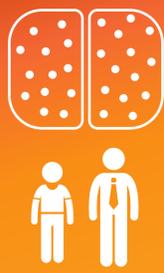


Prevalence of Meningococcal Carriage by Serogroup in Adolescents and Young Adults: A Global Systematic Literature Review and Meta-Analysis



Adolescents and young adults are vulnerable to meningococcal B serogroup; targeted vaccination in this group can be an impactful public health intervention



SCAN ME

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Background

- Invasive meningococcal disease (IMD) caused by *Neisseria meningitidis* is a major cause of meningitis and septicaemia resulting in life-threatening complications or death.^{1,2}
- Globally, *N. meningitidis* causes **500,000 cases of IMD and 50,000 deaths annually**.³
- The greatest burden of IMD is in infants and young children. However, a second peak is observed in adolescents and young adults (YA), who are considered transmission drivers in the wider population.^{4,5}

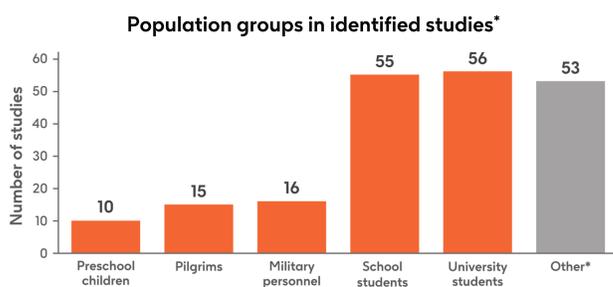
Conclusions

- Meningococcal carriage is highest in adolescents and YA, mainly driven by serogroup B. Adolescents and YA is at increased risk of IMD.
- Introducing serogroup B prevention for adolescents and YA can be an impactful public health intervention, as this group is the primary carrier of the disease.
- Understanding carriage prevalence is critical to guide public health interventions.

Aim

- To systematically assess and meta-analyse meningococcal carriage prevalence by serogroup, age, and region among adolescents and YA.
- To systematically identify meningococcal carriage prevalence that can inform meningococcal vaccine strategy optimization.

Demographics



Results

SRL conducted to identify studies (Jan 2000-April 2024) from electronic data bases and public health sources.

Meta-Analysis (MA) combined data across identified studies. Studies included:

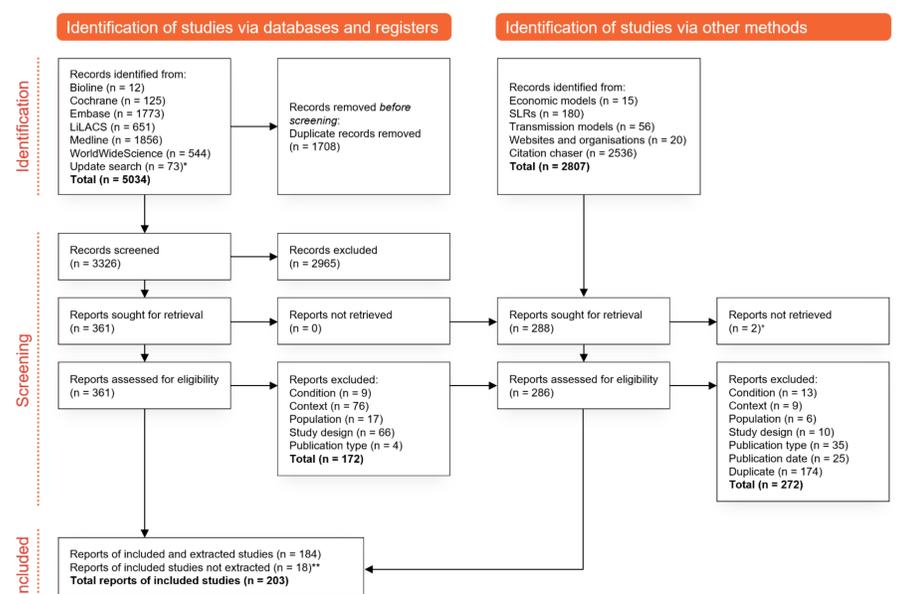
- 203 (sample sizes: 15 – 34,489; timeframe: 1996–2022).
- 60 focused on adolescents.
- 71 on young adults.

Data spanned six continents.

Carriage prevalence:

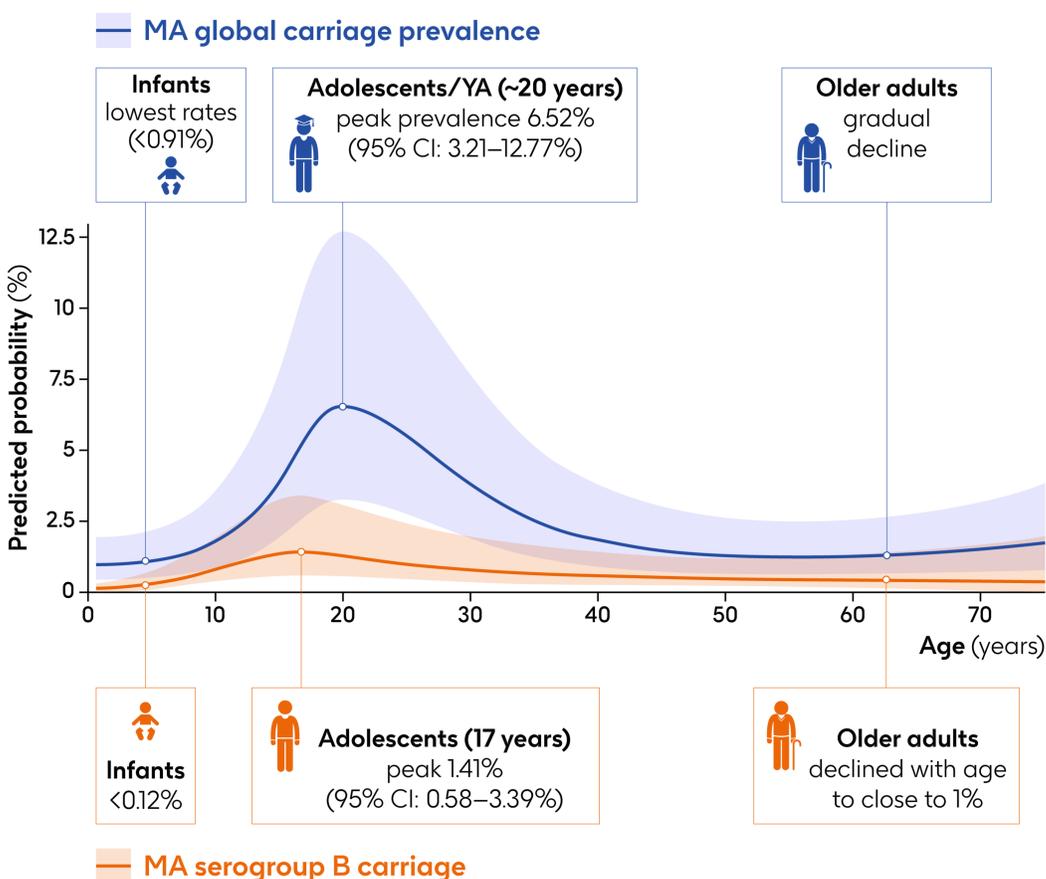
- Estimated by age and meningococcal serogroup.
- Adjusted for key factors (e.g., swab method, risk group, study year).
- Accounted for differences between countries and studies.
- Age-specific carriage prevalence estimated using hierarchical mixed-effects models.

Systematic literature review (SLR) study selection flow diagram

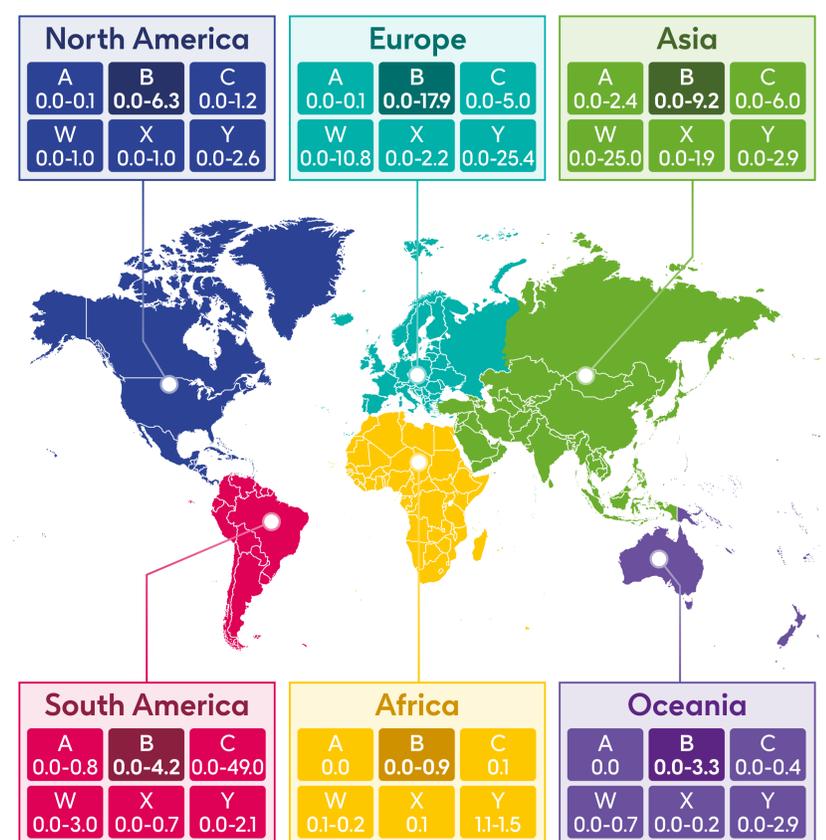


Footnotes: * Records identified from CDSR (n = 4), Embase (n = 19), LILACS (n = 11), Medline (n = 23), WorldWideScience (n = 16). ** Records that presented carriage prevalence data reported in other studies from the same cohort. More information on the design of studies included in the review is presented in Supplemental Material.

Global meningococcal carriage increases through childhood, peaks in adolescents/YA, and declines in older age, serogroup B being the most common globally



Considerable regional differences in meningococcal carriage prevalence (%) reported in studies across continents: highest carriage rates seen in Europe (serogroup B)



Specific serogroup B carriage prevalence (%) among adolescents and YA in specific countries is presented in Supplemental Material

Abbreviations

CI: confidence interval; IMD: Invasive meningococcal disease; LILACS: Latin American and Caribbean Health Sciences Literature; MA: meta-analysis; SLR: systematic literature review; UK: United Kingdom; US: United States; YA: young adults.

References

1. Pizza M, et al. Microorganisms. 2020;8(10):1521. 2. European Centre for Disease Prevention and Control. Factsheet about meningococcal disease 2023. Available at: <https://www.ecdc.europa.eu/en/meningococcal-disease/factsheet> [accessed September 12, 2025]. 3. Harrison LH and al. Vaccine. 2011;29(18):3363-71. 4. Peterson ME, et al. BMJ Open. 2019;9(4):e024343. 5. MacLennan JM, et al. Lancet Infect Dis. 2021;21(5):677-87.

Acknowledgements

The authors would like to thank Enovalife Medical Communication Service Center for editorial assistance and publications coordination; and Malack Abbas for medical writing support, on behalf of GSK.

Disclosures

ZK, AG, IU, LT, TP, HS and PM are employed by and hold financial equities in GSK. PC, MT, AE received research grants from GSK for this study. The authors declare no other financial and non-financial relationships and activities.

Funding

GSK study identifier: VEO-000812

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Supplemental Data

Serogroup B specific carriage (%) was especially pronounced in adolescents and YA

- Serogroup B was the most frequently detected serogroup.
- High rates of carriage in adolescents and YA likely reflect behavioural changes in these groups.
- This pattern was consistent across all regions.

	Adolescents (%)	Young Adults (%)
South Africa	NA	0.8-0.9
China	0.7-9.2	1.3
Israel	NA	3.3
Philippines	5.7	1.2
South Korea	0.8	0.9-3.8
Turkey	NA	0.0-0.3 ^(a)
Czech Republic	3.9	2.8
Germany	2.3-7.1	13.8
Greece	1.5-3.5	3.4-6.8
Hungary	5.9	0.7
Italy	1.4-4.9	0.2
Lithuania	NA	1.0
Netherlands	2.8	8.7-11.0
Norway	0.3-0.9	NA
Poland	5.0	NA
Portugal	NA	3.1-5.3
Russia	NA	0.0
Spain	9.7	3.8-4.8
UK	1.0-6.7	3.3-14.0
Canada	NA	3.3-5.6
Cuba	2.1	1.3
US	0.1-1.6	0.3-4.0
Australia	0.9-1.6	1.7-3.2
Argentina	1.9	NA
Brazil	0.6-1.6	2.1-4.2
Chile	1.5	1.5

(a) 0% prevalence assumed based on reported serogroup assays

S1- Criteria used to define populations in this SLR

Population group	Definition	Number of identified studies*
Infants	Aged <1 year	4
Toddlers	Aged ≥1 to 4 years ± 1 year	13
Children	Aged ≥5 to 9 years ± 1 year	21
Adolescents	Aged ≥10 to 17 years, or were part of a population of high/secondary school students, or were part of a population with an average age within the ≥10 to 17 age range	60
Young adults	Aged ≥18 to 25 years, or were part of a population university or military population, or were part of a population with an average age within the ≥18 to 25 age range	71
Adults	Aged ≥26 to 64 years	24
Older adults	Aged ≥65 years	8

* Does not include all studies identified in the review; as age ranges in some studies do not fit within the defined categories.

S2- Design of studies included in the review was mostly cross-sectional

Study design	Definition	Number of identified studies*
Block-randomised human challenge	Participants intentionally exposed to a pathogen under controlled conditions and randomization is done within predefined blocks to ensure balanced distribution of participants across different study groups	1
Cross-sectional	Carriage prevalence measured at a single timepoint	128
Cross-sectional and longitudinal	Cross-sectional survey where a selection of the participants are then followed longitudinally	4
Longitudinal	Carriage prevalence repeatedly measured in the same set of individuals over time	27
Repeat cross-sectional	Multiple cross-sectional surveys at different timepoints	9
Repeat cross-sectional with nested cohort	Multiple cross-sectional surveys at different time points, with a cohort of individuals repeatedly surveyed within them	10
Randomized controlled trial	Participants randomly assigned to study group to compare effects of an intervention	3

* 182 data points from 181 unique studies.

Abbreviations

NA: not available; SLR: systematic literature review; YA: young adults.