

PNEUMOCOCCAL DISEASE IN OLDER CHILDREN AND ADULTS GLOBALLY: RESULTS FROM THE AGEDD PROJECT

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INTRODUCTION

- The burden of invasive pneumococcal disease (IPD) in young children is well established, but few reviews have assessed disease burden in older children & adults.
- These data are essential to project the potential impact of pneumococcal conjugate vaccines (PCV) through direct & indirect effects of vaccination.

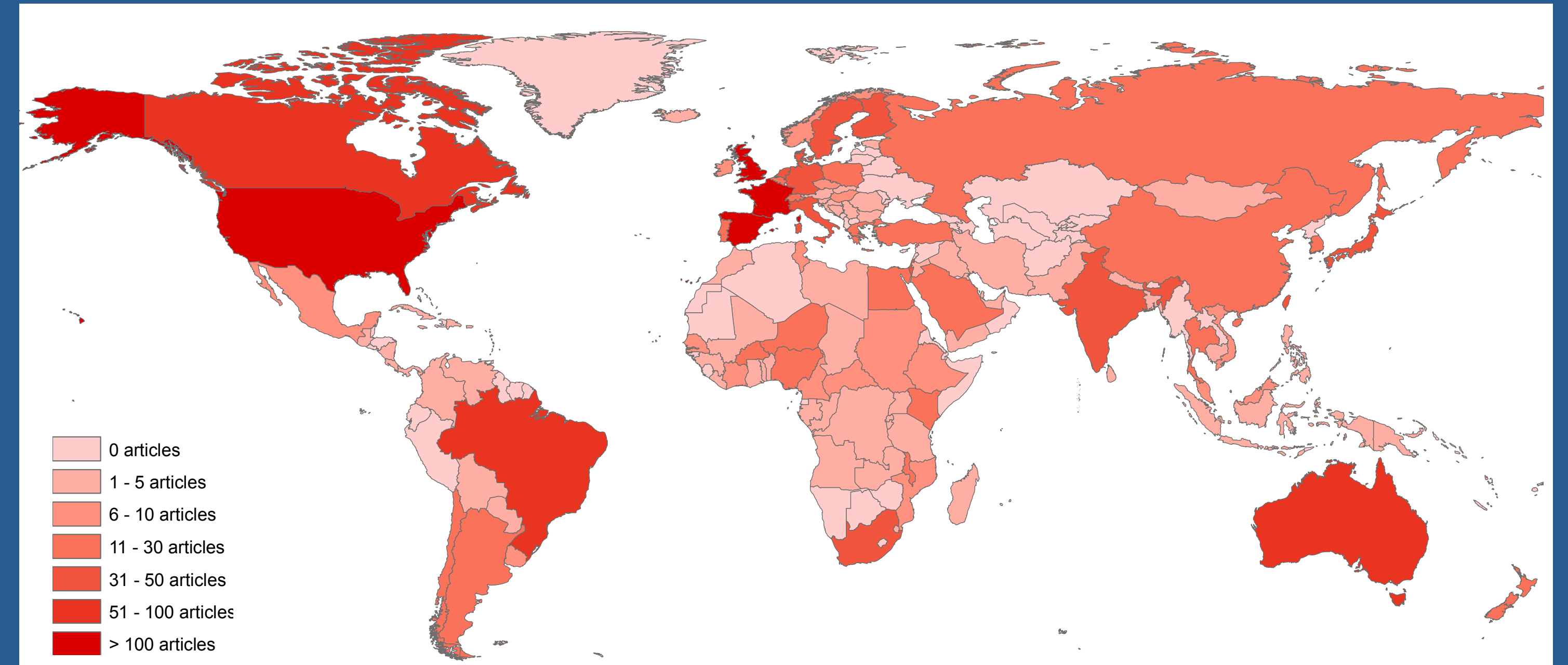
OBJECTIVE

- The goal of the Adult Global Estimation of Disease Burden and Distribution of Serotypes of Serious Pneumococcal and Meningococcal disease (AGEDD) project is to estimate the global & regional morbidity, mortality, and serotype/serogroup distribution of IPD in older children and adults and of meningococcal disease in all ages through a systematic review of published & unpublished data.

METHODS

- We systematically searched 16 databases to identify studies conducted 1980 - 2009 reporting IPD cases, deaths, case fatality ratio (CFR), incidence, mortality rates, or serotype distribution data among persons age 5 years and older.
- Additionally, we abstracted data from national surveillance reports from Australia, Canada, New Zealand, South Africa, United States, and several European countries not identified in the literature search.
- Articles included in the qualitative analysis presented
 - primary human data
 - pneumococci isolated from specimens from sterile sites
 - study population representative of the general population (with HIV as exception)
- Trained abstractors used a standardized form to extract
 - study characteristics (study location, time period, case definition, laboratory methods, and PCV use)
 - outcome data for cases/deaths
- Outcome data were assessed for data quality and assigned a score of "A" (low risk), "B", or "C" (high risk) to characterize risk of bias due access to care, case/death ascertainment, population denominator used to estimate incidence/mortality rates, laboratory methods, or other potential biases.
- Data were included in the quantitative analysis (i.e. to be used in models to estimate disease burden) if the study reported relevant outcome data from
 - ≥40 lab-confirmed cases among persons ≥5 years
 - quality assessment score for relevant categories of A/B
- Among studies reporting overlapping data from the same study location and time period, the source with the greatest number of cases or longer study duration was included in the analysis, with preference for nationally representative studies.

FIGURE 1: Distribution of articles meeting study inclusion criteria and presenting data for at least one outcome of interest for IPD



Key Outcomes of Interest

- IPD incidence varied globally with a median of 7.0 cases/100,000 population (Table 2).
- Studies reporting the % pneumonia due to pneumococcus (median 28.0%) and % meningitis due to pneumococcus (median 33.5%) were available from all regions.
- Although few studies were from Africa, the % pneumonia due to pneumococcus was greatest in Africa. Conversely, most studies presenting meningitis etiology data were from Africa and reported the highest % meningitis due to pneumococcus.
- Median IPD CFR globally was 21.8% with the highest CFR reported from EMR region.

TABLE 2: Median Incidence, CFR, and Syndrome Etiology by Region

WHO Region	IPD Incidence per 100,000 population (Range)	IPD CFR (Range)	% of Meningitis cases due to SP (Range)	% of CAP cases due to SP (Range)
AFR	6.9 (0.8-25.0)	38.1 (22.2-44.4)	49.0 (0-72.3)	54.4 (6.3-70.9)
AMR	4.1 (0-205.4)	13.3 (3.9-47.6)	12.4 (1.9-30.9)	20.6 (12.4-43.0)
EMR	94.5 (55-219)	42 (3.4-48)	34.7 (6.7-59.7)	36.6 (31.8-41.3)
EUR	9.9 (0-97)	17.3 (5.1-27.8)	47.2 (16.5-58.0)	33.3 (12.5-82.9)
SEAR	---	26.3 (15.2-65.0)	38.1 (16.8-86.4)	26.7 (20.0-28.0)
WPR	6.25 (0-298)	13.1 (5.1-38.3)	10.8 (8.1-28.2)	27.1 (1.3-61.0)
Global	7.0 (0-298)	21.8 (3.4-65.0)	33.5 (0-86.4)	28.0 (1.3-82.9)

RESULTS

Literature Search Results

- Literature search yielded 17,375 unique articles and 2,133 articles reporting IPD data outcomes of interest and were eligible for inclusion in the qualitative analysis (Figure 1).
- Data was available (n=284 studies) from all regions; most were from developed countries in Europe (n = 887) and the Americas (n = 464); few presented data stratified specifically for older children and adults.
- >80% of the articles contributed to the quantitative analysis for all outcomes with the exception of IPD CFR with only 47% of articles included in the analysis (Table 1).

TABLE 1: Data availability for key outcomes of interest for older children and adults by region.

WHO Region	Articles Included in the Qualitative Analysis				Articles Included in the Quantitative Analysis			
	Number with IPD Incidence (%)	Number with IPD CFR (%)	Number with % Meningitis due to Pneumococcus (%)	Number with % Pneumonia due to Pneumococcus (%)	Number with IPD Incidence (%)	Number with IPD CFR (%)	Number with % Meningitis due to Pneumococcus (%)	Number with % Pneumonia due to Pneumococcus (%)
AFR	8 (14.0)	12 (13.6)	20 (41.7)	5 (8.8)	5 (10.9)	4 (10.8)	16 (37.2)	5 (9.6)
AMR ¹	13 (22.8)	20 (22.7)	3 (6.3)	6 (10.5)	11 (23.9)	7 (18.9)	3 (7.0)	5 (9.6)
EMR	1 (1.8)	6 (6.8)	6 (12.5)	2 (3.5)	1 (2.2)	3 (8.1)	6 (13.9)	2 (3.8)
EUR ¹	19 (33.3)	15 (17.1)	10 (20.8)	14 (24.5)	19 (41.3)	6 (16.2)	12 (27.9)	11 (21.2)
SEAR	0 (0.0)	7 (8.0)	3 (6.3)	5 (8.8)	0 (0.0)	3 (8.1)	3 (7.0)	5 (9.6)
WPR	16 (28.1)	28 (31.8)	6 (12.5)	25 (43.9)	10 (21.7)	14 (37.9)	3 (7.0)	24 (46.2)
Total	57 (100)	88 (100)	48 (100)	57 (100)	46 (100)	37 (100)	43 (100)	52 (100)

¹ Only includes studies with nationally representative data and data from national surveillance websites. Articles with sub-national data have not been abstracted for most EUR countries, Canada, and the United States.

CONCLUSION

- All regions had some data on the incidence and CFR of IPD in older children & adults.
- Variability was observed in the amount of data available by region and outcome
 - Fewer data were available from low & middle income countries, and particularly from the WHO's South East Asia Region.
 - More data were available for estimating the % pneumonia and % meningitis cases due to *S. pneumoniae* than for other outcomes.
- These studies indicate that pneumococci are an important cause of pneumonia & bacterial meningitis in older children & adults, with the highest occurrence in Africa.

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