# Potential impact of prospective Strep A vaccines on the global burden of disease: model-based analysis

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Aim

- Estimate the projected health impact of Strep A vaccination at the global, regional, national (183 countries), and income levels
    - Strep A disease states and sequelae
        - pharyngitis
        - impetigo
        - invasive disease
        - cellulitis
        - rheumatic heart disease
    - Vaccination impact
        - cases, deaths, DALYs averted
        - lifetime impact of vaccination
        - 30 birth cohorts (2022 - 2051)
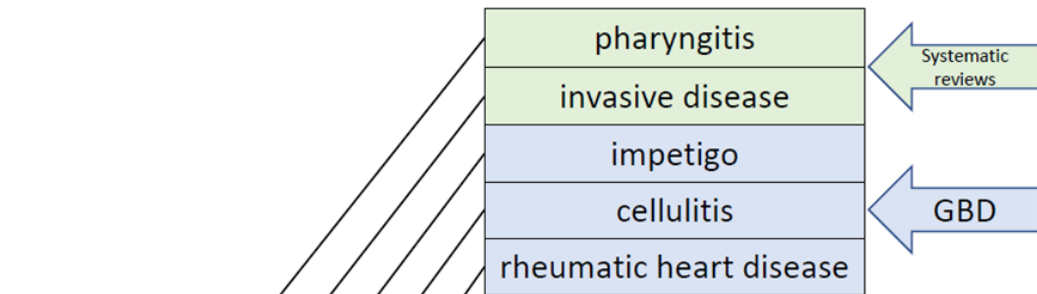
Strep A vaccine impact model

Static cohort model
proportional reduction
direct effect
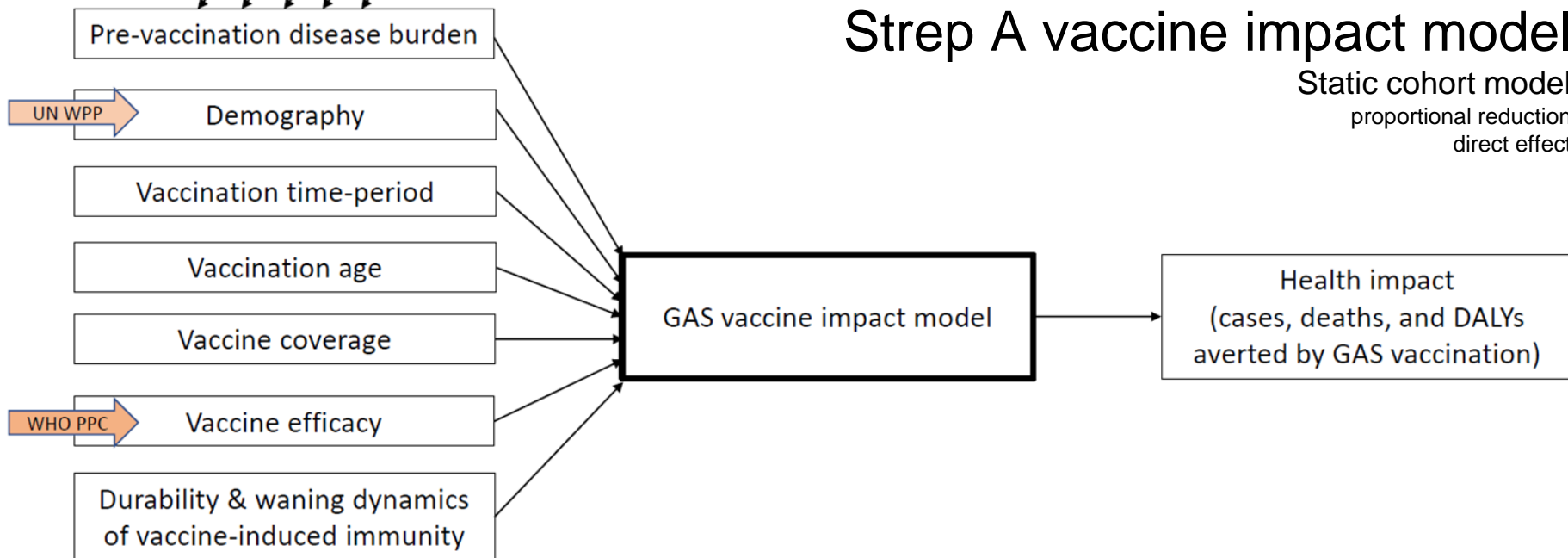
Vaccine efficacy

| Group A streptococcus disease state/sequelae	Vaccine efficacy (%)
Pharyngitis	80
Impetigo	80
Invasive disease	70
Cellulitis	70
Rheumatic heart disease	50

Vaccination scenarios

Scenario	Year of vaccine introduction	Maximum coverage	Durability of vaccine-derived immunity
1	Country-specific (2022 - 2034)	Country-specific (9 - 99%)	Full efficacy for 10 years
2	Country-specific (2022 - 2034)	Country-specific (9 - 99%)	Linear waning over 20 years
3	2022	50%	Full efficacy for 10 years
4	2022	50%	Linear waning over 20 years
5	Country-specific (2022 - 2034)	50%	Full efficacy for 10 years
6	Country-specific (2022 - 2034)	50%	Linear waning over 20 years

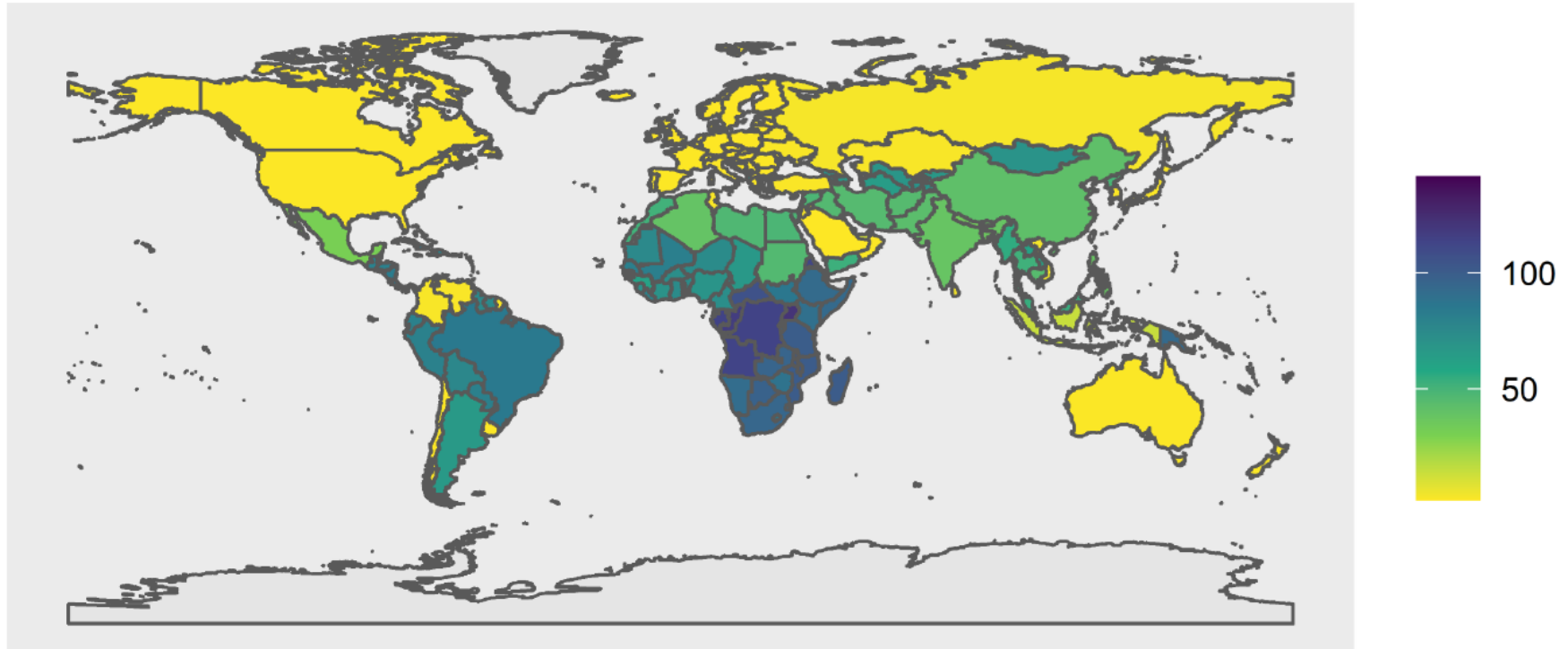# Vaccine impact @ country income levels
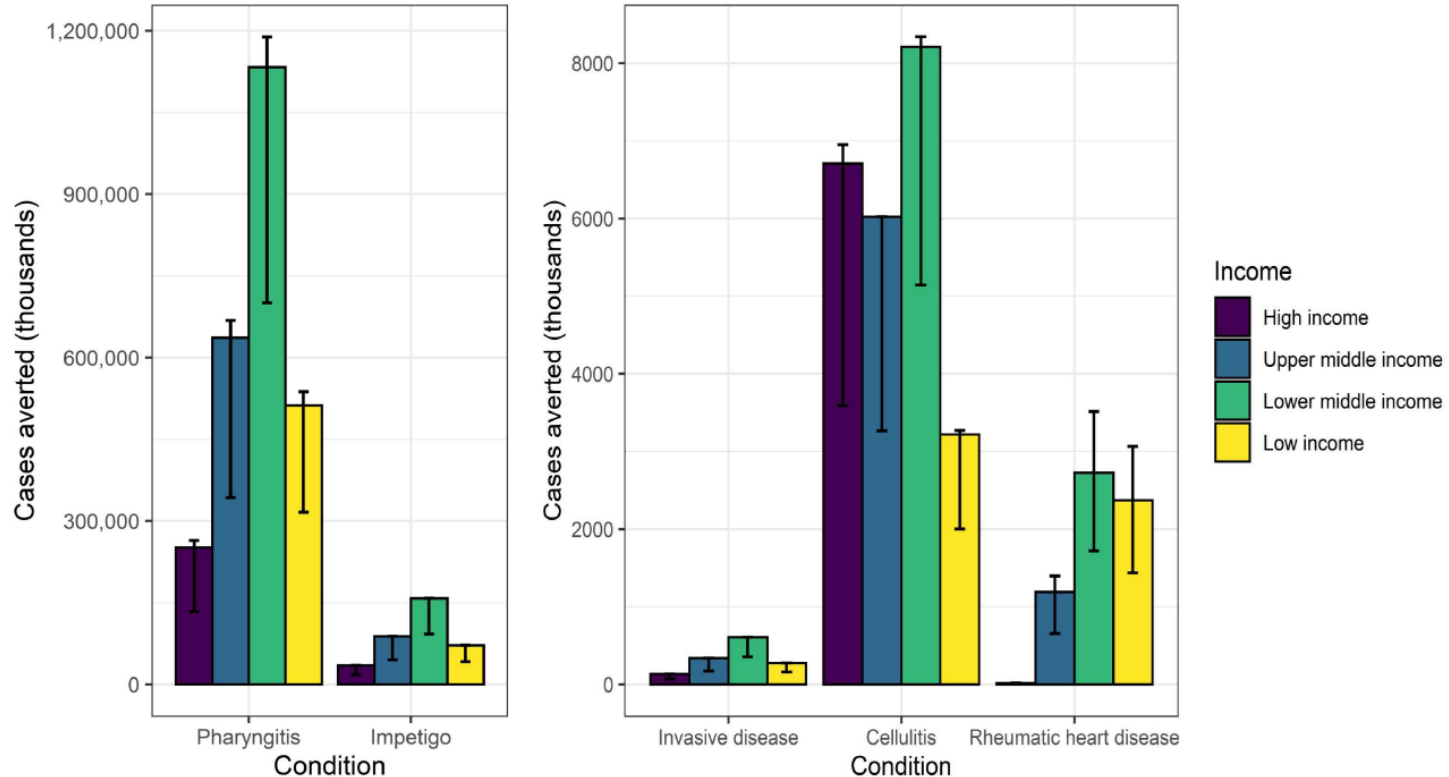
Vaccine impact @ regional and global levels
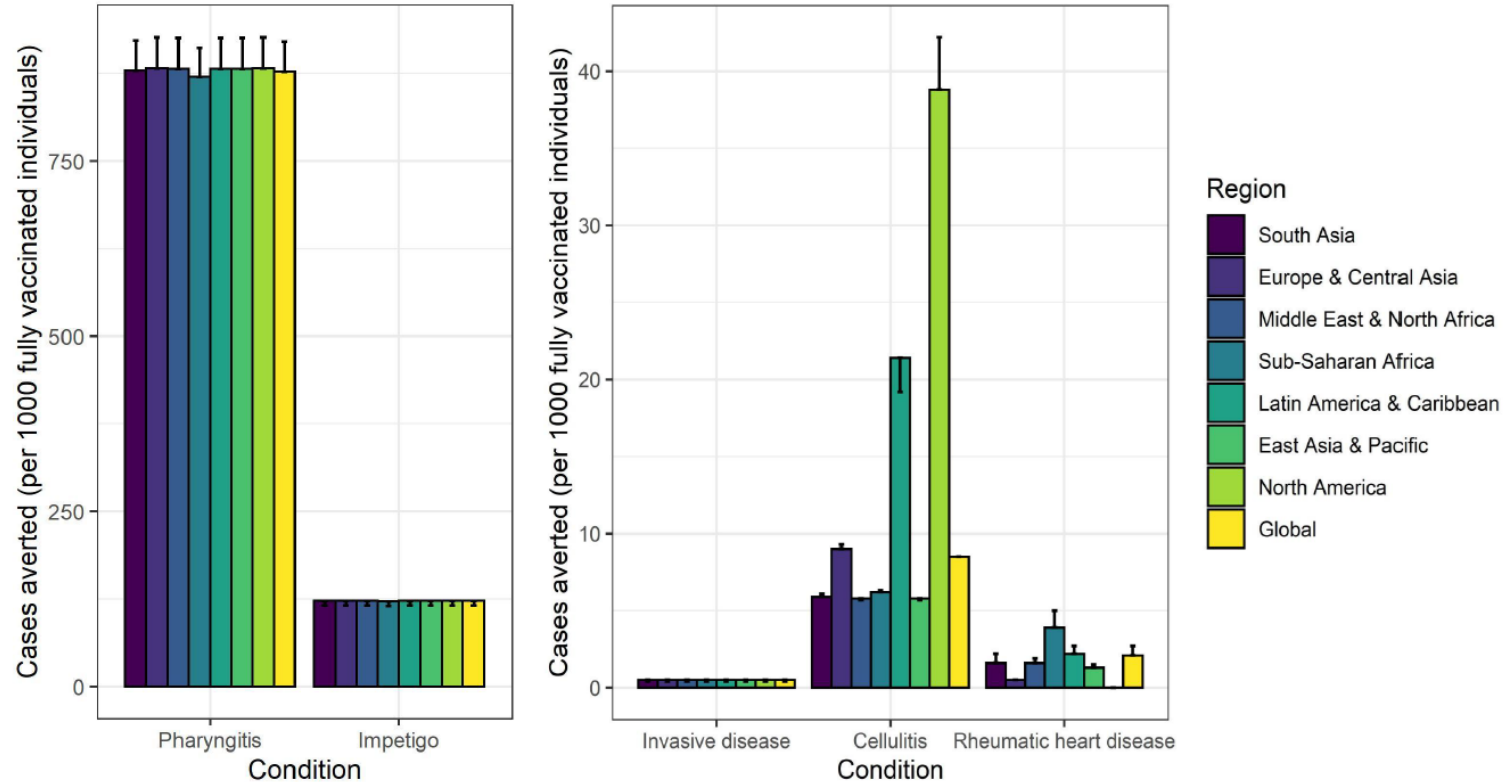
Vaccine impact @ national and global levels

Disability-adjusted life years (DALYs) averted per 1000 fully vaccinated individuals

Vaccine impact @ regional and global levels

UN regions	Scenarios	Fully vaccinated individuals (millions)	Cases averted through vaccination (thousands) (range for scenarios 1-2 and 3-6)				
			Pharyngitis	Impetigo	Invasive disease	Cellulitis	Rheumatic heart disease
South Asia	1-2*	657	(578,344, 606,913)	(76,156, 80,716)	(291, 310)	(3,880, 3,992)	(1,041, 1,466)
	3-6	(381, 388)	(334,999, 357,905)	(44,117, 47,620)	(169, 183)	(2,246, 2,352)	(608, 870)
Europe & Central Asia	1-2*	226	(199,636, 209,585)	(26,231, 27,796)	(100, 106)	(2,027, 2,104)	(102, 120)
	3-6	(122, 124)	(107,661, 114,573)	(14,146, 15,197)	(54, 58)	(1,115, 1,171)	(53, 62)
Middle East & North Africa	1-2*	218	(192,160, 201,701)	(25,266, 26,776)	(96, 102)	(1,253, 1,258)	(348, 407)
	3-6	(121, 122)	(106,638, 112,917)	(14,025, 14,991)	(53, 57)	(693, 701)	(196, 232)
Sub-Saharan Africa	1-2*	918	(799,501, 838,027)	(105,671, 112,075)	(407, 433)	(5,548, 5,635)	(3,635, 4,633)
	3-6	(583, 607)	(505,846, 553,384)	(62,933, 74,061)	(258, 286)	(3,562, 3,777)	(2,285, 3,030)
Latin America & Caribbean	1-2*	184	(162,482, 170,555)	(21,361, 22,637)	(81, 87)	(3,544, 3,949)	(413, 501)
	3-6	(109, 113)	(95,898, 104,796)	(12,608, 13,913)	(48, 53)	(2,091, 2,435)	(244, 306)
East Asia & Pacific	1-2*	575	(507,378, 532,590)	(66,695, 70,679)	(254, 270)	(3,261, 3,354)	(763, 860)
	3-6	(317, 329)	(279,857, 304,513)	(36,790, 40,426)	(140, 155)	(1,837, 1,954)	(414, 483)
North America	1-2*	107	(94,334, 99,039)	(12,395, 13,134)	(47, 50)	(4,145, 4,506)	(4, 4)
	3-6	(58, 58)	(51,094, 53,879)	(6,714, 7,145)	(26, 27)	(2,245, 2,451)	(2, 2)
Global	1-2*	2,886	(2,533,834, 2,658,410)	(333,775, 353,814)	(1,277, 1,359)	(23,657, 24,797)	(6,306, 7,991)
	3-6	(1,690, 1,741)	(1,481,995, 1,601,967)	(195,332, 213,353)	(748, 820)	(13,789, 14,843)	(3,802, 4,985)

* Same number of fully vaccinated individuals for scenarios 1 and 2.

Pre-vaccination disease burden

R package documentation

R package and Shiny web app :
https://github.com/fionagi/GASImpactModel
https://github.com/fionagi/GASImpactModel_app

Vaccination impact

(cases, deaths, DALYs averted)
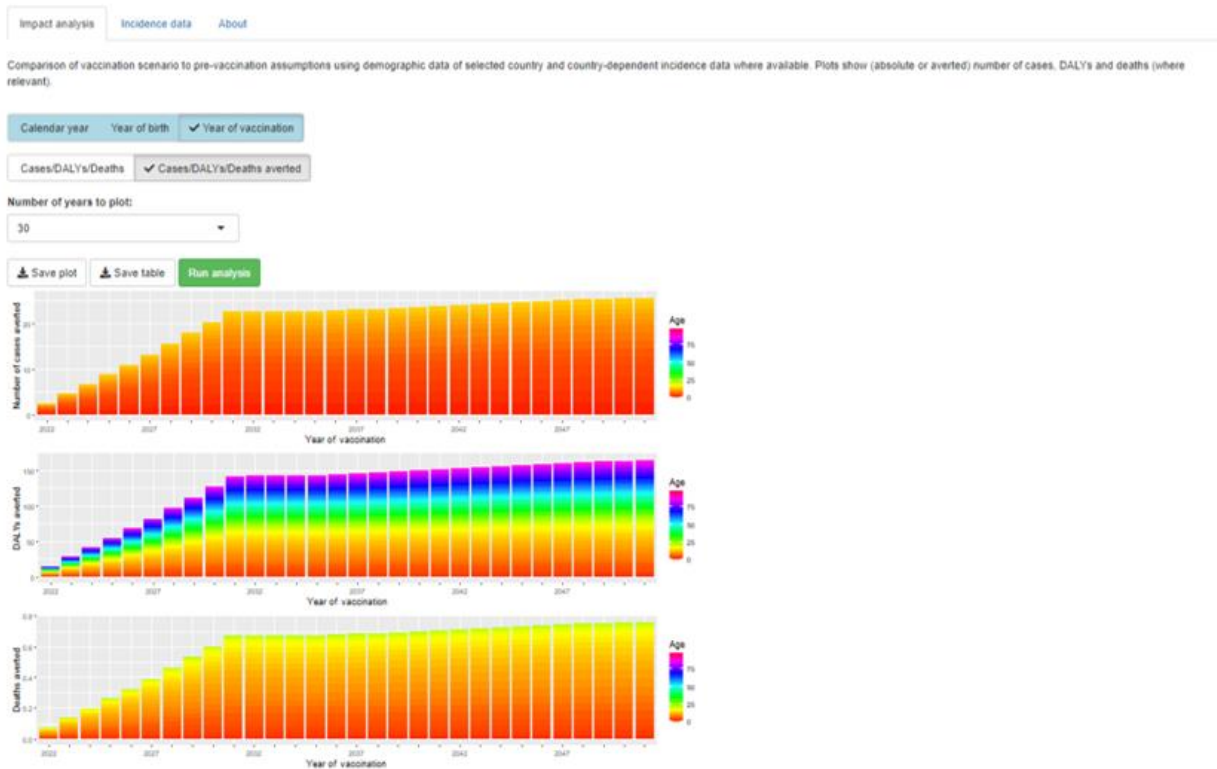
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Thank you

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