Unlocking the Value of RSV Adult Vaccination with Adjuvanted RSVPreF3 Vaccine in Germany: a Return on Investment Analysis Using an Integrated Actuarial-Macroeconomic Model

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Respiratory syncytial virus vaccination in Germany is a **cost-saving public health intervention**: for every €1 spent on vaccinating people aged 60 and older, society gains at least €2.70 through **health and broader economic benefits**.

Background

- Respiratory syncytial virus (RSV) is a leading cause of lower respiratory tract infection (LRTD) in older adults, especially those with underlying health conditions.[1,2]
- Besides imposing a substantial burden on the German healthcare system, RSV contributes to a diminished quality of life for patients, and to productivity losses for the entire economy.[3]
- Vaccination programs present an effective strategy to alleviate RSV burden. Thus, economic evaluation is essential to adequately inform policies and their implementation.

An actuarial model was adapted to the German context, with projection of RSV impact on productivity. We aimed to measure, through modelling, the return on investment (ROI) of adjuvanted RSVPreF3 vaccination in Germany, considering: Healthcare cost savings; Averted productive output loss (gross domestic product [GDP] loss); Averted monetized quality-adjusted life-year (QALY) loss; Deadweight loss.

Demographics
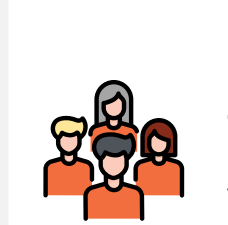
Population: One time vaccination of adults aged 50-59 at increased risk and adults aged ≥60 years for 5 years
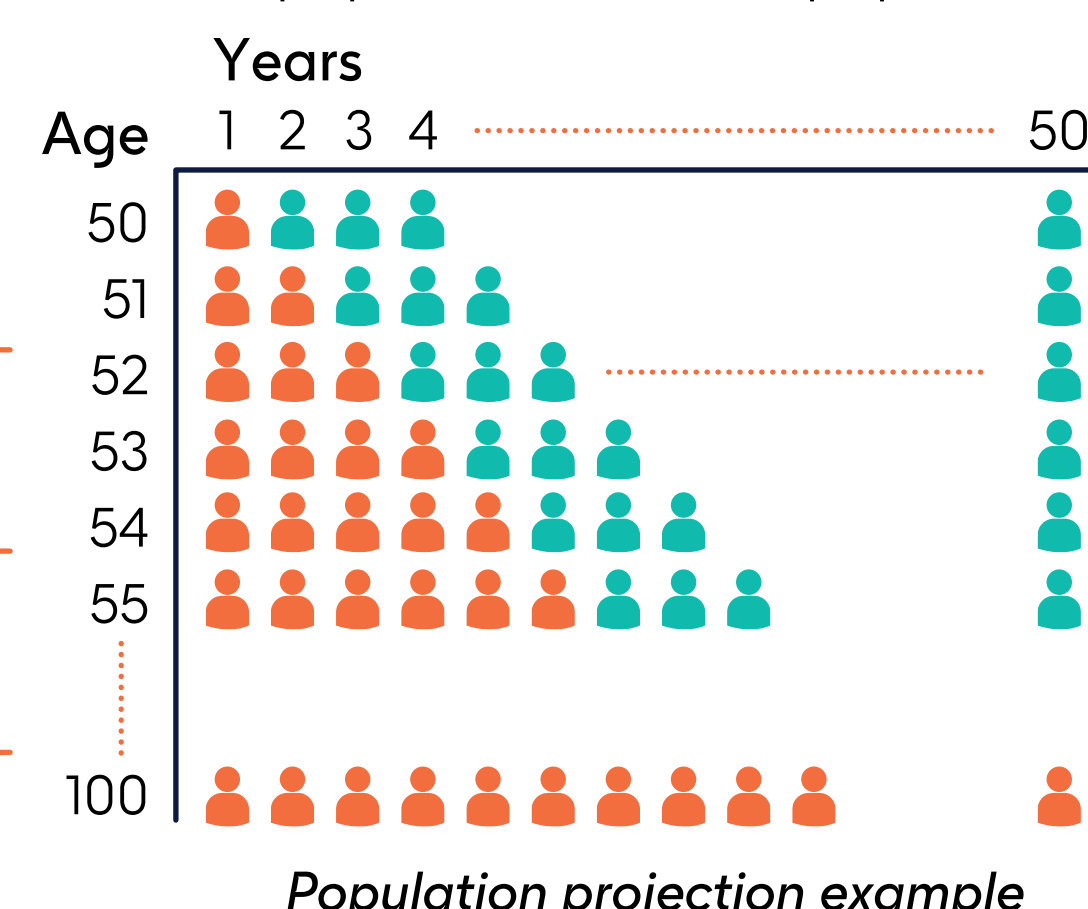
Vaccination coverage: 75%[4]
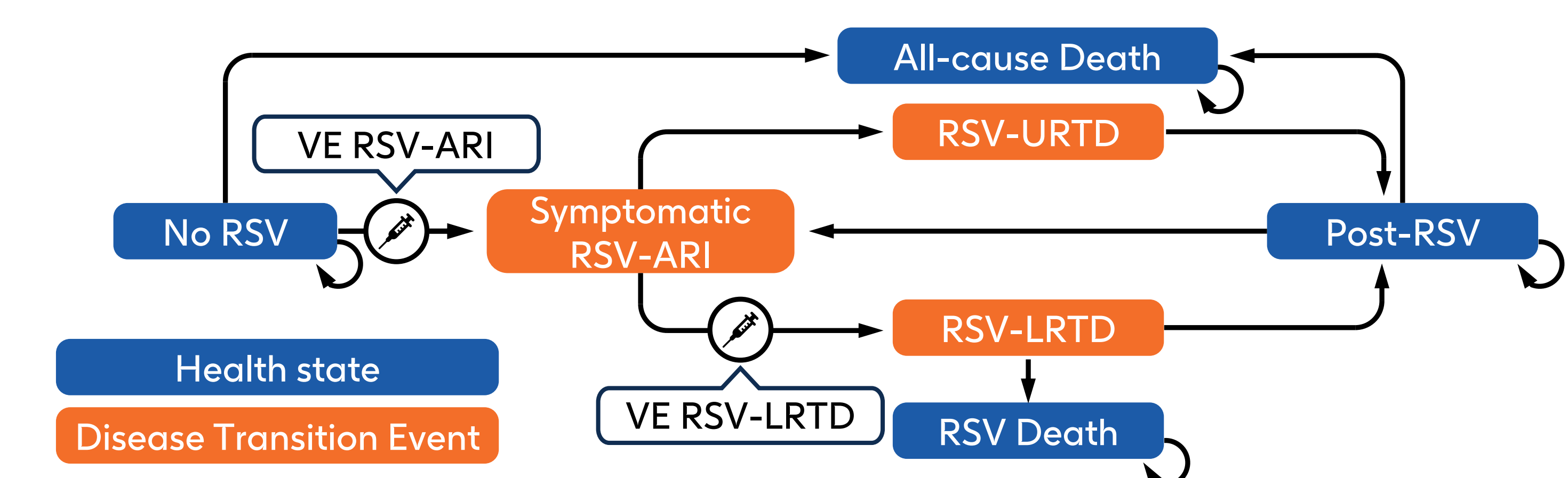
Time horizon: 10 years (outcomes) & lifetime (QALYs)

Discount rate: 3% Costs and QALYs
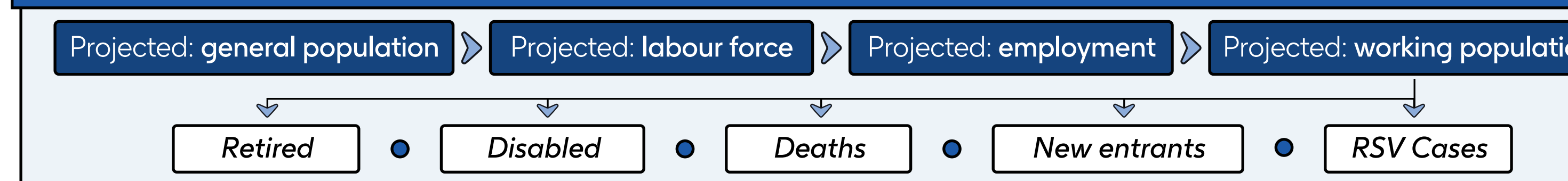

Initial population · New population

Population projection example

Study design

Disease simulation model[5] to assess health benefits and healthcare cost savings with vaccination

Health state · Disease Transition Event

Actuarial framework to project age-specific disease incidence, healthcare resource use, and costs[6]

Projected: general population → Projected: labour force → Projected: employment → Projected: working population

Retired · Disabled · Deaths · New entrants · RSV Cases

Productivity loss component (impact of RSV-attributed productivity loss on GDP)

GDP loss was estimated using the Cobb-Douglas production function,[7] typically expressed as $Y = A \cdot K^\alpha \cdot L^\beta$

$$\text{GDP Loss: } YL(t) = \frac{\text{Work Hours Loss (t)} \times \beta \times Yh}{\text{Total Work Hours (t)}}$$

Y: total output (i.e., GDP); A: total factor productivity reflecting efficiency in the use of capital (K) and labour (L) which is measured in terms of total hours worked; α, β: output elasticities of capital and labour; Yh: GDP per workhour.

Deadweight loss

The economic cost, associated with raising additional tax revenue to compensate for the loss of government revenue caused by reduced productivity.

Vaccination benefits (monetised QALYs)

Valued at 1x GDP per capita (i.e., €43,400)[8] per QALY gained
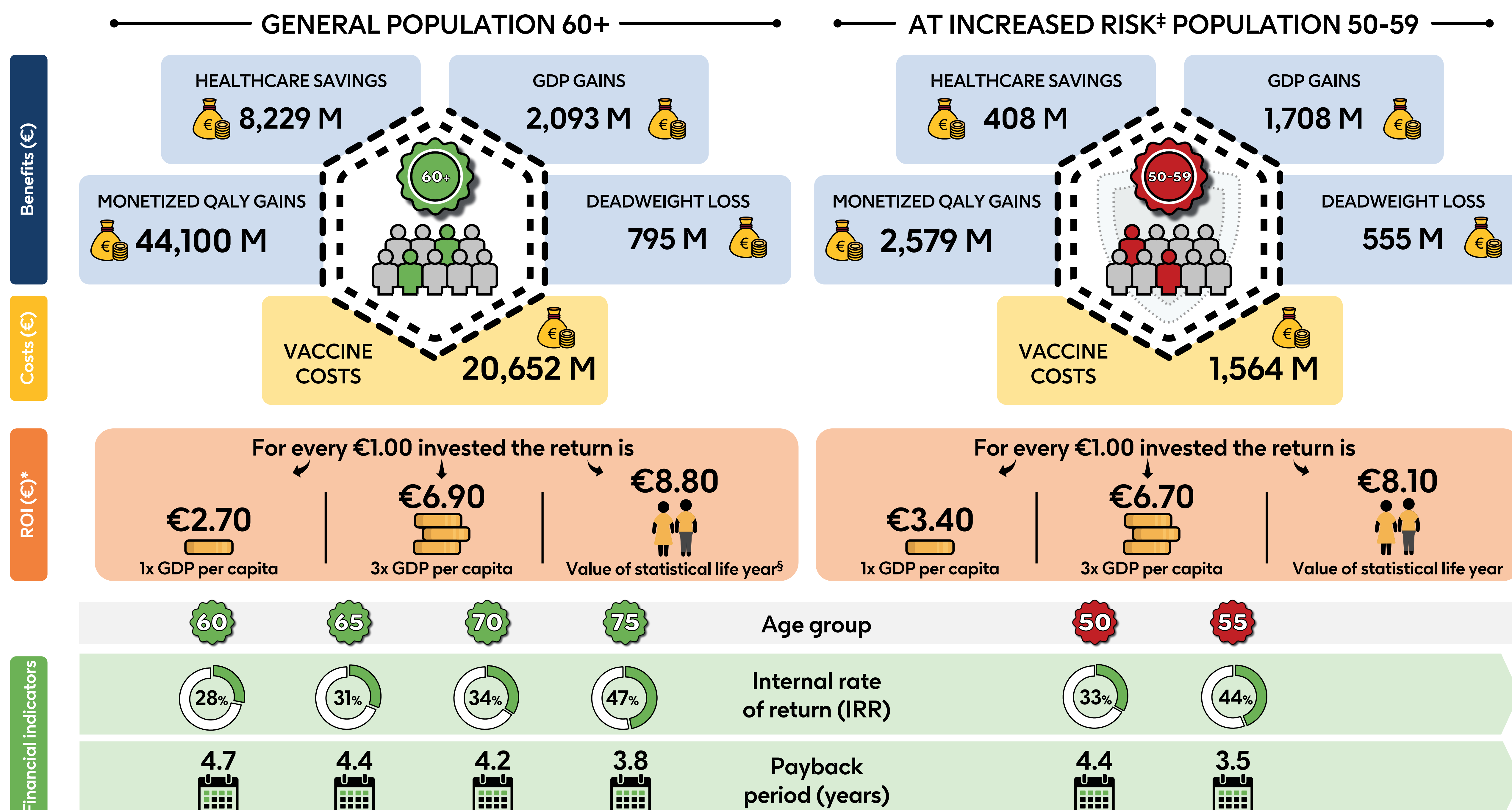
Cost-benefit analysis (CBA)

The CBA generated a ROI: to compare vaccination economic gains (averted losses) with the costs of vaccination

$$\text{ROI} = \frac{\Delta(\text{PV Broader Economic Loss}) + \Delta(\text{PV Health Related Loss}) + \Delta(\text{Monetised QALYs})}{\Delta(\text{Vaccine Costs})}$$

PV: Present value; Δ: Difference between vaccinated and unvaccinated cohorts.

Results

GENERAL POPULATION 60+

Benefits (€)

HEALTHCARE SAVINGS: 8,229 M
GDP GAINS: 2,093 M
MONETIZED QALY GAINS: 44,100 M
DEADWEIGHT LOSS: 795 M

Costs (€)
VACCINE COSTS: 20,652 M

ROI (€)*
For every €1.00 invested the return is
€2.70 — 1x GDP per capita
€6.90 — 3x GDP per capita
€8.80 — Value of statistical life year[§]

AT INCREASED RISK[‡] POPULATION 50-59

Benefits (€)

HEALTHCARE SAVINGS: 408 M
GDP GAINS: 1,708 M
MONETIZED QALY GAINS: 2,579 M
DEADWEIGHT LOSS: 555 M

Costs (€)
VACCINE COSTS: 1,564 M

ROI (€)*
For every €1.00 invested the return is
€3.40 — 1x GDP per capita
€6.70 — 3x GDP per capita
€8.10 — Value of statistical life year

Financial indicators

Age group	60	65	70	75		50	55
Internal rate of return (IRR)	28%	31%	34%	47%		33%	44%
Payback period (years)	4.7	4.4	4.2	3.8		4.4	3.5

Key Messages

- In both **populations vaccination** delivers **substantial societal and economic value** through monetized QALYs, healthcare savings, GDP gains, and reduced deadweight loss.
- The vaccine program's costs are **outweighed** by substantial financial and healthcare benefits.
- Every **€1 invested** in RSV vaccination delivers between **€2.70** and **€8.80** in value to society.
- Investing in RSV vaccination offers attractive returns, delivering an IRR of **28%–47%** and full capital recovery in **3.5–4.7 years**.

Conclusions

A vaccination program with the adjuvanted RSVPreF3 vaccine for adults aged 50-59 years at increased risk and adults aged ≥60 years in Germany would constitute a high-value public health investment, yielding positive returns.

The results support informed decisions on public investment in RSV immunization as a cost-saving strategy that delivers both substantial health benefits and broader economic gains.

*Data updated post-abstract submission. [‡]Assuming a higher risk of hospitalization due to a baseline condition. [§]The value of a statistical life year (VSLY) measures how much society is willing to pay to gain one extra year of life expectancy for an individual. The VSLY used here is based on German reference values.[9]

References

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