

# A Systematic Review of Health State Utility Values for Influenza and Influenza-like Illness

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## INTRODUCTION

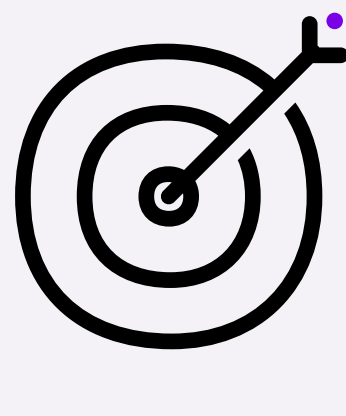


Influenza imposes a substantial clinical and economic burden on health care facilities. It causes acute lower respiratory infection and hospitalizations especially among the elderly.



Valid and reliable information on the impact of influenza and influenza-like illness (ILI) in terms of health state utility values (HSUVs) is an essential input for health economic evaluation (e.g., cost-effectiveness or cost-utility analysis (CEA/CUA)) assessing health care interventions against influenza and ILI - such as the use of vaccines.

## OBJECTIVE



To give a comprehensive overview of international studies across all populations that estimated the effects of influenza and ILI on health-related quality of life (HRQoL) expressed as HSUVs.

## METHODS

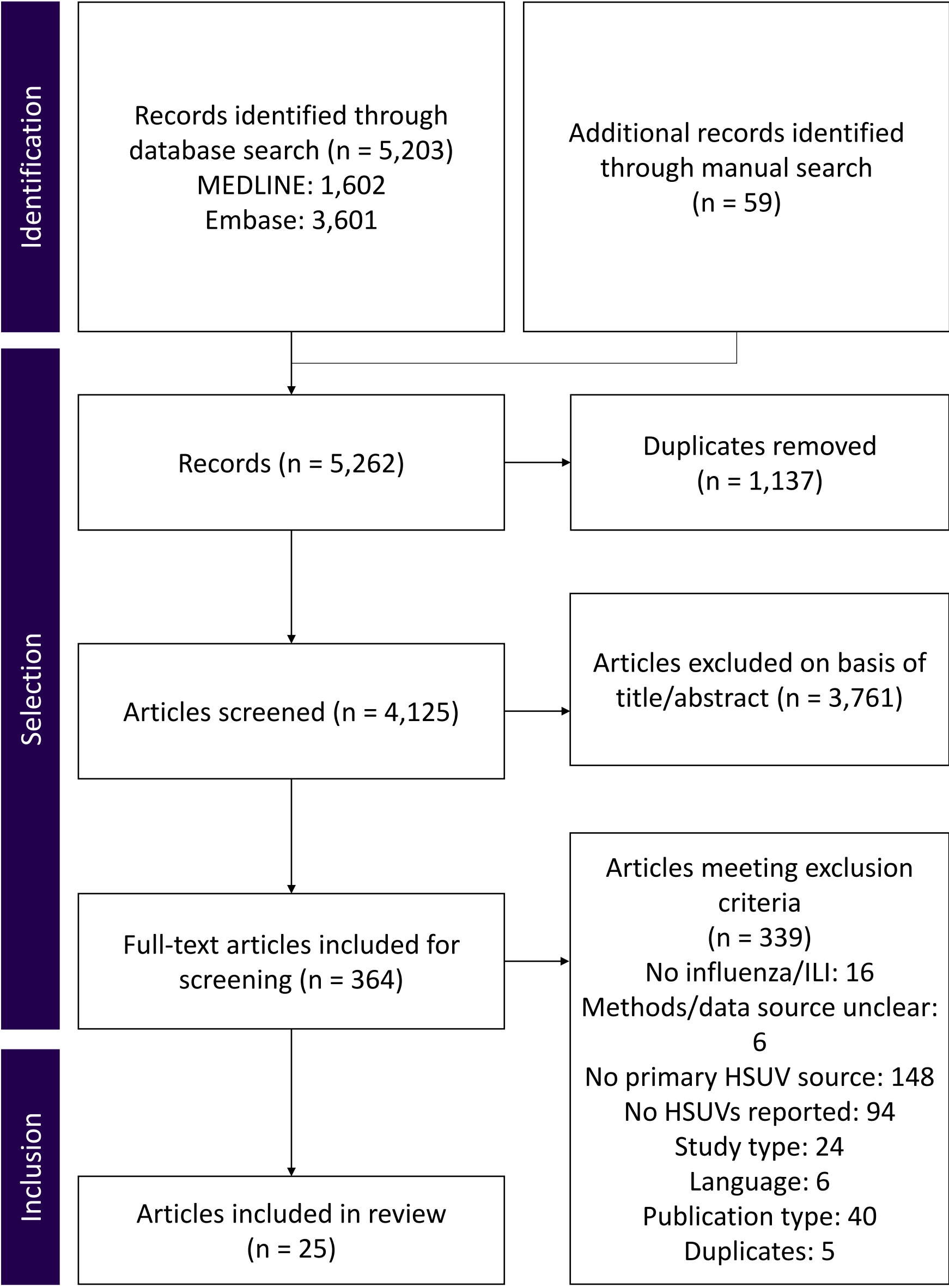
We conducted a systematic literature search in MEDLINE and Embase to identify articles published from 1990/01/01 to 2023/08/15 in English, German, Portuguese, or Spanish language. Articles reporting data on HSUVs associated with influenza or ILI were included. A quality assessment was performed based on 10 pre-defined questions.

### Data extraction encompassed:

- Main study characteristics: study type, assessed groups for HSUV, sample size, and as instrument for assessment and timepoint.
- Findings related to baseline and influenza/ILI HSUVs with respective mean utility weights and duration of health states.

## RESULTS

Figure 1: PRISMA flowchart



### Characteristics of included studies:

- 14 studies were conducted in Europe, 7 in North America, and 2 each in Asia and Australia.
- Many of the included utility studies were performed as part of model-based economic evaluations.
- Population sizes in the studies ranged from 15 to 6,289 subjects.

### Quality of included studies:

- We observed varying study quality; only 6 studies met all pre-defined and applicable quality criteria.

### Results of included studies:

- Utility values showed great heterogeneity: the range for the worst day of infection was -0.342 in patients with laboratory-confirmed influenza to 0.48 in patients with ILI.
- Total range was -0.342 for worst day of influenza infection to 0.941 for ILI in at risk children ≤12 years of age.
- Only one study reported age-specific values.
- Observed differences between values potentially reflect the variety of study populations and timepoints of assessment.

Table 1: Study characteristics and results

Study	Assessed groups	Method/instrument	Valued influenza/ILI health state and utility weight		
Author-based assessment					
Burls et al. (2002)	Adults	EQ-5D-3L	Influenza: 0.516		
Mauskopf et al. (2000)	Patients (>12 years); applied in CEA	QWB	Influenza/ILI: 0.5579		
Muennig & Khan (2001)	Otherwise healthy adults (15–65 years); applied in CEA	QWB	ILI: 0.61		
Rothberg et al. (2005)	Hypothetical children (2 -15 years)	a) EQ-5D, and b) Assumption	a) Influenza, not hospitalized: 0.32 b) Influenza, hospitalized: 0.20 <sup>a</sup>		
Expert-based assessment					
Griffin et al. (2001)	Hypothetical high-risk patients	EQ-5D	Influenza in a hypothetical high-risk patient:-0.263		
Stouthard et al. (1997)	Dutch population	Person trade-off and VAS, and interpolation	Influenza (episode of 2 weeks): 0.84		
Stratton et al. (2000)	Children and adults (all ages)	HUI2	a) Influenza ('moderate to severe respiratory illness with bed rest'): 0.75 b) Influenza, hospitalized (acute care): 0.65 c) Influenza, ICU: 0.52 d) Discomfort/recuperation following bed rest/hospitalization: 0.90		
Self-assessment					
Bilcke et al. (2014)	Children (0-17 years) and adults (≥18 years)	SF-12v2 Health Survey	a) ILI, no medical care: 0.7 b) ILI, outpatient: 0.68 c) ILI, inpatient: 0.61 d) Clinically diagnosed influenza, outpatient: 0.68 e) Clinically diagnosed influenza, inpatient: 0.62		
Brady et al. (2001)	Not reported <sup>b</sup>	HUI3	a) Influenza, outpatient: 0.636 b) Influenza, inpatient: 0.35		
Camacho et al. (2013) <sup>c</sup>	Children (0-17 years) and adults (≥18 years)	Scale of 0 to 100. Scores were used as quality weights <sup>c</sup>	ILI: 0.60 <sup>c</sup>		
Chung et al. (2022)	Adults (≥16 years)	VAS	Laboratory-confirmed influenza a) Within 3 days if illness onset; VAS: 48.5 b) 4-7 days after illness onset; VAS: 52.2		
Fragaszy et al. (2018)	Children and adults (all ages)	EQ-5D-3L	a) ILI: 0.48 b) Influenza A (H1N1pdm09 PCR positive): 0.44 c) Influenza B (PCR positive): 0.36		
Griffin et al. (2001)	Adults (≥18 years)	EQ-5D	Confirmed influenza illness a) Whole influenza illness: -0.066 b) Worst day of influenza: -0.342		
Hollmann et al. (2013)	Children (8-17 years) and adults	EQ-5D-3L	a) Confirmed influenza H1N1, outpatient: 0.50 b) Confirmed influenza H1N1, inpatient: 0.23		
Mao et al. (2022)	Adults (≥60 years)	EQ-5D-5L	Laboratory-confirmed influenza, outpatient a) 0.54 <sup>d</sup> (week 0) b) 0.664 (week 1 after symptom onset) c) 0.75 <sup>d</sup> (week 2 after symptom onset) d) 0.77 <sup>d</sup> (week 3 after symptom onset) e) 0.81 <sup>d</sup> (week 4 after symptom onset)		
O'Brien et al. (2003)	Otherwise healthy adults (16-64 years)	VAS <sup>e</sup>	a) Confirmed influenza within 48 hours of symptom onset, day 1-7: 0.40 - 0.79 b) ILI within 48 hours of symptom onset, day 1-7: 0.40 - 0.78		
Osborne et al. (2000)	Otherwise healthy adults	AQoL	Symptoms of influenza, day 0-7: 0.77 - 0.85		
Pradas Velasco et al. (2009)	Otherwise healthy working-age patients	EQ-5D-3L	Confirmed influenza Social tariff based on VAS: 0.437 Social tariff based on TTO: 0.294		
Rombach et al (2022)	At risk children (6 months to 12 years)	EQ-5D-Y and EQ-5D-3L	ILI EQ-5D-Y Proxy, day 0-28: 0.568 - 0.923 EQ-5D-Y Child, day 0-28: 0.531 - 0.941		
Rothberg et al. (2003)	Working-age patients (<65 years) and healthcare workers	HUI-3	a) Influenza, not hospitalized: 0.25 b) Influenza, hospitalized: 0.20 <sup>f</sup>		
Thorrington et al. (2017)	Children in primary schools	EQ-5D	ILI: 0.2		
Tsuzuki & Yoshihara (2020)	Individuals (all ages)	SF-12v2 Standard	a) Influenza: 0.66 b) ILI: 0.66		
Turner et al. (2003)	Otherwise healthy adults (12-65 years) and elderly/high-risk patients (≥65 years)	Likert scale (0 to 10), Likert scores were converted TTO equivalent scores	a) Confirmed Influenza in healthy adults, day 1-21: 0.067543 - 0.86484 b) Confirmed Influenza in elderly and high-risk, day 1-21: 0.117313 - 0.668569		
Van Hoek et al. (2011)	Children and adults	EQ-5D	a) Influenza A/H1N1v (PCR positive): 0.29 b) ILI (PCR negative): 0.34		
Vindt Holm et al. (2004)	Otherwise healthy adolescents and adults (13-64 years)	11-point VAS Likert scales for health, sleep and usual activities and conversion into TTO equivalent scores	Influenza and ILI, day 1-21: 0.112936 - 0.86484		
Yang et al. (2017)	Children (0-15 years) <sup>g</sup> and adults (≥16 years)	EQ-5D-3L; telephone interview and EQ-5D proxy	Age (years)	a) Influenza outpatient	b) Influenza inpatient
			0-4	0.6286	0.5900
			5-15	0.6216	0.6132
			16-59	0.5939	0.4913
			≥60	0.5733	0.4128

Abbr. AQoL Assessment of Quality of Life; CEA cost-effectiveness analysis; CUA cost-utility analysis; EQ-5D EuroQol five-dimensional questionnaire; HUI Health Utility Index; ILI influenza like illness; PCR polymerase chain reaction; QoL Quality of Life; QWB Quality of Well-Being scale; RCT randomized controlled trial; SF-12v2 Short-Form 12 Items (version 2); TTO time trade-off; UK United Kingdom; VAS visual analogue scale  
<sup>a</sup>Author assumption <sup>b</sup>HUI3 assessment by 11 adults, but it is unclear from the original source whether they had influenza themselves. <sup>c</sup>To obtain utility weights, the scores were divided by 100. <sup>d</sup>Values were reported graphically only and approximated using WebPlotDigitizer. <sup>e</sup>VAS scores were normalized into quality weights (0 to 1). <sup>f</sup>Estimate <sup>g</sup>For children younger than 18 months the mobility and self-care dimensions were not scored (n=91).

## CONCLUSIONS



- This systematic review revealed varying utility weights for influenza and ILI across published studies.
- Since methods used to estimate utility weights also differed considerably, researchers should take care when selecting HSUVs for further analysis, such as CEA/CUA.

### CONFLICTS OF INTEREST, FUNDING & Disclosure

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