY gained) | **26,956 BRL/QALY** | **38,120 BRL/QALY** |

### PSA for asthma and COPD ~ 1,000 iterations

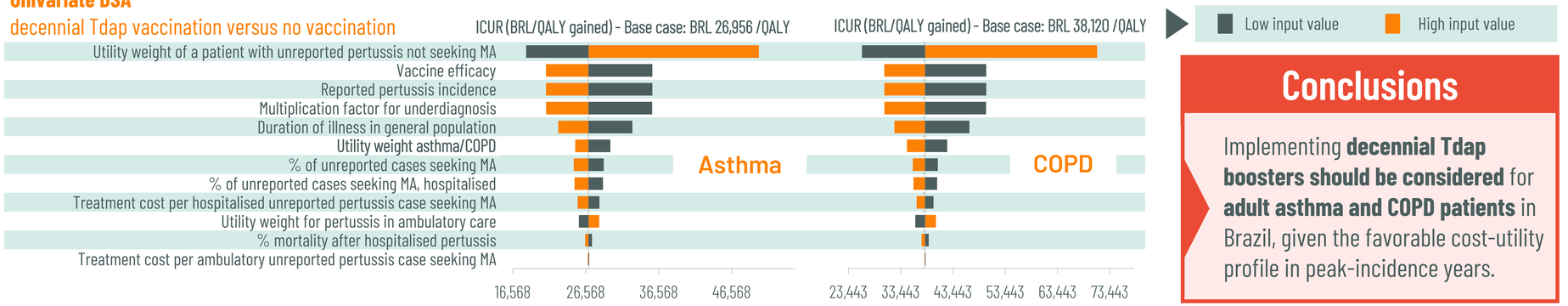
**Incremental cost-effectiveness planes**

At a cost-effectiveness threshold of 1 GDP/capita (39,448 BRL), **85.8%** and **49.7%** of **simulations** were **cost-effective in asthma and COPD** populations respectively, while **all simulations were cost-effective** at a threshold of **3 GDP/capita** (118,334 BRL).




### Univariate DSA

decennial Tdap vaccination versus no vaccination




## Conclusions

Implementing **decennial Tdap boosters should be considered** for **adult asthma and COPD patients** in Brazil, given the favorable cost-utility profile in peak-incidence years.

**BRL** Brazilian reais, **COPD** chronic obstructive pulmonary disease, **DSA** deterministic sensitivity analyses, **GDP** gross domestic product, **ICUR** incremental cost-utility ratio, **MA** medical advice, **N** number, **PSA** probabilistic sensitivity analysis, **QALY** quality-adjusted life year, **Tdap** tetanus, diphtheria and acellular pertussis

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