

The Protective Effect of Pneumococcal Vaccination on Cardiovascular Disease in Adults: A Systematic Review and Meta-analysis

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BACKGROUND

Epidemiological studies suggest that there is a link between pneumococcal infection and adverse cardiovascular outcomes such as myocardial infarction. A few studies have evaluated the cardioprotective effect of the 23-valent polysaccharide pneumococcal vaccine (PPV23), but results have varied.¹⁻²

OBJECTIVE

We conducted a meta-analysis to summarize the available evidence on the impact of PPV23 on cardiovascular disease.

METHODS

Data sources: A literature search from January 1946 to September 2019 was conducted across Embase, Medline and Cochrane.

Inclusion criteria: Studies evaluating the effect of PPV23 on any cardiovascular events, including: myocardial infarction (MI), heart failure and cerebrovascular events compared with a control (placebo, no vaccine or another vaccine), were included.

Exclusion criteria: Studies that were of different intervention, review articles, non-English papers and clinical guidelines were excluded.

Outcomes: Primary analysis studied the impact of PPV23 on any cardiovascular event. Secondary analysis studied the impact of PPV23 on specific cardiovascular events (MI, CHF, stroke, and mortality)

Statistical analysis: Risk ratios (RRs) were pooled using random effects model (R software v4.0.2). Publication bias was assessed through funnel plots by comparing standard errors with residual values.³ Heterogeneity was evaluated using Egger's test and the I² statistic.

RESULTS

Figure 1. Study Inclusion

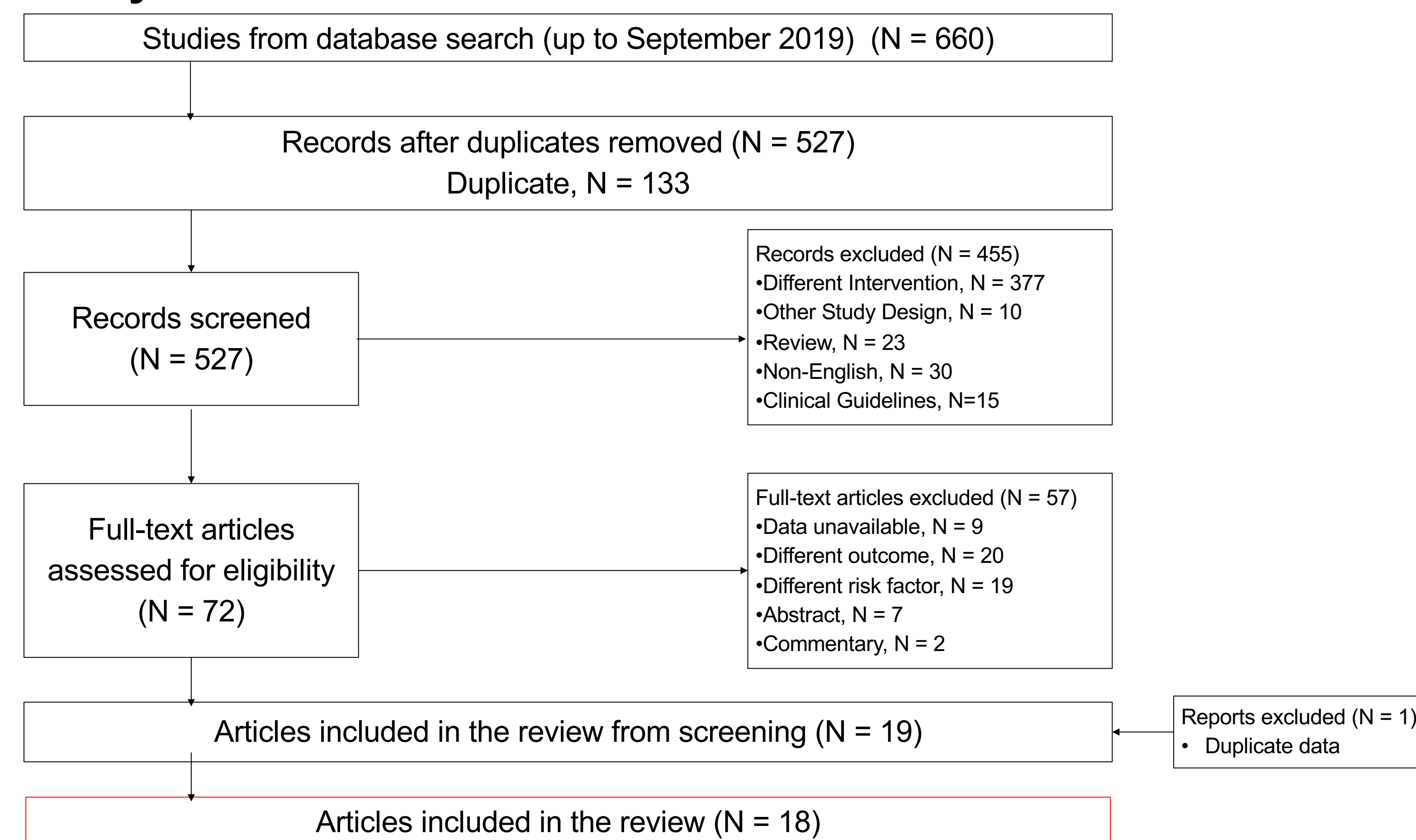


Figure 2. Any Cardiovascular Event and Pneumococcal Vaccination

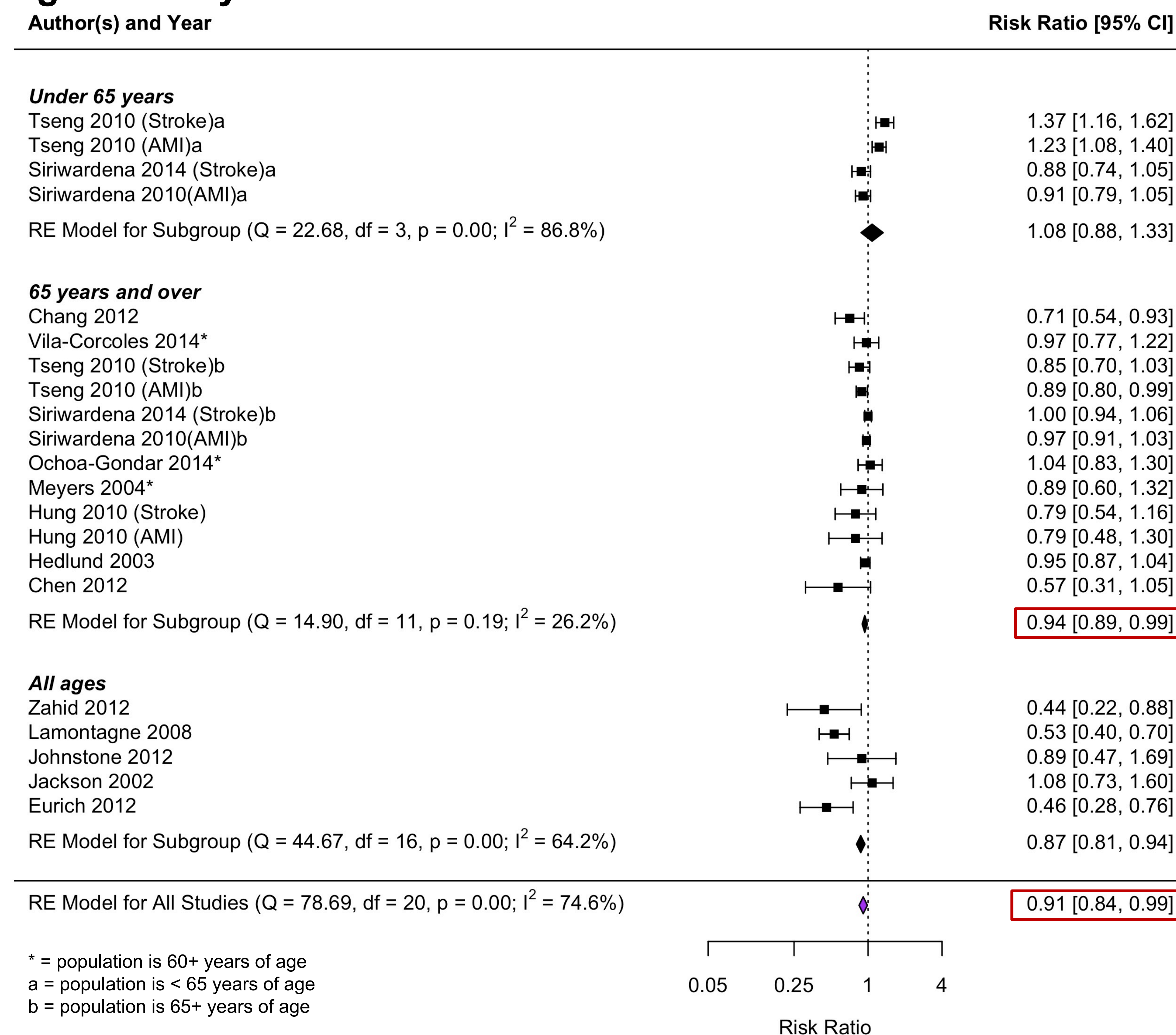
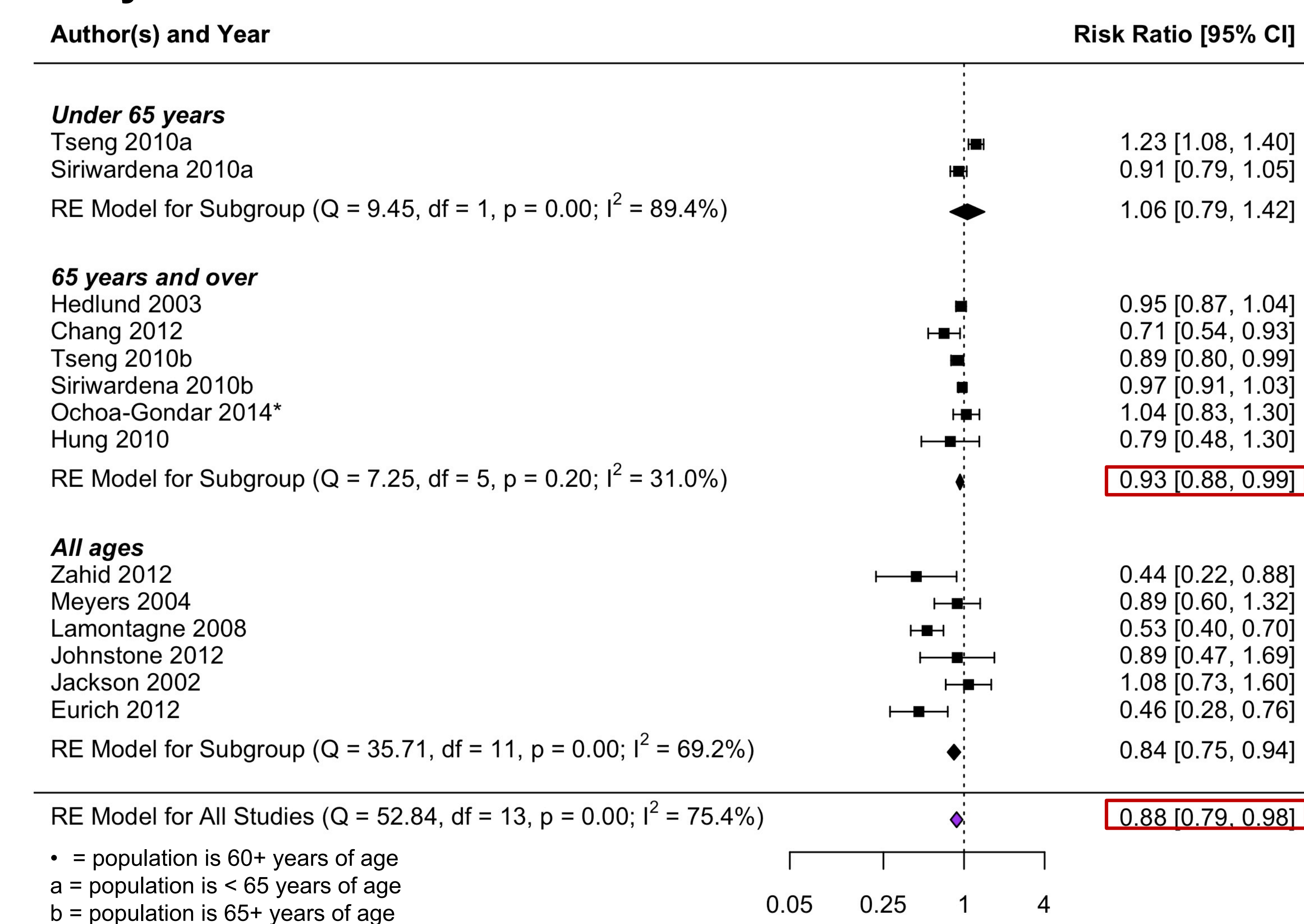


Figure 3. Myocardial Infarction and Pneumococcal Vaccination



- As shown in Figure 1, 18 studies were included, with a total of 716,108 participants and a follow-up duration ranging from 4 months to 11 years.
- Vaccination with PPV23 was associated with decreased risk of any cardiovascular event in all age groups (RR: 0.91; 95% CI: 0.84-0.99), especially among individuals aged ≥65 years (RR: 0.94; 95% CI: 0.89-0.99) as seen in Figure 2.
- As highlighted in Figure 3, PPV23 was also associated with decreased MI in all age groups (RR: 0.88; 95% CI: 0.79-0.98) and those aged ≥65 years (RR: 0.93; 95% CI: 0.88-0.99).
- Vaccination was also associated with decreased risk in all-cause mortality in all ages (RR: 0.78; 95% CI: 0.68-0.88) and those aged ≥65 years (RR: 0.71; 95% CI: 0.60-0.84), data not shown here.

CONCLUSION

Polysaccharide pneumococcal vaccination decreased the risk for some adverse cardiovascular events, specifically for acute MI in the vaccinated population who are aged ≥65 years. It would be highly beneficial to vaccinate this population who is at greater risk of cardiovascular diseases.

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