

Health states utilities for allergic rhinitis - an AI-supported systematic review

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Introduction

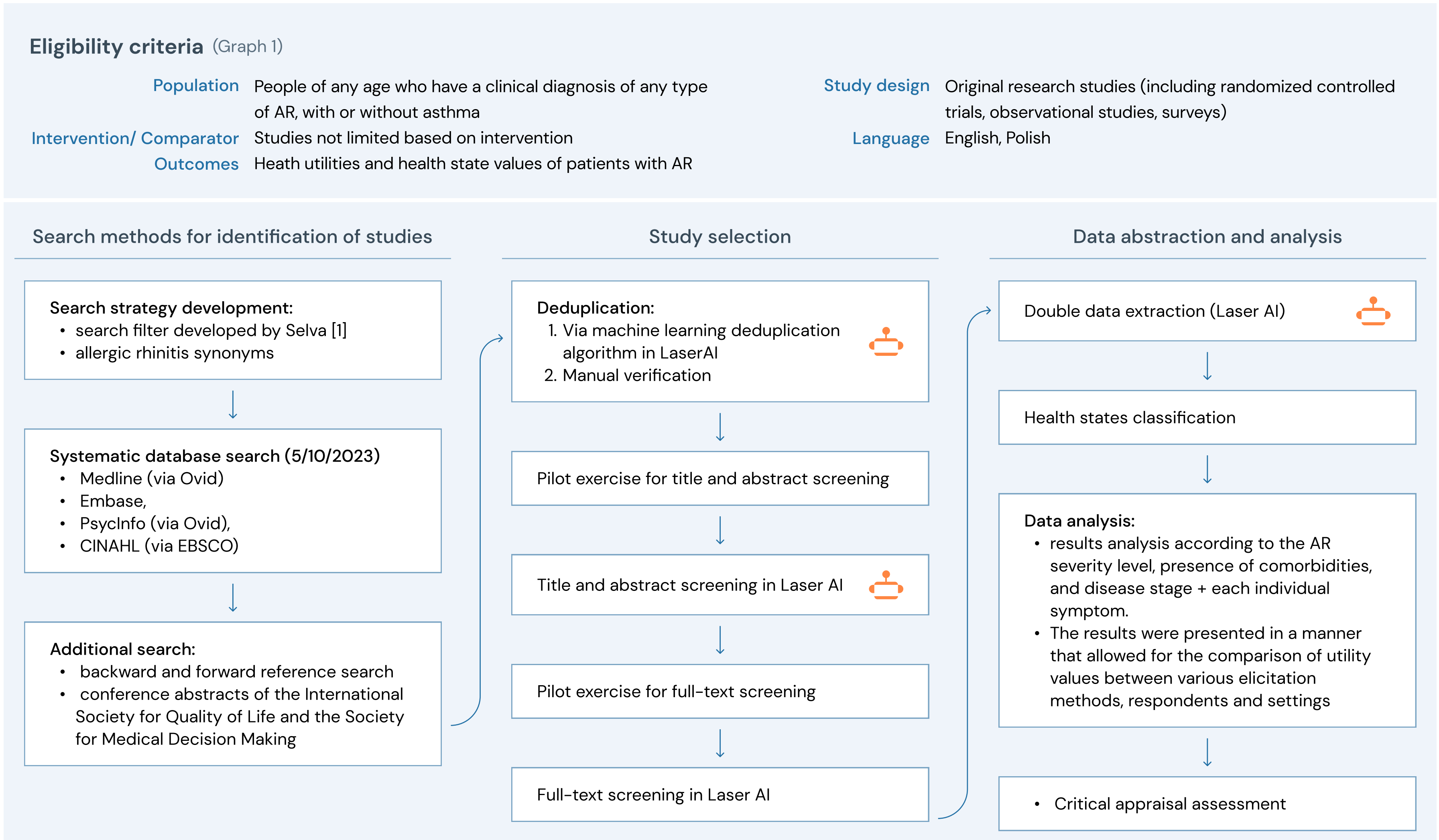
Allergic rhinitis (AR) is a challenging health issue in modern societies, affecting a significant portion of the population worldwide. It causes discomfort and interferes with daily activities due to bothersome symptoms. The rising prevalence of AR is attributed to urbanization, lifestyle changes, and environmental factors. Health state utility values (HSUVs) are commonly used in health economics and outcomes research to inform economic analyses, resource allocation decisions, and reimbursement policies. They also enable to capture individuals' preferences for specific health states, allowing for the comparison of the impact of different diseases and interventions on quality of life. In the context of allergic rhinitis, HSUVs enable researchers and policymakers to assess the overall burden of the disease and estimate the cost-effectiveness of various treatment strategies. This information is invaluable for healthcare decision-makers in prioritizing limited resources and maximizing health outcomes within budget constraints. Artificial Intelligence (AI), implemented eg. in the tools for systematic reviews, may have a potential to enhance the efficiency and accuracy of systematic reviews focusing on health state utility values, contributing to evidence-based decision-making in healthcare.

Objective

To build a comprehensive catalog of HSUVs for children and adults diagnosed with AR, identify evidence gaps and provide future directions for research in this area.

Methods

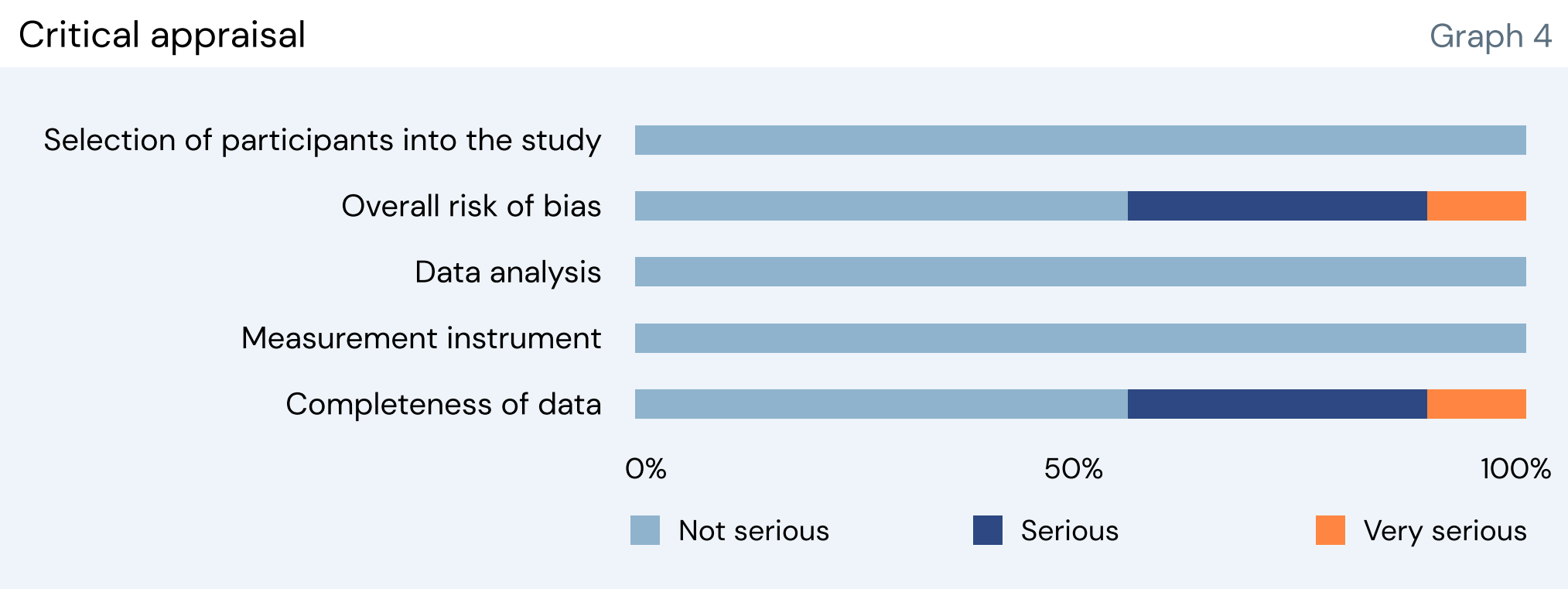
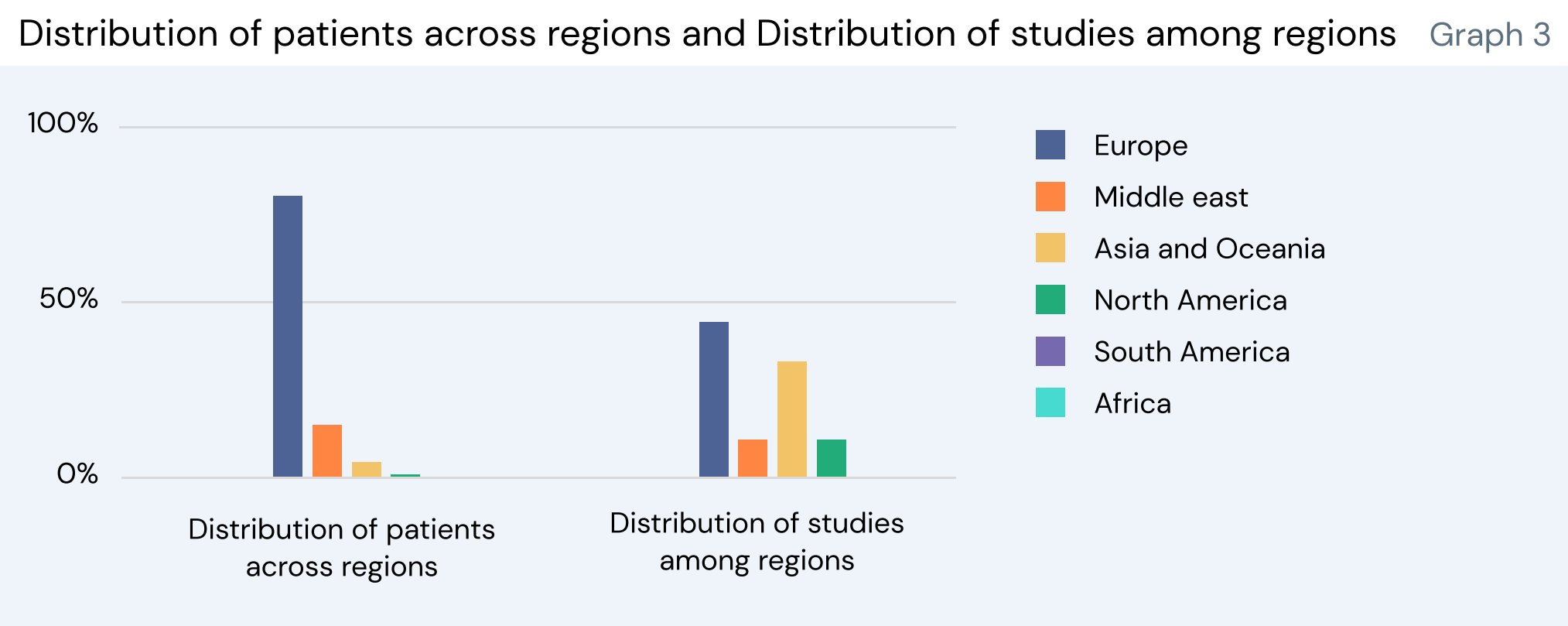
Search methods: Four bibliographic databases (Medline, Embase, PsycInfo, CINAHL) and grey literature were searched to identify studies reporting HSUVs for patients with allergic rhinitis. **Study selection:** Two indepenent reviewers performed abstract and full-text screening according to predefined criteria, each preceded by pilot excercise. Laser AI, with its machine learning models, was utilized during initial records deduplication and their prioritization during the double screening. **Data abstraction and analysis:** Included records was extracted in double in Laser AI with the support of the machine learning functionalities. In the analysis we included studies reporting utilities according to the severity level, presence of comorbidities, and disease stage and additionally utilities for each individual symptom. Given the high heterogeneity of data, meta-analysis was not performed. For each study we performed Critical appraisal assessment. **Graph 1** presents further detailed information on the systematic review process conducted within the Laser AI tool, including AI supported stages.



Results

The systematic search identified 9 studies [2–11] (15 609 patients) reporting HSUVs for 58 health states. More information can be found on **Graph 2**. Researches was primarily carried out in Europe and North America. There was no evidence for South America, Africa, or Australia. Distribution of studies among regions and distribution of patients across studies are presented on **Graph 3**. The majority of studies elicited HSUVs for adults only. EQ–5D were the most often used instrument. Standard Gamble was used in 3 studies, and Time Trade–Off in one study. The quality assessment for the HSU studies can be found in **Graph 4**. We did not identify any concerns related to the selection of participants and data analysis in any of the included studies. The general risk of bias assessment was quite high in most of the included studies (not a serious risk of bias). We present the full data on all HSUVs. Catalog of HSUVs comprised 4 categories: HSUVs for patients with SAR, PAR and AR (unspecified) and individual symptoms [**Table 1**, **Table 2**, **Table 3**, **Table 4**]. The analysis of HSUVs suggests that the higher AR severity, the lower utility values. Also, concomitant presence of asthma cause decrease of utility values. Children reported lower HSUVs compared to adult patients.

Characteristics		Graph 2
Elicitation method / measurement tool	EQ–5D – 4 Standard gamble – 3 Rating scales – 8 Rhinitis Symptom Utility Index – 2 Time trade-off – 1	
Sample size	15 609	
Respondent type	Adults: 9 studies Children: 1 study	
Health state found	58 Health states for 7 categories: - Utility for AR +/-comorbidities - Utility for AR +/-symptoms - Utility for different AR severity - Utility for different AR severity +/-comorbidities - Utility for different AR severity+symptoms - Utility of specific outcomes (single symptom) - Utility related to AR treatment	



Conclusion

This SR provides a dataset of HSUVs for AR that are required to support future economic studies. The use of AI allowed us to automate the deduplication of records and facilitated the screening and data extraction process. The study populations, elicitation methods, and summary statistics exhibited significant heterogeneity, leading to a wide range of reported HSUVs. Further studies are needed to explore the HSUVs for children subgroups and patients from regions other than Europe and North America.

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AR – adults				Table 1
Health state	Utility value	Used instrument	Region	
AR none/mild	0.79	RSUI	Europe/North America	
AR mild	0.96	TTO	Asia	
	0.82	Rating scales	Asia/Middle East	
	0.87	EQ–5D	Asia/Middle East	
	0.82	RSUI	Asia/Middle East	
AR mild/moderate	0.70	RSUI	Asia/Middle East	
AR moderate	0.94	TTO	Asia	
	0.71	Rating scales	Asia/Middle East	
	0.70	RSUI	Asia/Middle East	
AR moderate/severe	0.74	EQ–5D	Asia/Middle East	
AR severe	0.89	TTO	Asia	
	0.56	Rating scales	Asia/Middle East	
	0.49	RSUI	Asia/Middle East	
AR severest	0.83	TTO	Asia	
	0.43	Rating scales	Asia/Middle East	
AR mild (with current nasal symptoms/ without current nasal symptoms)	0.97/0.96	TTO	Asia	
AR moderate (with current nasal symptoms/ without current nasal symptoms)	0.96/0.93	TTO	Asia	
AR severe (with current nasal symptoms/ without current nasal symptoms)	0.90/0.87	TTO	Asia	
AR severest (with current nasal symptoms/ without current nasal symptoms)	0.83/0.82	TTO	Asia	
AR (with current nasal symptoms/ without current nasal symptoms)	0.92/0.90	EQ–5D	Asia/Middle East	
AR (controlled/not–controlled)	0.9/0.7	EQ–5D	Europe	
AR only (good control)	0.87–0.98	EQ–5D	Europe	
AR only (partial control)	0.84–0.95	EQ–5D	Europe	
AR only (poor control)	0.73–0.84	EQ–5D	Europe	
AR+asthma (good control)	0.84–0.97	EQ–5D	Europe	
AR+asthma (partial control)	0.81–0.94	EQ–5D	Europe	
AR+asthma (poor control)	0.73–0.87	EQ–5D	Europe	
AR (with asthma)	0.836	EQ–5D	Europe	

SAR /PAR – Adults				Table 2
Health state	Utility value	Used instrument	Region	
SAR none	1.000	EQ–5D	Asia/Middle East	
SAR mild	0.943	EQ–5D	Asia/Middle East	
SAR moderate	0.909	EQ–5D	Asia/Middle East	
SAR severe	0.849	EQ–5D	Asia/Middle East	
SAR most severe	0.767	EQ–5D	Asia/Middle East	
SAR (with asthma/without asthma)	0.77/0.92	EQ–5D	Asia/Middle East	
SAR mild (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.880/0.872/0.844	Standard gamble	Europe/North America	
SAR moderate (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.864/0.847/0.828	Standard gamble	Europe/North America	
SAR severe (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.831/0.845/0.812	Standard gamble	Europe/North America	
PAR (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.842/0.849/0.818	Standard gamble	Europe/North America	

SAR/PAR – Children				Table 3
Health state	Utility value	Used instrument	Region	
SAR mild (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.705/0.677/0.643	Rating scales	Europe	
SAR moderate (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.675/0.668/0.647	Rating scales	Europe	
SAR severe (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.666/0.663/0.635	Rating scales	Europe	
PAR (without asthma/ with well-to-partly controlled asthma/ with uncontrolled asthma)	0.655/0.650/0.638	Rating scales	Europe	

Symptoms						Table 4
	Utility value					
	Standard gamble		Rating scale		RSUI	
	Europe/ North America	Asia	Europe/ North America	Asia/Middle East	Europe/ North America	Asia/Middle East
Single Symptoms						
Severe Sneezing	0.69	0.76	0.23	0.33	0.68	0.69
Severe Throat itching	0.68	0.75	0.20	0.32	0.68	0.68
Severe Itchy eyes	0.61	0.75	0.2	0.32	0.62	0.68
Severe Nasal congestion	0.68	0.61	0.17	0.27	0.7	0.61
Severe Rhinorrhea	0.66	0.61	0.19	0.27	0.68	0.61