

# Vaccination in 2025

## Australian Vaccinology Course

Professor Kristine Macartney  
28 August 2025 Day 1 AVC

### Learning objective

Analyse challenges and opportunities facing vaccination programs in Australia and the Asia-Pacific region

Global vaccination strategies and coverage

Challenges facing vaccination in 2025



# Acknowledgement of Country

## **‘Protect your mob – get vaccinated’**

Samantha Williams (1988–2023; *vale*),  
Wiradjuri woman from Narrandera, NSW

*NCIRS would like to recognise Samantha for her significant contribution to the community through her work in health and immunisation.*

The artwork’s design represents our communities in the centre, from our home to the wider community. The symbols around the circle represent the people, both men and women – this could be anyone from mothers to fathers to gran. It is our responsibility to keep our mob healthy. We need to educate our younger generation and communities about the importance of immunisations and how they keep us protected. The lines going out from the circle represent our journeys, jobs and relocation and the impacts we have made along the way. Many Aboriginal and Torres Strait Islander families may relocate from one community to another. We have mob all over – but no matter where we go, the story is the same: we need to protect our mob. So the smaller circles represent herd immunity across our communities, and the people that this has an impact on – our elders, our babies and our people who cannot be immunised.

*NCIRS commissioned this artwork*





# Outline

## Disease prevention and better health using vaccines



### People

All ages and stages

All health status

All connected



### Diseases

Growing VPDs

Emerging diseases

Each pathogen distinct



### Vaccines

Pipeline technologies

Cost and evaluation

Novel deliver



### Communities

Immunisation systems

How we think and feel together

Each pathogen, vaccine and person is unique  
We live in complex communities but can prevent disease

# 1967

Mass vaccination begins with the World Health Organization announcing the Intensified Smallpox Eradication Programme.

Read more about the [HISTORY OF THE SMALLPOX VACCINE](#) →

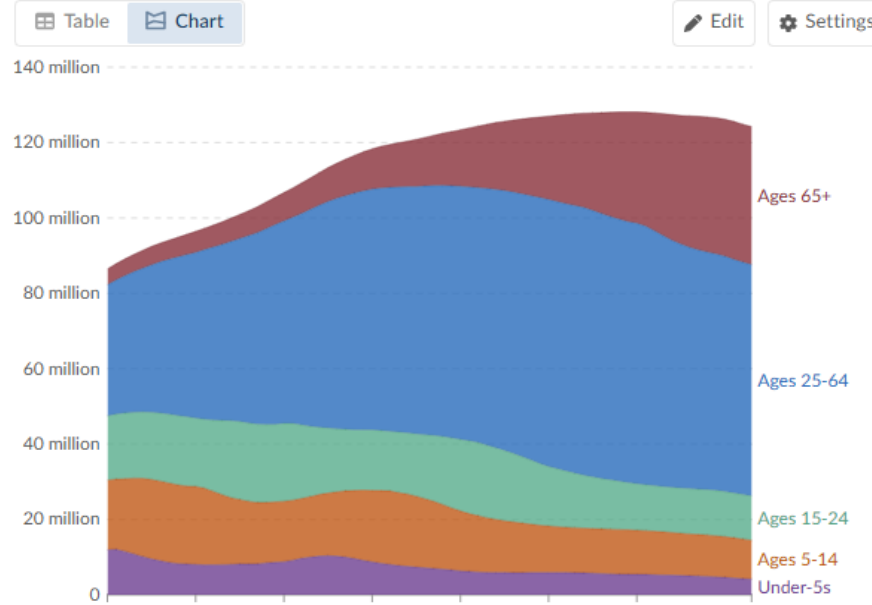


How old was Kristine in 1967?

# The world population is changing:

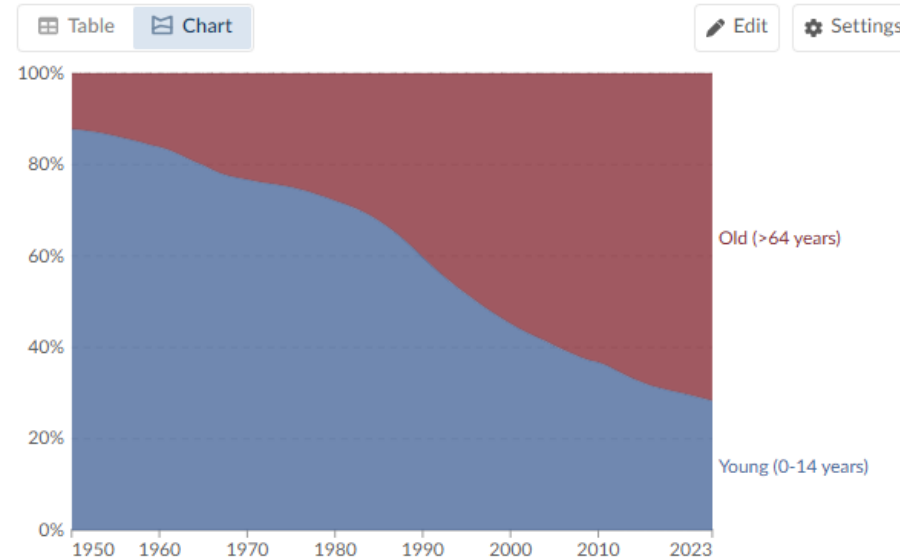
- 1950 - 2.5 billion people
- 2021- 8 billion
- 2100 - 10 billion expected
- Now more people over 64 than children younger than 5
- Australia's population 'officially passed 27 million (March 2024)
- Net overseas migration 83% of 615,300 growth
- 105,500 natural increase
- 2,879,025 temporary visa holders

### Population by age group, Japan

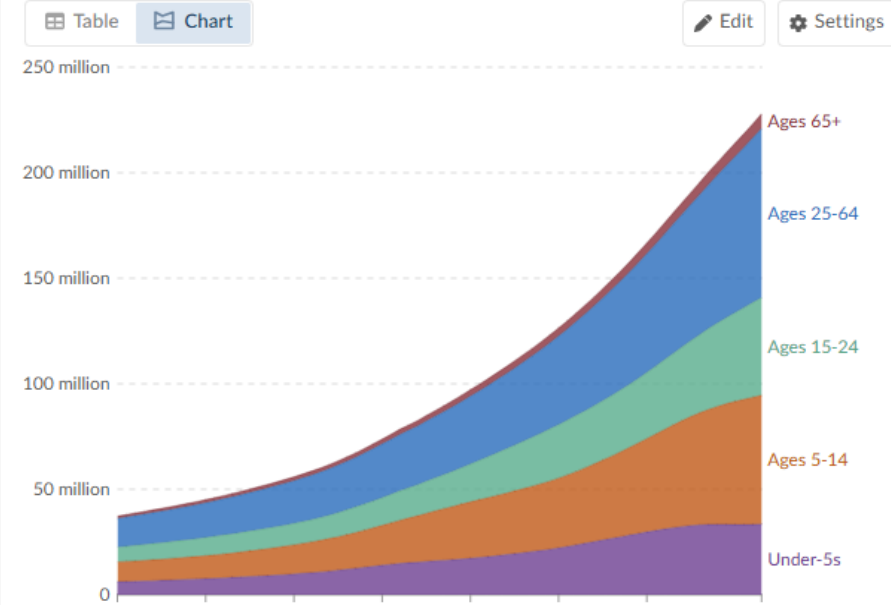


### Age dependency breakdown by young and old dependents, Japan, 1950 to 2023

Age dependency ratio is the ratio of dependents (either children aged 0-14 years, or older populations aged over 64 years) to the working age population (15-64 years). Data shows the relative composition of the dependent population between young and old.

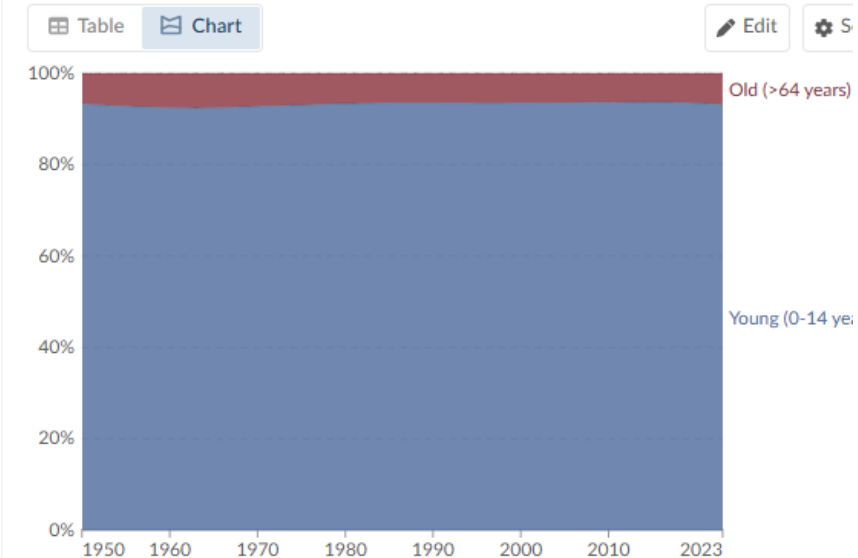


### Population by age group, Nigeria



### Age dependency breakdown by young and old dependents, Nigeria, 1950 to 2023

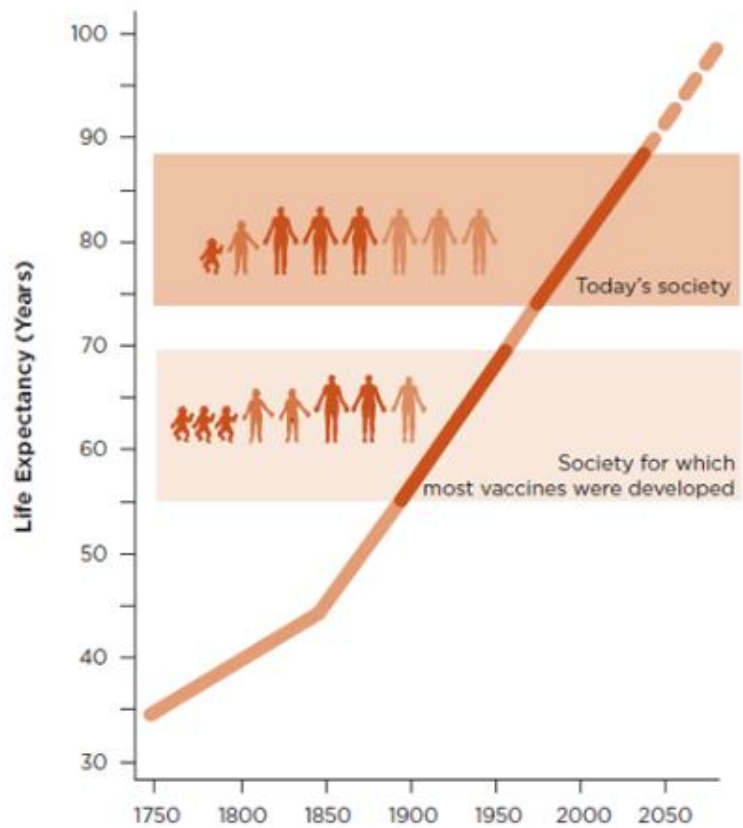
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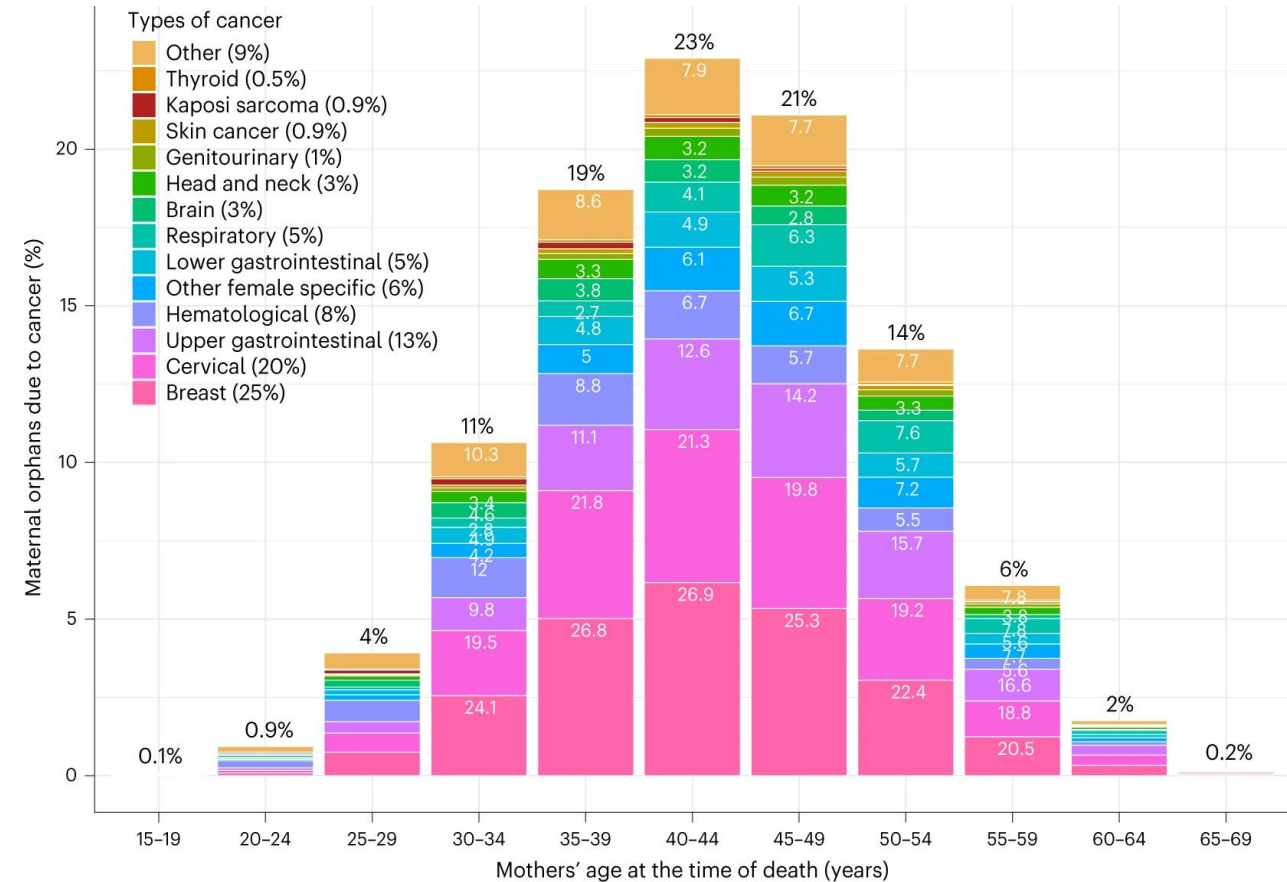
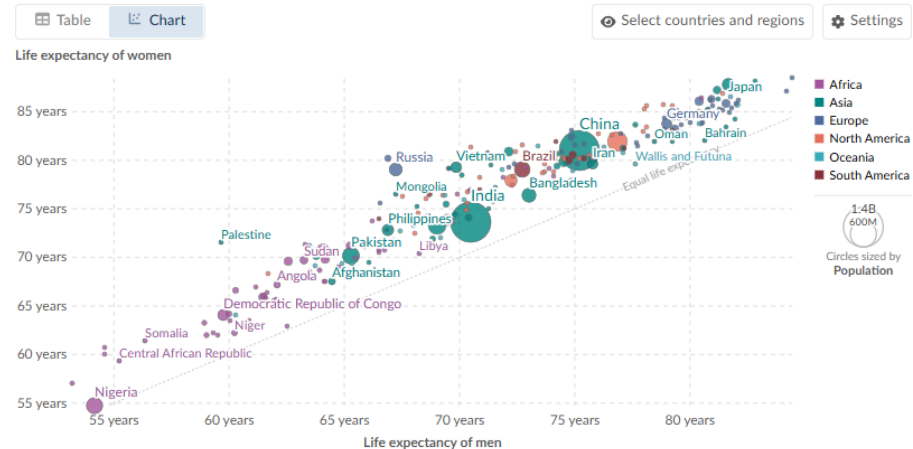
## Cervical cancer

Est. 341,000 cervical cancer deaths, resulting in 210,000 new maternal orphans



### Life expectancy of women vs. men, 2023

The period life expectancy at birth, in a given year.



Global distribution of maternal orphans due to cancer by mother's age at time of death and type of cancer

# Young and old living with chronic conditions increase risk of acquiring and/or severity of infectious diseases

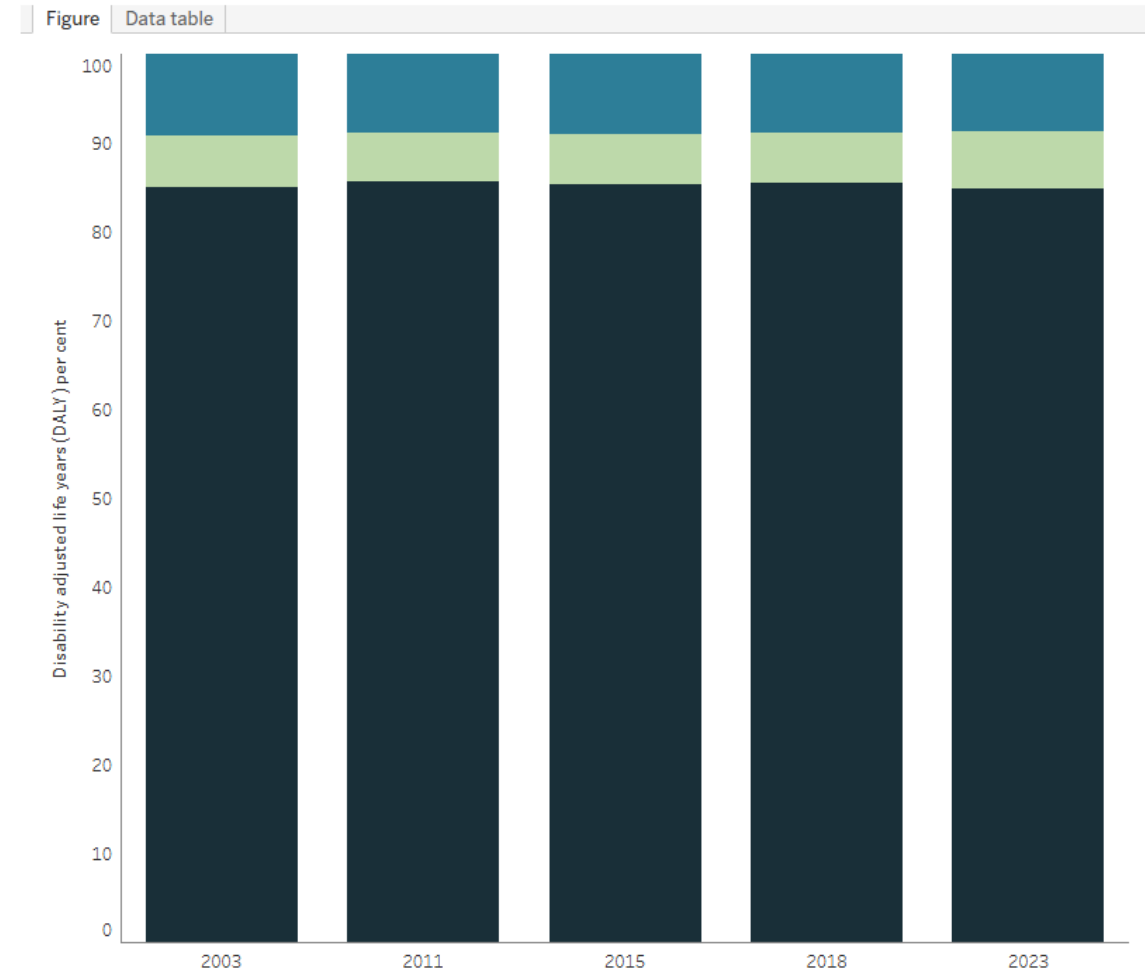


## Chronic conditions - Australian Institute of Health and Welfare

Table 1: Long-term health condition groups and prevalence among people of all ages

Condition group	Inclusions <sup>(a)</sup>	Prevalence (%) <sup>(b)(c)</sup>
Cancer	Bowel or colorectal cancer, brain cancer, breast cancer, cancer of female genital organs, cancer of male genital organs, cancer of other digestive organs, cancer of other respiratory and intrathoracic organs, Hodgkin's disease, leukaemia, non-Hodgkin's lymphoma, oesophageal or stomach cancer, skin cancer, lung cancer, cancer site unknown, other malignant tumours, in situ neoplasms, benign neoplasms & neoplasms of uncertain nature	2.3
Cardiovascular diseases	Heart failure, ischaemic heart diseases (including angina, heart attack and other ischaemic heart diseases), stroke, other heart diseases, other heart stroke and vascular diseases (including other cerebrovascular diseases, oedema and diseases of arteries, arterioles and capillaries), other diseases of circulatory system (including rheumatic heart disease)	5.5
Chronic respiratory	Asbestosis, asthma, chronic obstructive pulmonary disease (chronic airflow limitation, chronic bronchitis, emphysema)	12.3
Endocrine disorders	Type 1 diabetes, Type 2 diabetes and diabetes type unknown	5.3
Gastrointestinal	Diseases of the liver, diseases of the oesophagus (including gastro oesophageal reflux disease), inflammatory bowel disease (enteritis and colitis)	1.7
Genitourinary	Chronic kidney disease (including Glomerular diseases, Renal failure or Kidney disease, Renal tubulo-interstitial diseases), non-inflammatory female pelvic conditions (including endometriosis)	2.7

Figure 2: Percentage of total burden of disease due to chronic and non-chronic conditions and injury, 2003 to 2023



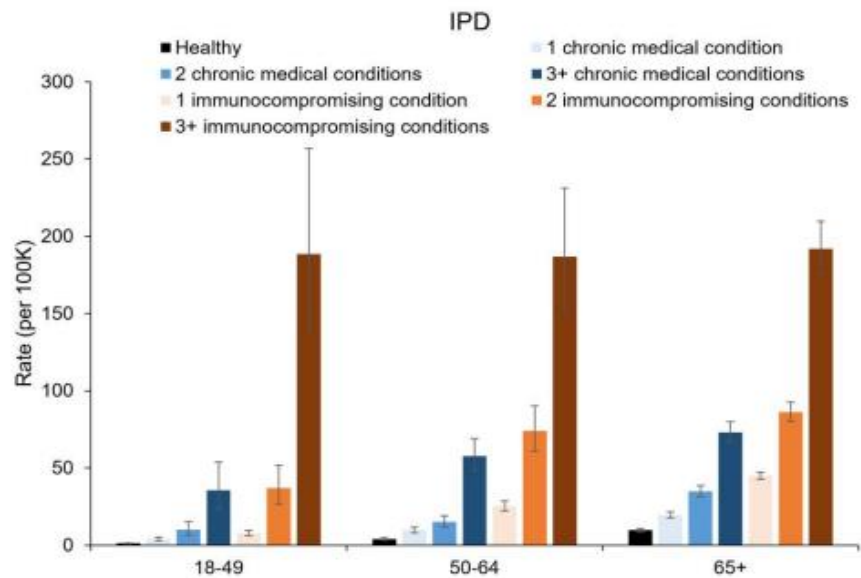
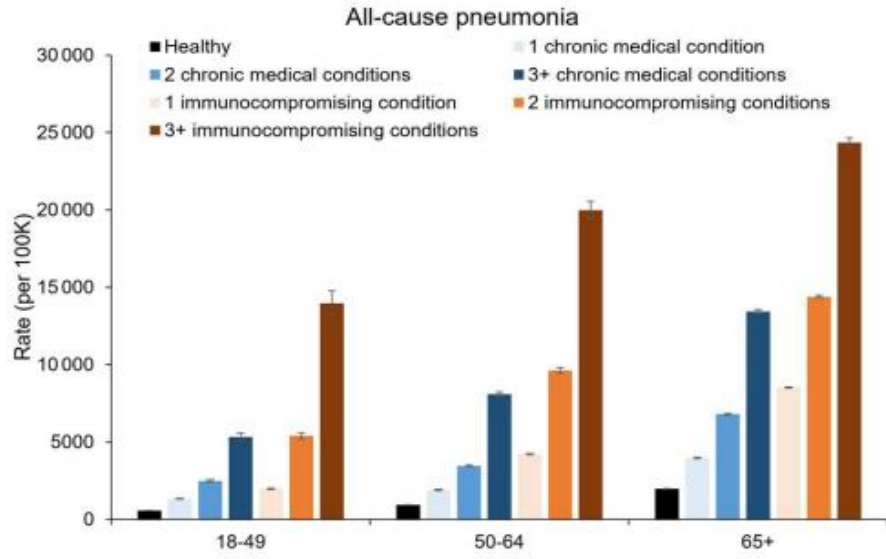
# Risk-based vaccine programs

## Table. Risk conditions and immunosuppressive therapies for zoster vaccination and eligibility for NIP funding



Australian Government  
Department of Health  
and Aged Care

Australian  
Immunisation  
Handbook



Biologic therapies	Tumour necrosis factor inhibitors (TNFi) (e.g. adalimumab)	Yes – if received in the last 6 months	
	Soluble TNF receptors (e.g. etanercept)		
	T-cell co-stimulation modulators (e.g. Abatacept)		
	Type I interferon receptor inhibitors (IFNAR1) (e.g. anifrolumab)		
	Proteasome inhibitors (e.g. bortezomib)		
	Anti-integrins (e.g. natalizumab and vedolizumab)		No
	Anti-IgE antibodies (e.g. omalizumab)		
Anti-complement antibodies (e.g. eculizumab)			
Immunomodulatory drugs	Sphingosine-1-phosphate receptor modulators (e.g. fingolimod)	Yes – if received in the last 6 months	
Oral small molecule targeted therapies	Bruton's tyrosine kinase (BTK) inhibitors (e.g. Ibrutinib)	Yes - currently or within the last 6 months	
	Janus kinase (JAK) inhibitors (e.g. Upadacitinib)		
	BCR-ABL inhibitors (e.g. Imatinib)		
Immunosuppressive therapy to prevent organ rejection	Any therapy to prevent organ rejection	Yes – if prior to or following solid organ transplantation, currently, or within the last 6 months	
Interleukin (IL) inhibitors	Anti-IL1 antibodies (e.g. canakinumab or anakinra)	Yes – if currently receiving or received within the last 6 months	
	Anti-IL4/13 antibodies (e.g. dupilumab)		
	Anti-IL5 antibodies (e.g. mepolizumab)		
	Anti-IL6 antibodies and IL-6 receptor inhibitors (e.g. tocilizumab)		
	Anti-IL17 antibodies (e.g. secukinumab)		No
	Anti-IL 12/23 antibodies (e.g. ustekinumab)		
	Anti-IL23 antibodies (e.g. guselkumab)		
	Anti-IL31 antibodies (e.g. nemolizumab)		



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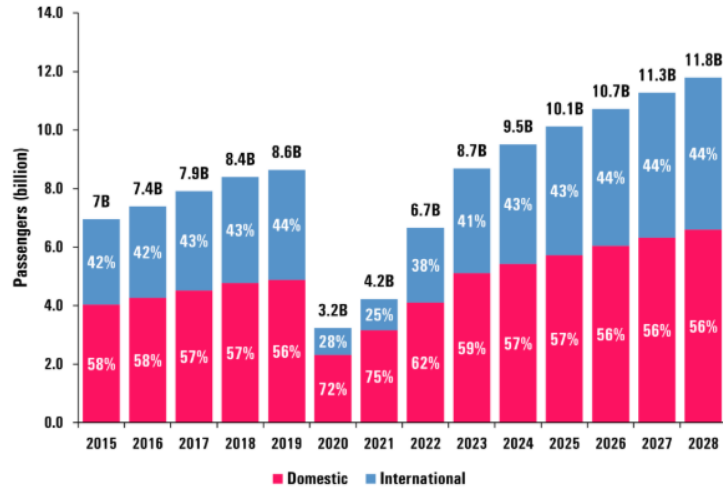
# People (and diseases) travel

## 11.8 billion travellers

## New destinations

## Diseases spread

Medium-term international and domestic passenger traffic



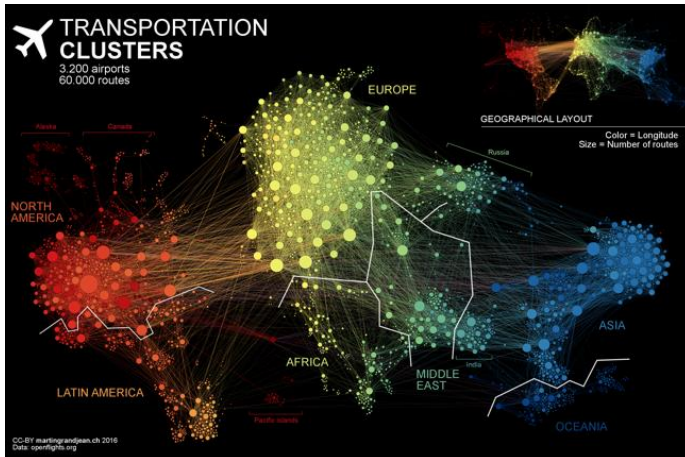
New travel destinations are gaining traction, while established favorites see continued demand.

Destination ranking based on total travel spend (domestic and international), select countries\*

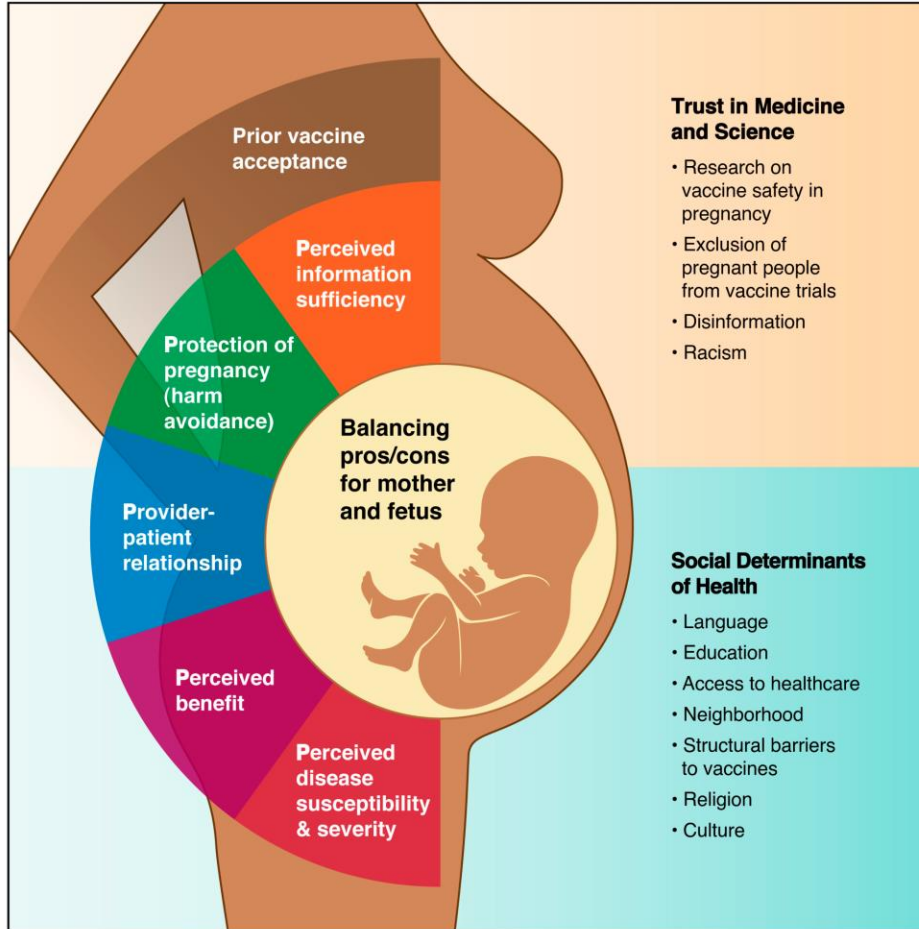
	2023 rank		2030 projected rank
Thailand	8	↑	5
India	11	→	11
Philippines	35	↑	32
Vietnam	37	↑	35
Peru	77	↑	68
Rwanda	140	↑	134

Estimated Mean Values of  $R_0$  from Data.

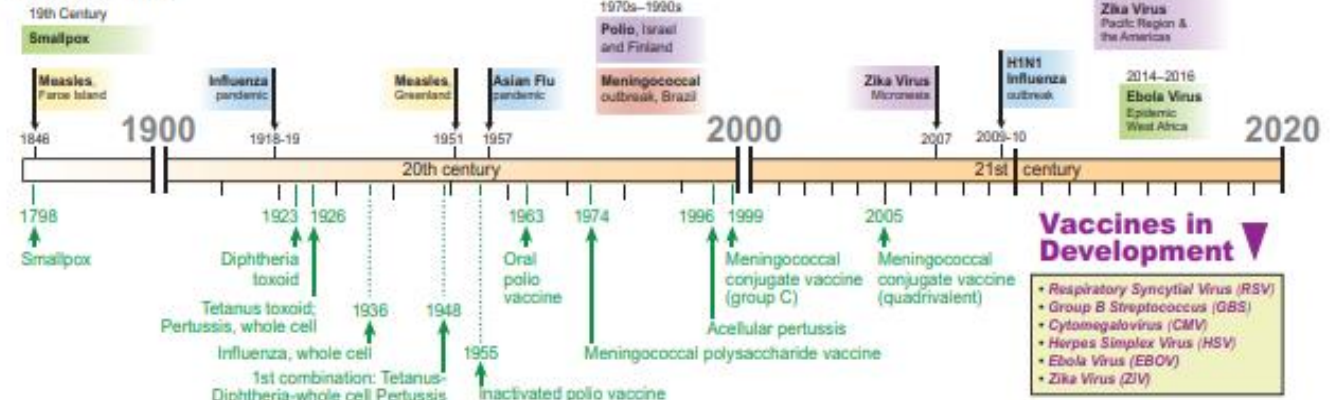
Disease outbreak and location	$R_0$
Smallpox in Indian subcont. (1968–73)	4.5
Poliomyelitis in Europe (1955–60)	6
Measles in Ghana (1960–68)	14.5
SARS epidemic in (2002–03)	3.5
1918 Spanish influenza in Geneva	
Spring wave	1.5
Fall wave	3.8
H2N2 influenza pandemic in US (1957)	1.68
H1N1 influenza in South Africa (2009)	1.33
Ebola in Guinea (2014)	1.51
Zika in South America (2015–16)	2.06



# Vaccination in pregnancy

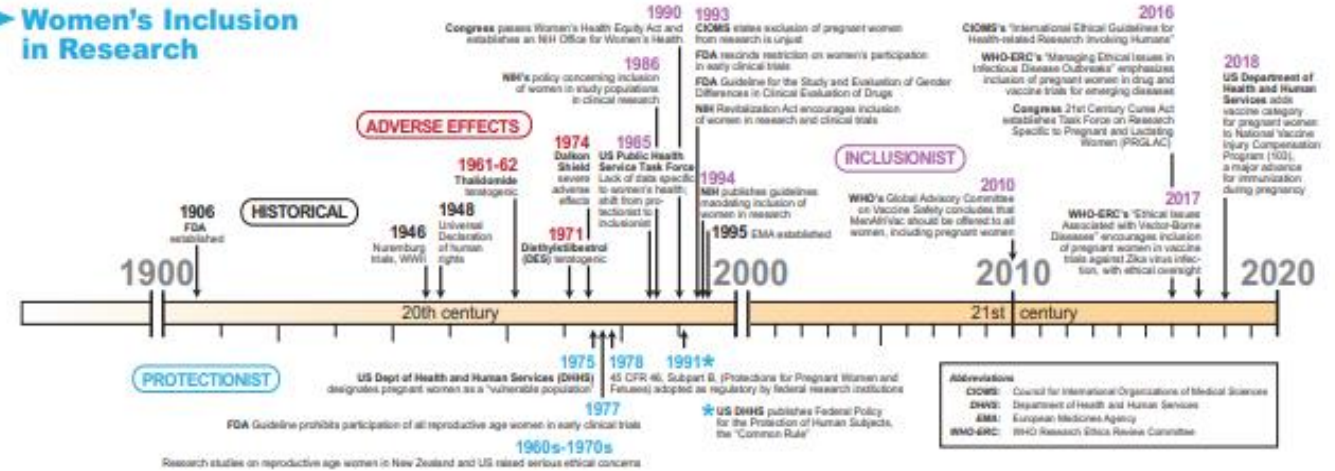


## Outbreaks

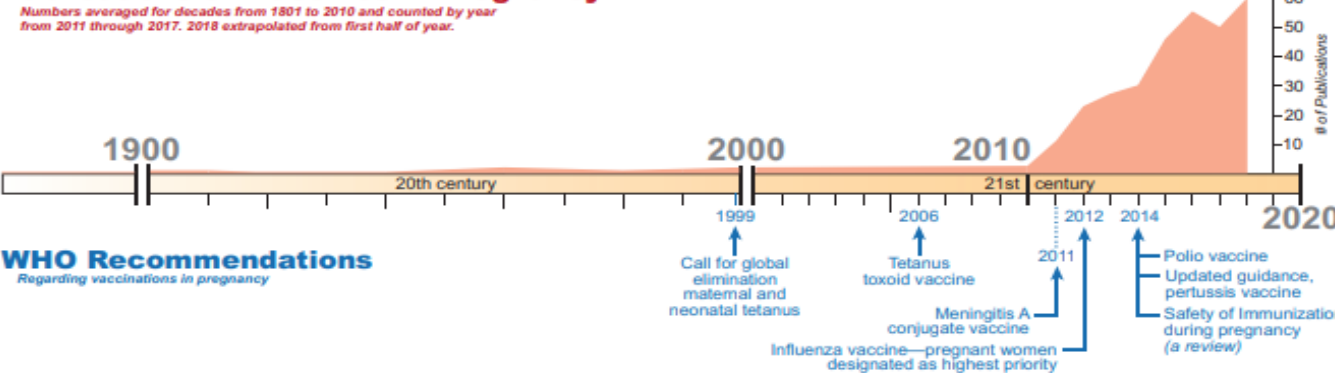


## Human Vaccine Development (Historical)

### Women's Inclusion in Research

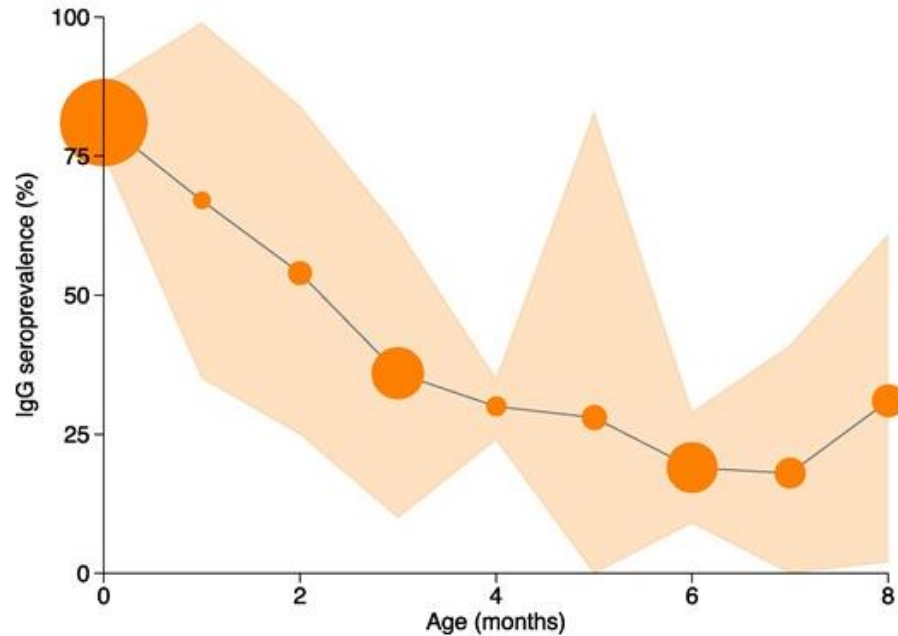


## Publications on Vaccines in Pregnancy





## Measles seroprevalence in infants declines rapidly and influences effectiveness (and hence timing) of first measles-containing vaccine dose



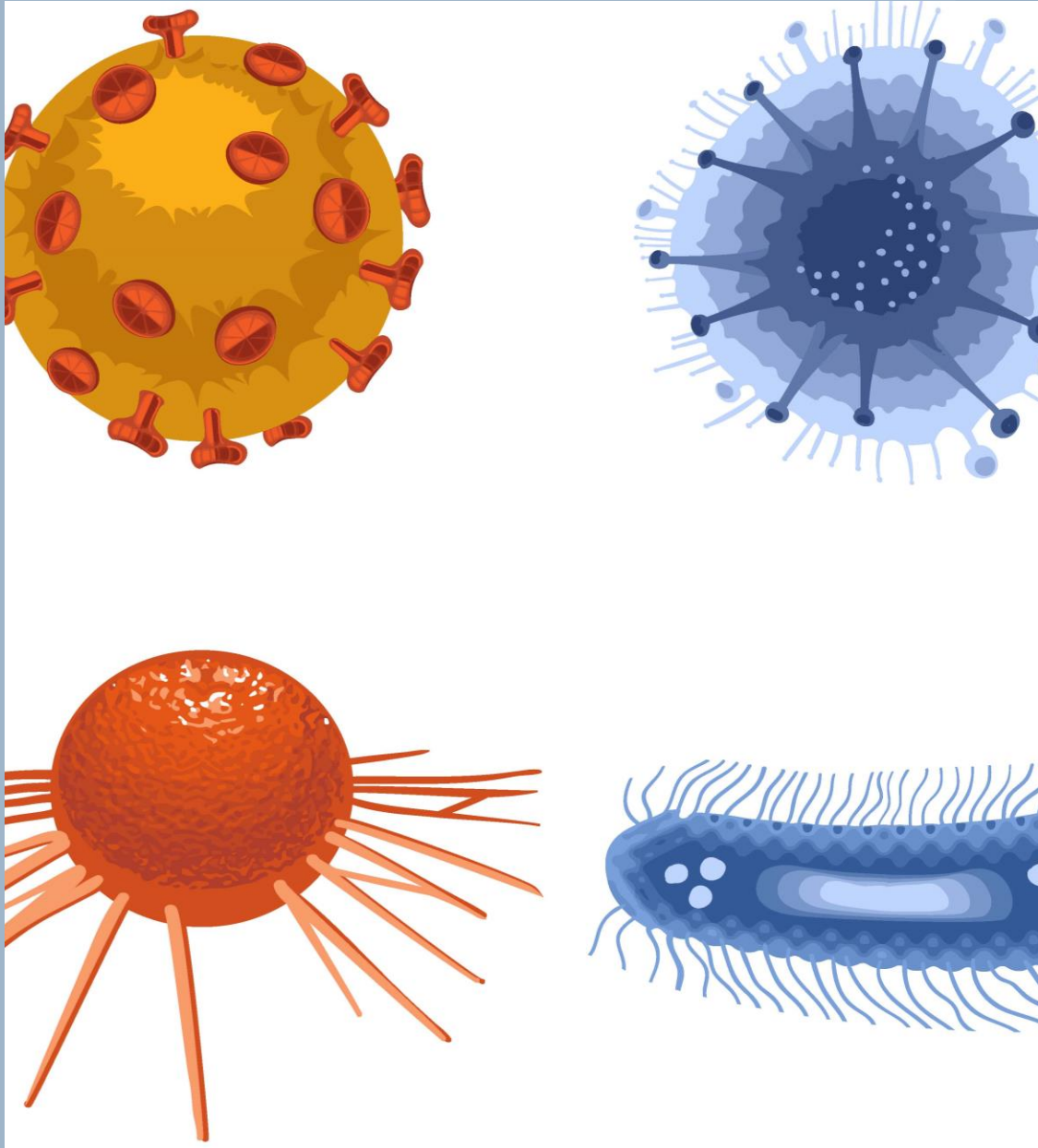
**Figure 3.** Pooled measles seropositivity from birth to 8 months of age. This figure presents pooled measles seropositivity and 95% confidence intervals (CI) by age group (months). The dots denote pooled estimates and their size reflect the sample size for each age group (0 months, n = 6193; 1 month, n = 203; 2 months, n = 404; 3 months, n = 2130; 4 months, n = 276; 5 months, n = 452; 6

[Measles Seroprevalence in Infants Under 9 Months of Age in Low- and Middle-Income Countries: A Systematic Review and Meta-analysis | The Journal of Infectious Diseases | Oxford Academic](#)

## Mentimeter

In middle income countries what proportion of infants aged 4 months have no protective antibody to measles?

- A. 20%
- B. 40%
- C. 50%
- D. 70%



# Diseases

# Cowpox inoculation



On May 14, 1796, Jenner inoculated eight-year-old James Phipps with matter from a cowpox sore on the hand of milkmaid Sarah Nelmes.

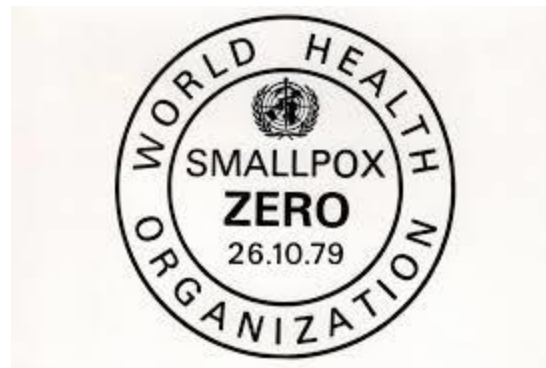
Phipps suffered a local reaction and felt poorly for several days but made a full recovery.

In July 1796, Jenner inoculated Phipps with matter taken from a fresh human smallpox sore, as if he were variolating the boy, in an attempt to challenge the protection from cowpox.

Phipps remained healthy.



Jenner vaccinating James Phipps



## Influenza: Spanish Influenza Pandemic and Vaccines

Photo # NH 41731-A Influenza precaution sign at the Naval Aircraft Factory, Philadelphia, 19 Oct. 1918



A sign warning about Spanish Influenza at the Naval Aircraft Factory, Philadelphia, Pennsylvania, on 19 October 1918. *U.S. Naval Historical Center*

In the deadly Spanish influenza pandemic of 1918-19, investigators attempted to develop vaccines to prevent influenza, though they had not yet correctly identified the causative pathogen. A variety of killed whole cell bacterial vaccines were tested; these vaccines included *Bacillus influenzae* (now know as *Haemophilus influenzae*) and strains of pneumococcus, streptococcus, staphylococcus, and *Moraxella catarrhalis* bacteria. These vaccines would certainly not have prevented influenza infection--as we know now, the pandemic was caused by a new strain of the influenza A virus. Influenza viruses would not be isolated and identified until the 1930s, and the first commercial influenza vaccines were not licensed in the United States until the 1940s.

### Development of 'pandemic vaccine' in Australia

Commonwealth Serum Laboratories was established in Melbourne in 1916 to alleviate Australia's dependence on imported vaccines. In 1918 it developed its first, experimental vaccine in anticipation of pneumonic influenza reaching mainland Australia.

Researchers did not know what caused influenza, but produced a vaccine that addressed the more serious secondary bacterial infections that were likely to cause death.

In the first six months of the pandemic Commonwealth Serum Laboratories produced three million free doses for Australian troops and civilians. It later evaluated the vaccines to be partially effective in preventing death in inoculated individuals.

### Death rate and impact of flu in Australia

Across Australia, state governments introduced mask wearing, restrictions on movement and bans on gathering at schools, churches and theatres.

Despite these measures, it is estimated between a quarter and a third of Australians caught the flu in 1919. Up to 15,000 people died.

First Nations communities were badly affected by flu and comprised nearly a third of those who died in Queensland.

Many First Nations people lived on missions. They were often in poor health before the pandemic and did not have access to good medical facilities. On some missions around 15 per cent of those who caught flu died. This was a much higher rate than among white Australians – about 1.2 per cent of those who caught the flu in Sydney died from it.

In Sydney strict measures were implemented to limit the spread of the disease. Even so, the city experienced three waves of outbreaks, with an estimated 3,500 deaths and many more infections.

[Influenza pandemic | National Museum of Australia](#)  
[Vaccine Timeline | History of Vaccines](#)



Man wearing a face mask during the influenza pandemic, 1918



# How many VPDs are there?

## 'Routine' vaccines

1. Chickenpox (varicella)
2. COVID-19
3. Diphtheria
4. Hepatitis A
5. Hepatitis B
6. Hib (*Haemophilus influenzae type b*)
7. HPV (human papillomavirus)
8. Influenza
9. Measles
10. Meningococcal
11. Mumps
12. Pertussis (whooping cough)
13. Pneumococcal
14. Polio (poliomyelitis)
15. Rotavirus
16. RSV (respiratory syncytial virus)
17. Rubella (german measles)
18. Shingles (herpes zoster)
19. Tetanus

## Vaccines for travel or specific groups

1. Adenovirus\*
2. Anthrax\*
3. Chikungunya\*
4. Cholera
5. Dengue\*
6. Ebola\*
7. Hepatitis E\*
8. Japanese encephalitis (JE)
9. Mpox
10. Rabies/ABLV
11. Smallpox\*
12. Tick-borne encephalitis\*
13. Tuberculosis
14. Typhoid fever
15. Yellow fever





# Vaccine preventable disease control and elimination

There are >30 VPDs



## Goal to Eradicate

Polio



## Targets for elimination of transmission

Measles  
Rubella



## Targets for elimination as a public health problem

Bacterial Meningitis  
(*Streptococcus pneumoniae*,  
*Neisseria meningitidis*)  
Cervical Cancer (HPV)  
Cholera  
Hepatitis B  
Rabies  
Tetanus (maternal and  
neonatal)



## With established control targets

Influenza  
Japanese encephalitis  
Tuberculosis  
Yellow fever



## Without established control targets

recommended in all country  
immunization schedules

Diphtheria  
*H. influenzae type b* disease  
Pertussis  
Pneumococcal disease  
Rotavirus gastroenteritis



## Without established control targets with vaccines recommended based on disease burden

COVID-19  
Dengue  
Ebola virus disease  
Hepatitis A  
Hepatitis E  
Malaria  
Mumps  
Typhoid  
Varicella

## Aims of the Global Immunization Agenda (by 2030)

Reduce by  
**50%**

the number of children missing out on all vaccines

Achieve  
**90%**

coverage for essential vaccines given in childhood and adolescence

Introduce  
**500**

new vaccines in low and middle-income countries

## DO YOU KNOW THE DIFFERENCE?

Disease control

Elimination

Eradication

# Measuring impact of a pathogen: infection and disease

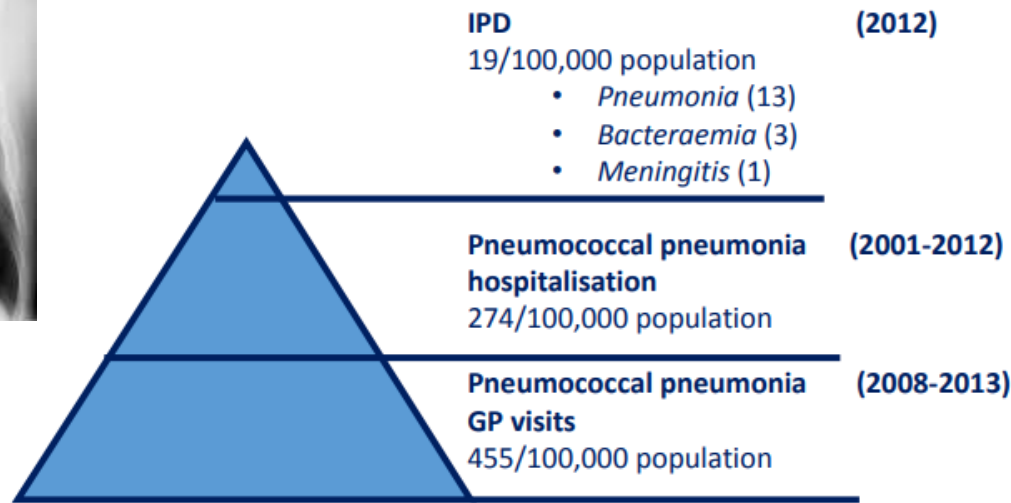


Ratio of Non-bacteraemic pneumococcal community acquired pneumonia (CAP) to bacteraemic pneumococcal CAP estimates range from 6-11 fold in adults in Australia (2018-2022)

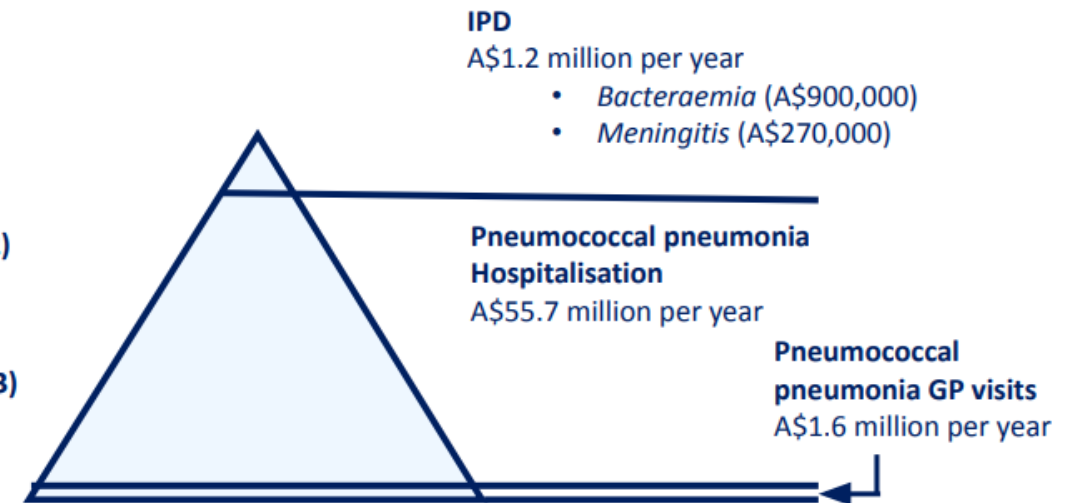
Jayasinghe, S et al, NCIRS, Presented at CDIC Adelaide 2025



## Distribution of incidence<sup>1</sup>



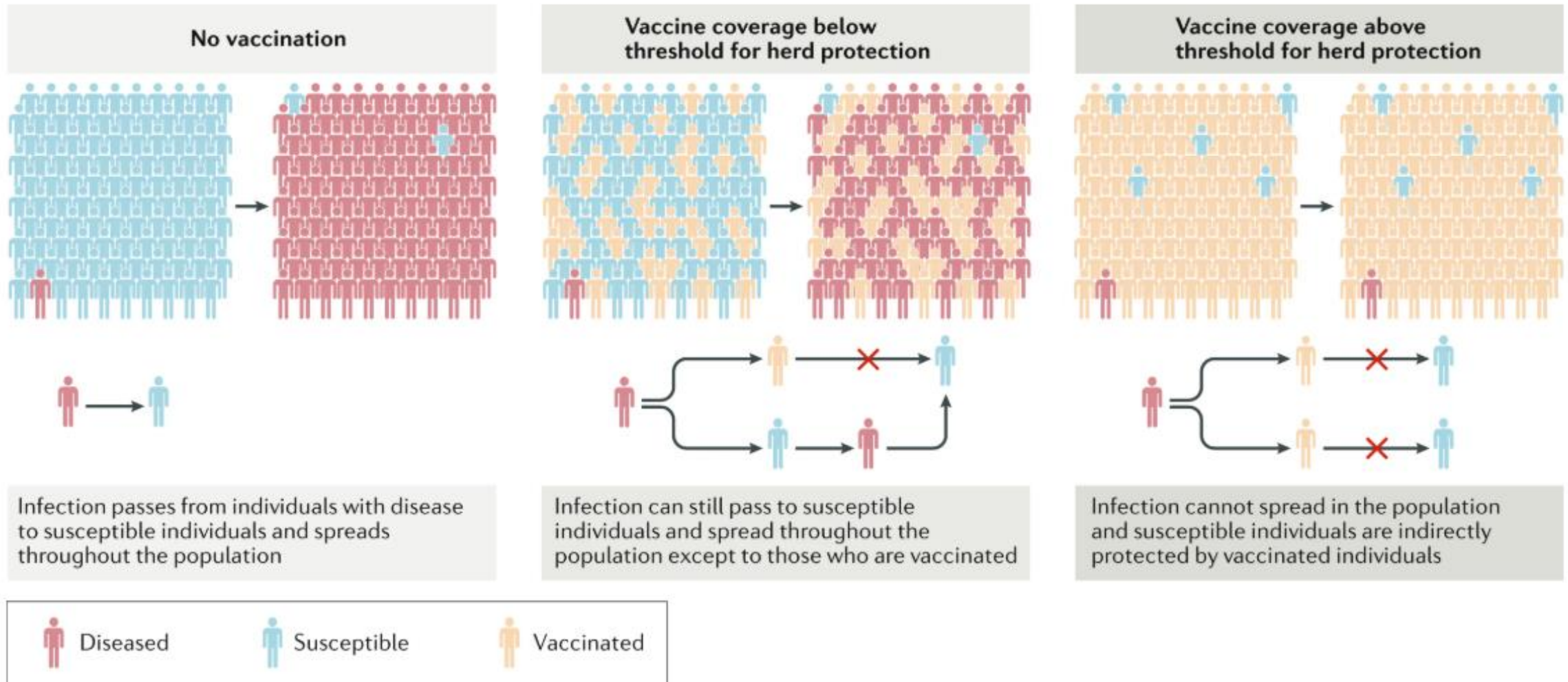
## Distribution of cost<sup>1</sup>



Retrospective cross-sectional study using administrative data from four national databases (Australian Institute of Health and Welfare (AIHW), Bettering Evaluation and Care of Health (BEACH), Australian Bureau of Statistics (ABS), National Hospital Data Collection for public hospitals [Australian Refined Diagnosis Related Groups; AR-DRG]) and published literature, to estimate burden of pneumococcal disease. GP, general practitioner, IPD, invasive pneumococcal disease.

1. Earle K and William S. *Pneumonia*. 2016;27;8:9.

# Herd immunity is an important feature of vaccine (and disease)-induced protection

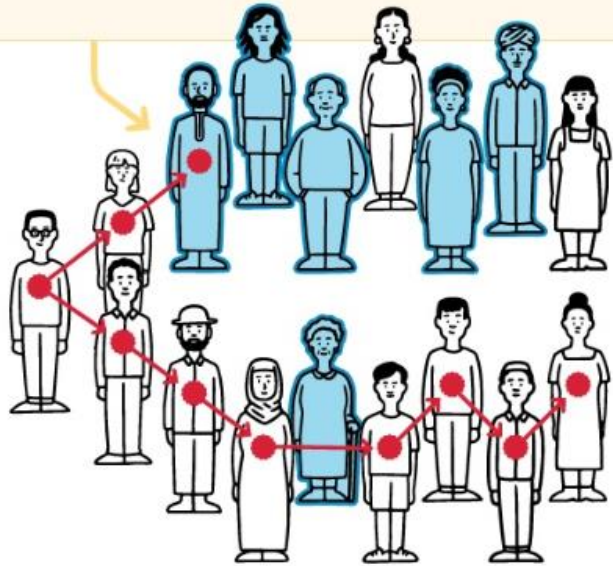




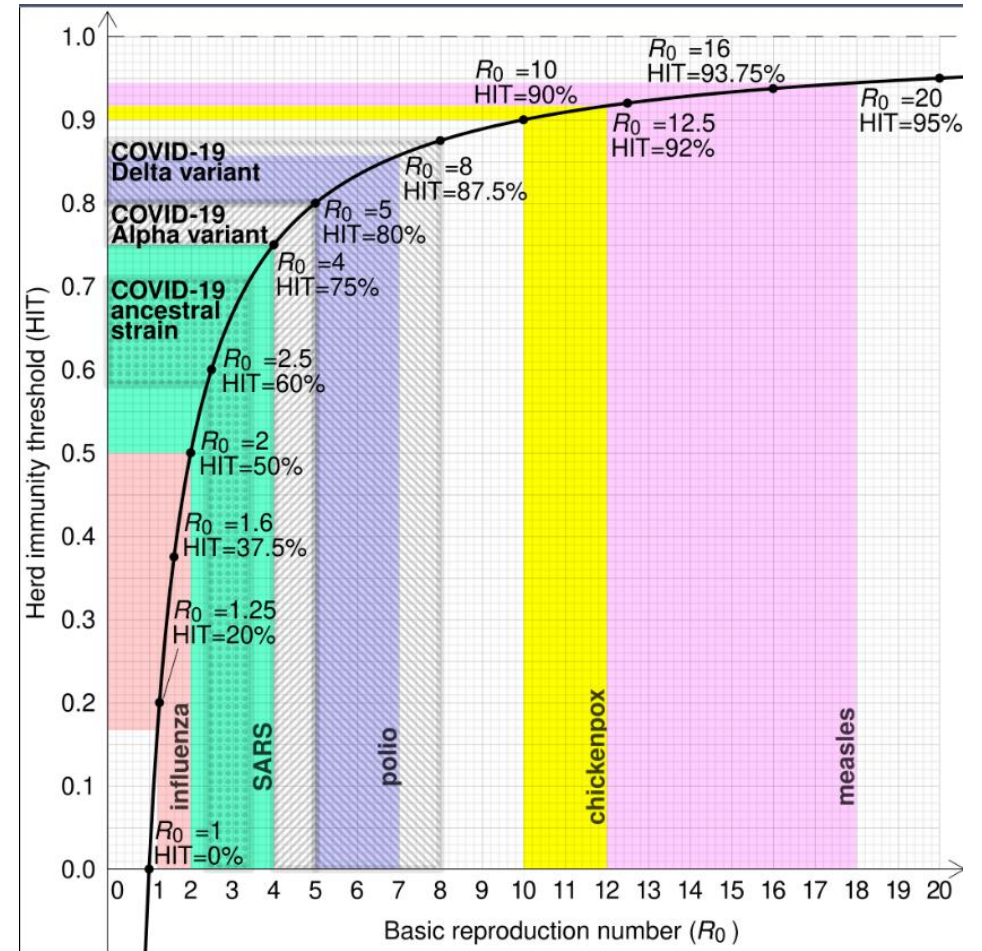
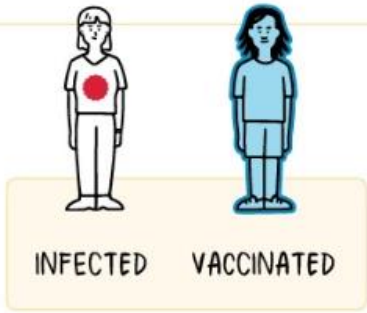
# Vaccine efficacy and effectiveness

Highest coverage/immunity is needed for the most transmissible pathogens

Vaccines do not provide full (100%) protection, so breakthrough infections can happen.



But as more people get vaccinated, it is expected fewer people will come into contact with the germ.

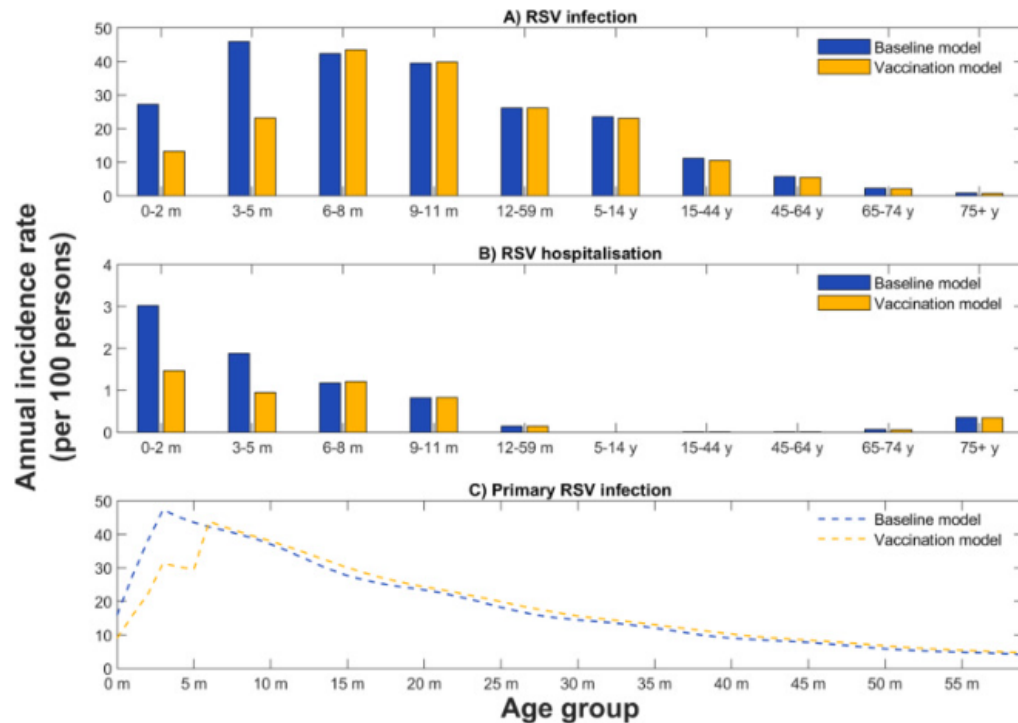




# Mentimeter

## RSV pregnancy vaccine alone

Assuming base case vaccine efficacy, 6 months duration of protection and 70% coverage, RSV hospitalisations were predicted to fall by 60% (from 3.0 to 1.2 per 100 persons) in infants aged <3 months and 40% (from 1.9 to 1.1 per 100 persons) in 3–5-month-olds. These benefits were primarily due to direct protection to infants of vaccinated mothers. This vaccine program was predicted to reduce the population-level RSV infection by about 4%.



To what level could the RSV pregnancy vaccine in Australia reduce RSV transmission in the wider community?

Up to:

- A. 4%
- B. 8%
- C. 12%
- D. 16%

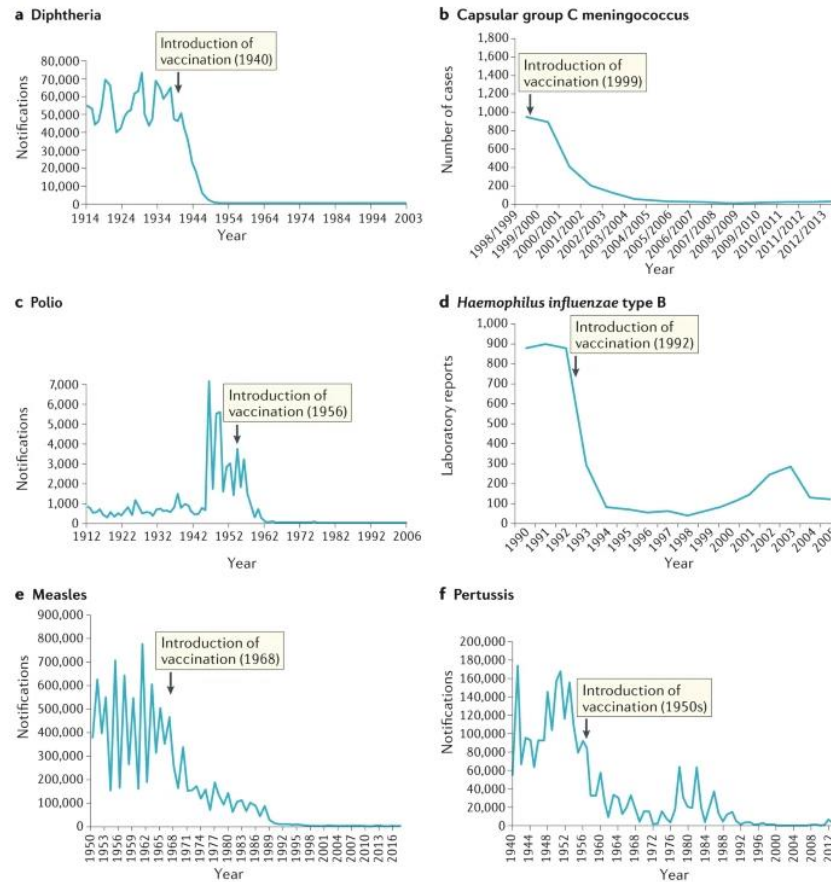











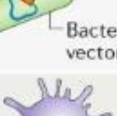

# Vaccines

New and old

# Many different vaccine types

**Fig. 1: The impact of vaccination on selected diseases in the UK.**

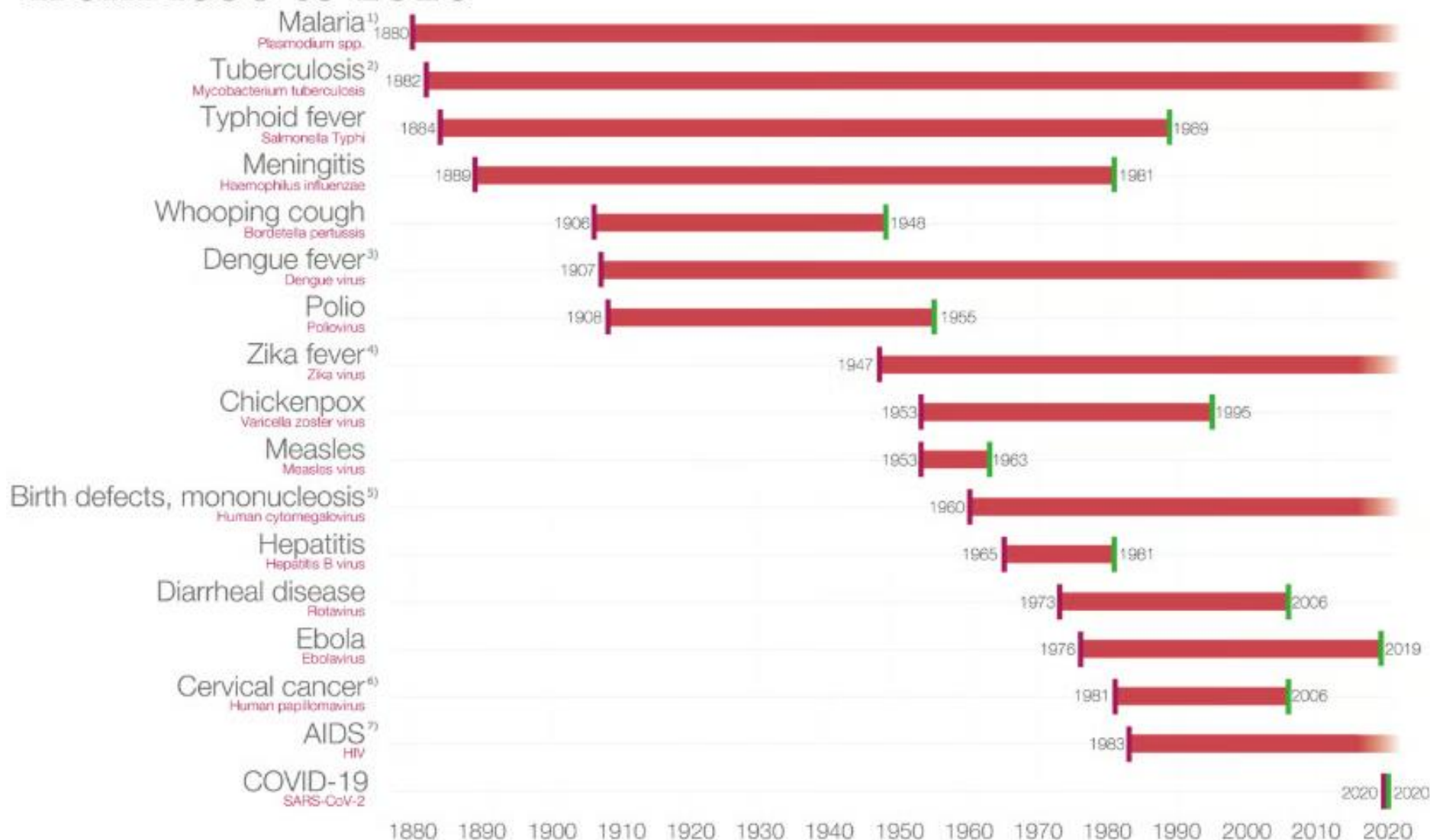


Type of vaccine	Licensed vaccines using this technology	First introduced
Live attenuated (weakened or inactivated)		Measles, mumps, rubella, yellow fever, influenza, oral polio, typhoid, Japanese encephalitis, rotavirus, BCG, varicella zoster
Killed whole organism		Whole-cell pertussis, polio, influenza, Japanese encephalitis, hepatitis A, rabies
Toxoid		Diphtheria, tetanus
Subunit (purified protein, recombinant protein, polysaccharide, peptide)		Pertussis, influenza, hepatitis B, meningococcal, pneumococcal, typhoid, hepatitis A
Virus-like particle		Human papillomavirus
Outer membrane vesicle	 Pathogen antigen, Gram-negative bacterial outer membrane	Group B meningococcal
Protein-polysaccharide conjugate	 Polysaccharide, Carrier protein	<i>Haemophilus influenzae</i> type B, pneumococcal, meningococcal, typhoid
Viral vectored	 Viral vector, Pathogen gene, Viral vector genes	Ebola
Nucleic acid vaccine	 DNA, RNA, Lipid coat	SARS-CoV-2
Bacterial vectored	 Pathogen gene, Bacterial vector	Experimental
Antigen-presenting cell	 Pathogen antigen, MHC	Experimental

# Vaccination innovation, from 1880 to 2020

Our World in Data

Disease  
Infectious agent  
year in which the agent was linked to the disease  
year in which the vaccination was licensed in the US

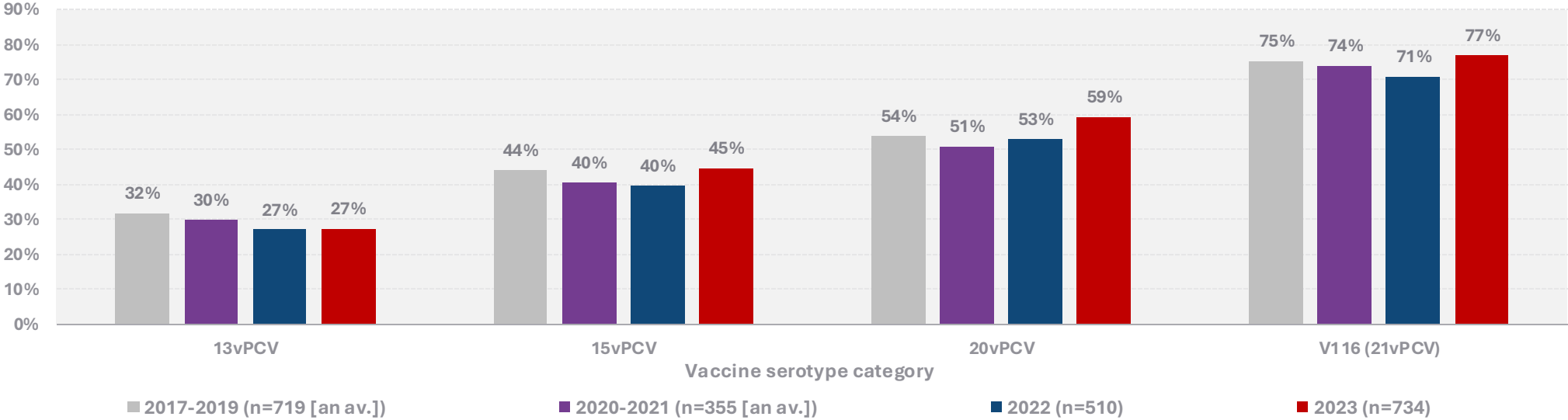


1) - 2016 vaccine RTS,S undergoing pilot trials in select countries after being approved by European regulators in 2015.  
 2) - The only approved vaccine is bacilli Calmette-Guérin (BCG), developed in 1921 but its efficacy in adults is variable. Other tuberculosis vaccines are currently in development.  
 3) - 2016 partially effective vaccine CYD-TDV, sold under the brand name Dengvaxia.  
 4) - Successful first human clinical trials of a vaccine against the virus in 2016. Only in 2016 did the WHO issue statements of concern about the zika virus' links to Guillain-Barré Syndrome (GBS) and microcephaly.  
 5) - A number of vaccine candidates are under investigation.

# Expanded valency PCVs under consideration.....



IPD serotype coverage (%) by vaccine type in non-Indigenous adults aged ≥65 years, 2017-2023 Australia



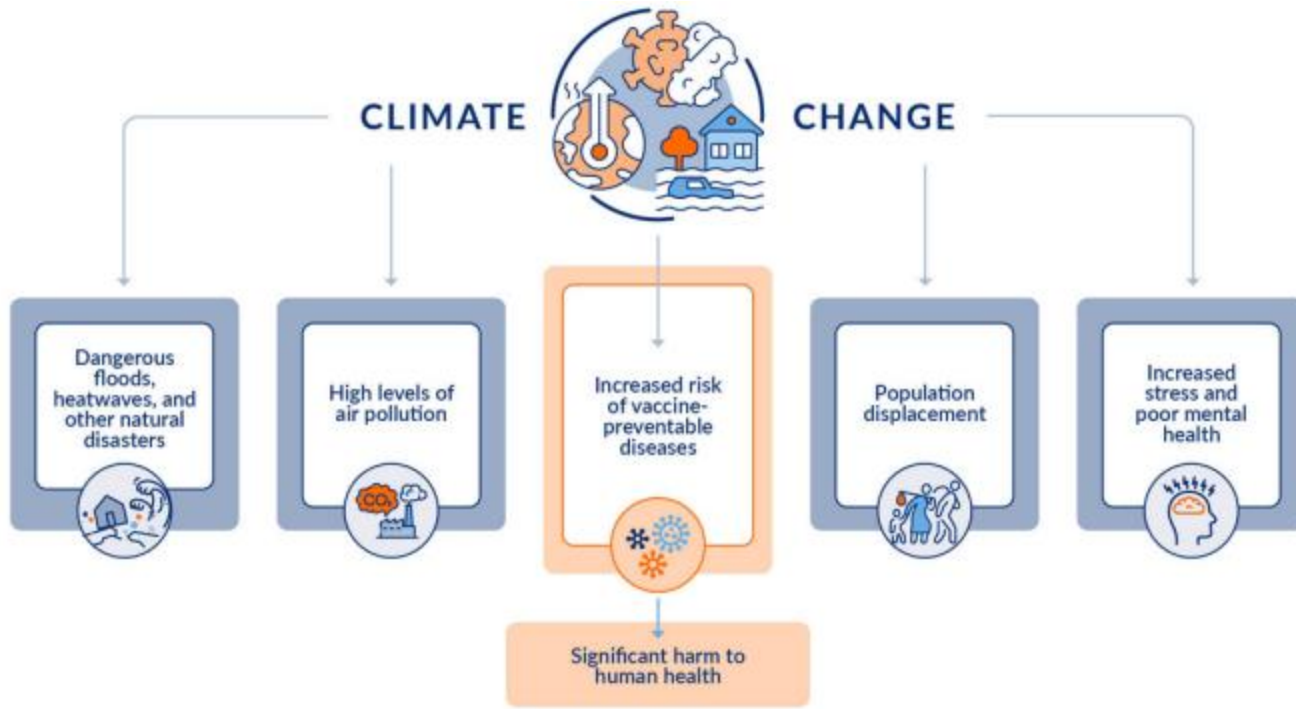
Data Source: National enhanced IPD surveillance data, NNDSS, EIPDSWG.  
Data request ID# 547 (Nov)/2022

Serotype composition																																
PCV13	4	6B	9V	14	18C	19F	23F	1	3	5	6A	7F	19A																			
PCV15	4	6B	9V	14	18C	19F	23F	1	3	5	6A	7F	19A	22F	33F																	
PCV20	4	6B	9V	14	18C	19F	23F	1	3	5	6A	7F	19A	22F	33F	8		10A	11A	12F	15B											
PPV23	4	6B	9V	14	18C	19F	23F	1	3	5		7F	19A	22F	33F	2	8	9N	10A	11A	12F	15B	17F	20								
V116*									3		6A	7F	19A	22F	33F		8	9N	10A	11A	12F		17F	20†	15A	15C†	16F	23A	23B	24F	31	35B



# Communities

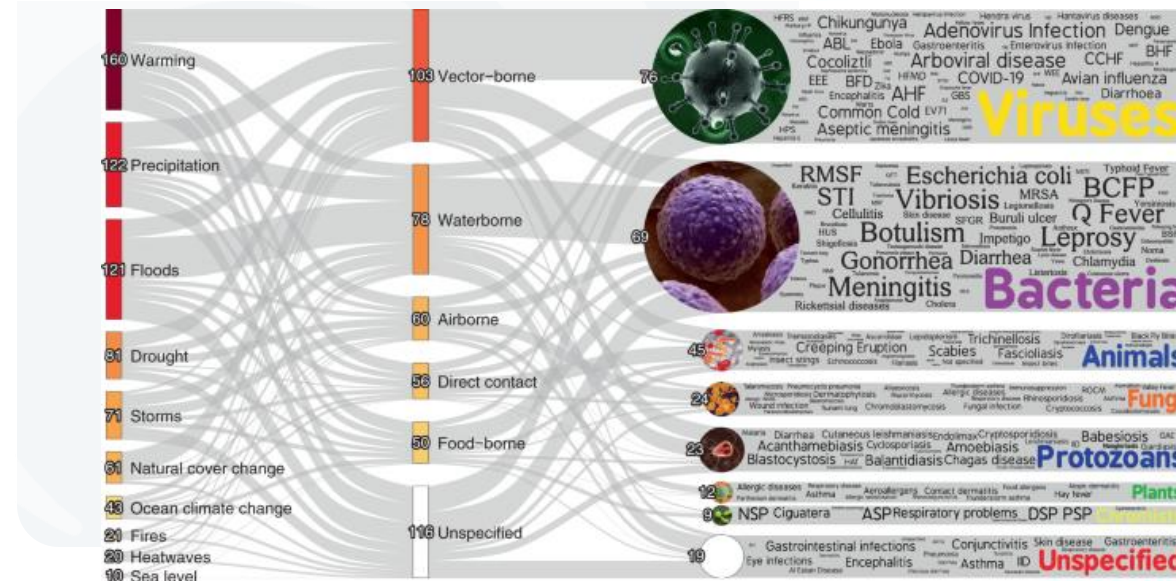
(and systems and programs)



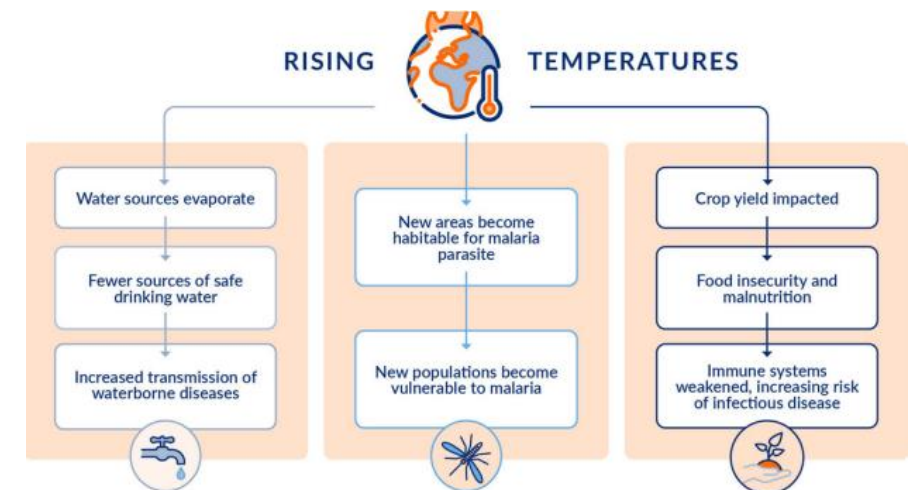
A government vaccinator administering polio drops to a young boy in the Baluchistan Province, Pakistan, following major flooding there in 2022. Credit: Gazi/Asad

## Five ways in which vaccines can protect us amid climate change

1. Protecting against diseases spiking from global warming
2. Reducing health vulnerabilities in displaced population
3. Protecting against the rising threat of zoonotic illnesses
4. Ensuring resilience against economic shocks
5. Reducing the strain on health systems



Over half of known human pathogenic diseases can be aggravated by climate change  
 | Nature Climate Change  
 | VOICE Climate Change



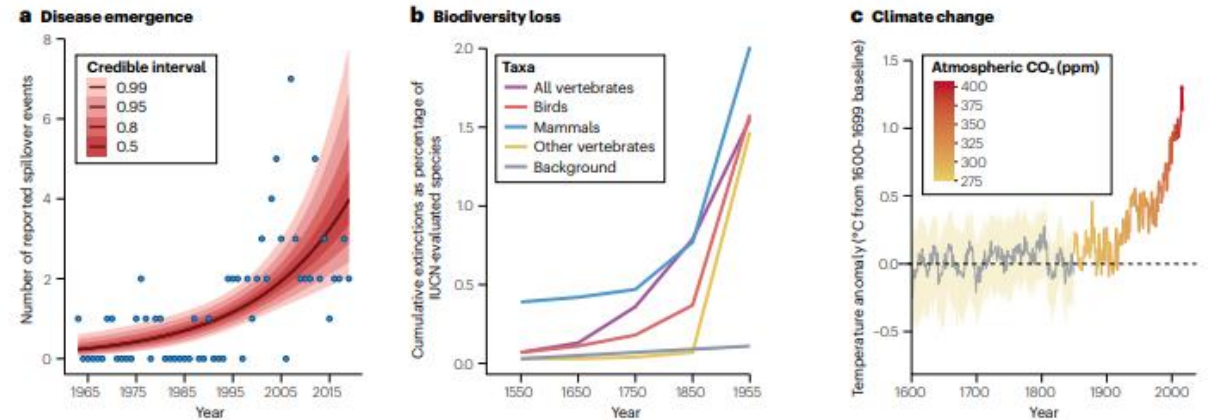
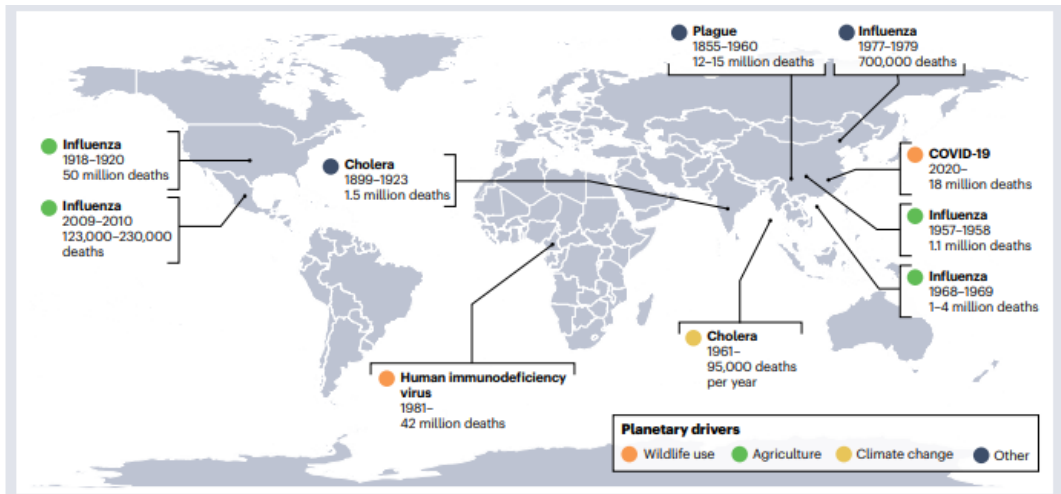
# Pathogens and planetary change

>70% of emerging infectious diseases have spread from animals to humans within the past several hundred years

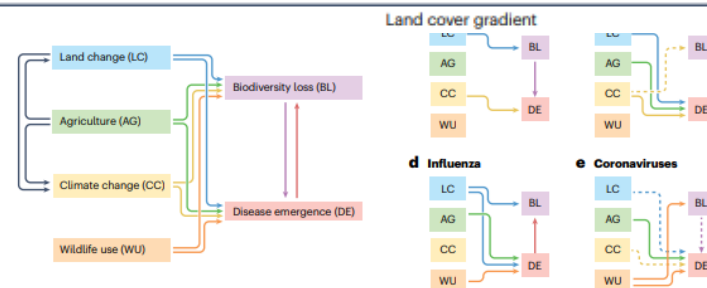
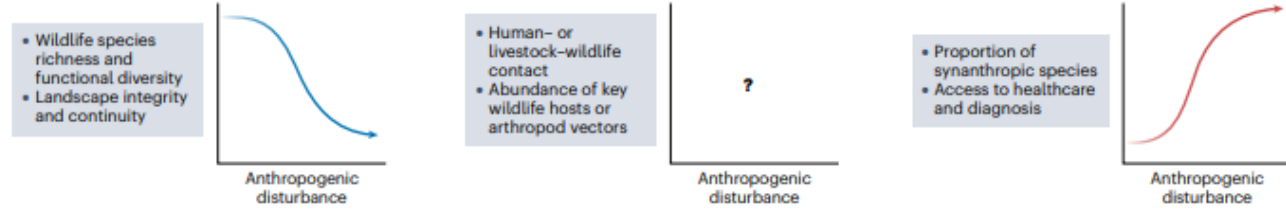
>50% come from wildlife (as opposed to livestock or pets).

Among emerging viruses specifically, almost 90% are zoonotic and 2/3s spill over from wildlife

## Pandemics past and future



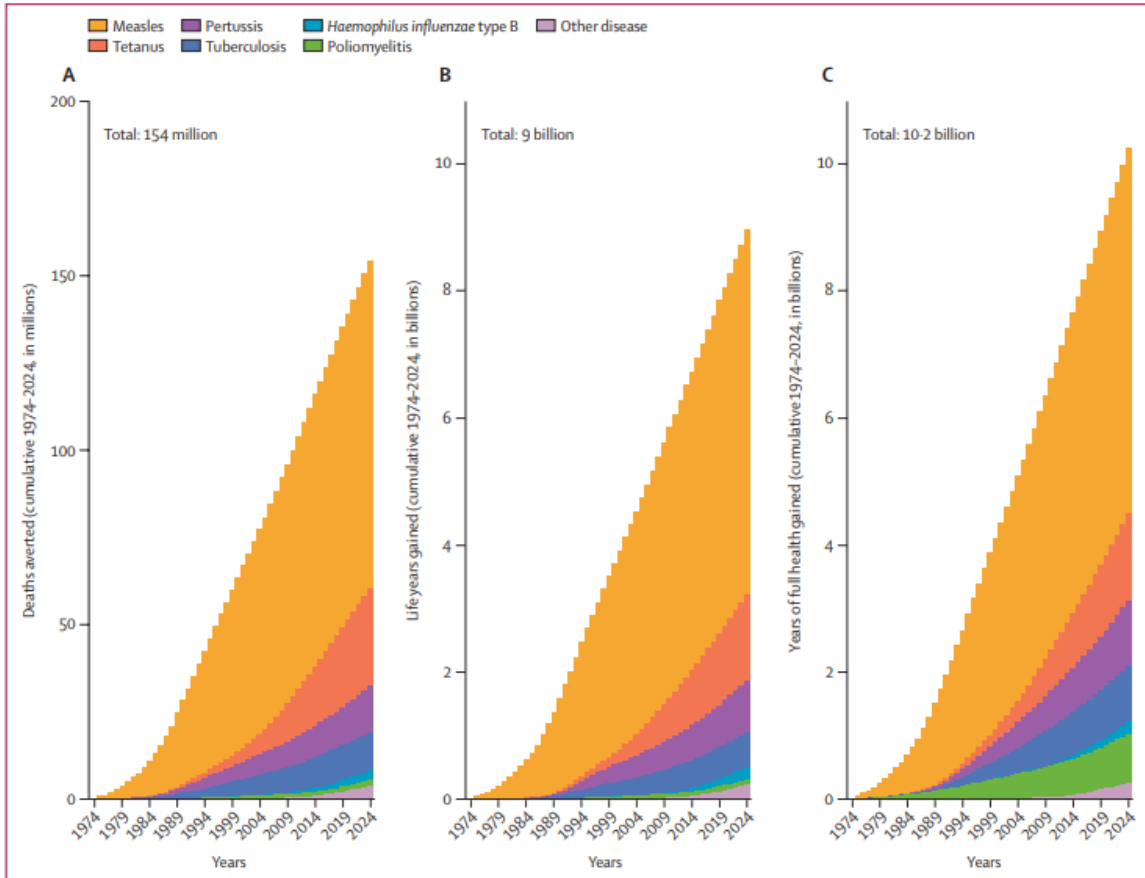
### Social-ecological systems perspective





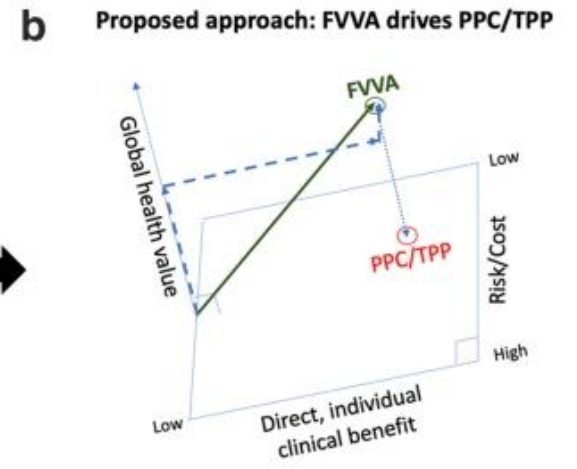
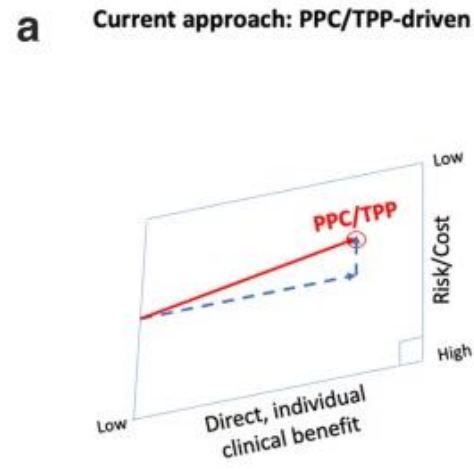
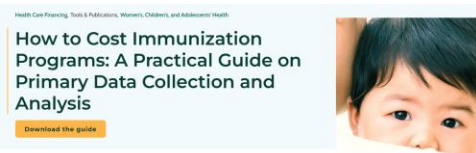
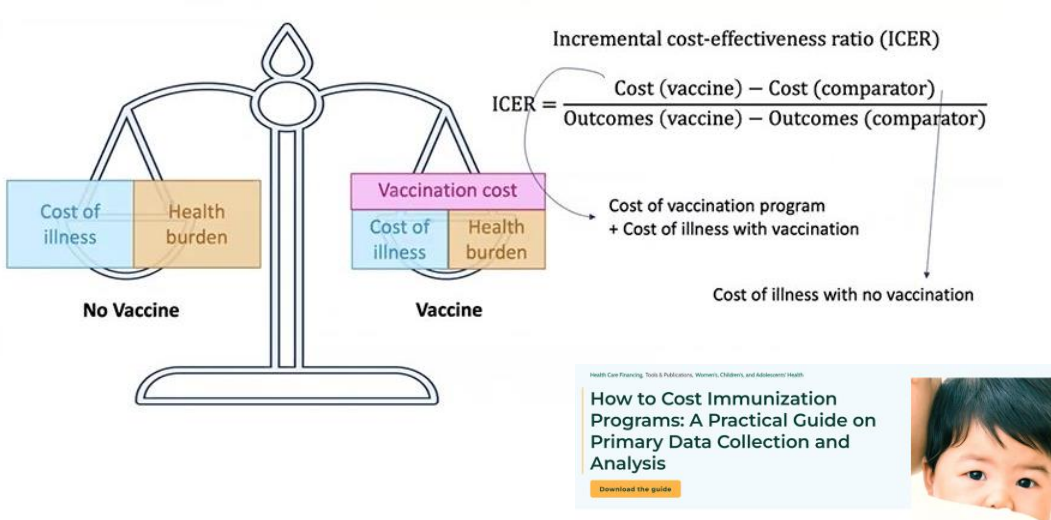
## Global immunization efforts have saved at least 154 million lives over the past 50 years

العربية 中文 Français Русский Español





# Introducing new vaccines is costly and needs to be evaluated against other health (and government) expenditure



## Australia's Criteria for Evidence to Decision Framework: Where does economic evidence fit in?



Table 1. CRITERIA FOR GRADE EVIDENCE TO DECISION FRAMEWORK - COVERAGE DECISIONS

	BALANCE OF EFFECTS • Desirable effects • Undesirable effects	CERTAINTY OF EVIDENCE	VALUES	COST EFFECTIVENESS • Effectiveness • Certainty of resources	EQUITY	ACCEPTABILITY	FEASIBILITY
<b>EVIDENCE TO DECISION FRAMEWORK QUESTION</b>	Does the balance between desirable and undesirable effects favour the option or the comparator?	What is the overall certainty of the evidence of effects?	Is there important uncertainty about variability in how much people value or how much people are affected by the main outcomes?	Does the cost effectiveness of the option or the comparator?	What would be the impact on health equity?	Is the option acceptable to key stakeholders?	Is the option feasible to implement?
<b>CONSIDERATIONS</b>	Desirable and undesirable effects can be considered separately. The evidence evaluations commissioned from NiMRC for the Natural Therapies Review did not evaluate harms or adverse events.	Measure of how certain we can be that the evidence is correct.	Assess whether consumers, carers and other stakeholders vary in how they value the option (or both).	Assess whether the net benefit is worth the cost, including assessing cost and uncertainty around costs. The evidence evaluations commissioned from NiMRC for the Natural Therapies Review did not evaluate economic impacts or cost effectiveness.	Assess whether the option would increase or decrease inequality.	Acceptability to consumers, carers, providers and policy makers. Consider who benefits/is harmed and who pays/saves.	Is the option implementable? Is there sufficient capacity to meet increased demand or should there be restrictions on cover? Can restricted cover be implemented? Are there legal, bureaucratic or ethical constraints that make it difficult or impossible to cover the option?
<b>SOURCES OF EVIDENCE TO INFORM JUDGEMENTS</b>	Systematic review of studies examining the effects of the intervention (NiMRC provided evidence plus additional sources covering harms and adverse effects)	The overall judgement of certainty from GRADE assessment of evidence evaluations.	Studies reporting direct measures, indirect measures (e.g. health related quality of life), or other types of importance of outcomes (utility) and qualitative data (e.g. representative focus groups)	Economic evaluations. May require judgement of trade-offs. If there is uncertainty about cost-effectiveness compared with standard care, decision makers may delay a recommendation until evidence of cost-effectiveness is available OR cover the option with monitoring of effects and expenditures.	Evidence relating to PROGRESS -Plus elements.	Program completion, continued use of therapeutic, qualitative evidence.	Policy makers or key decision makers.

The Full Value of Vaccine Assessments (FVVA): a framework for assessing and communicating the value of vaccines for investment and introduction decision-making | BMC Medicine | Full Text



Current approach vs. proposed approach. **a** Traditional direct risk/benefit vs. full public value of vaccines. **b** Addition of global health value

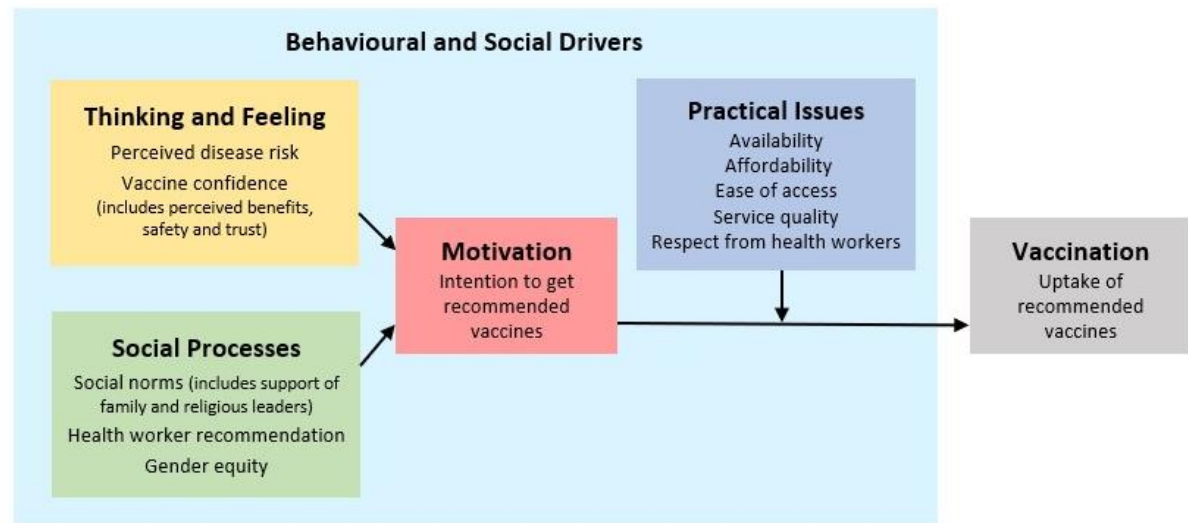


# How do we make decisions to have a vaccine?

Activation

Acceptance

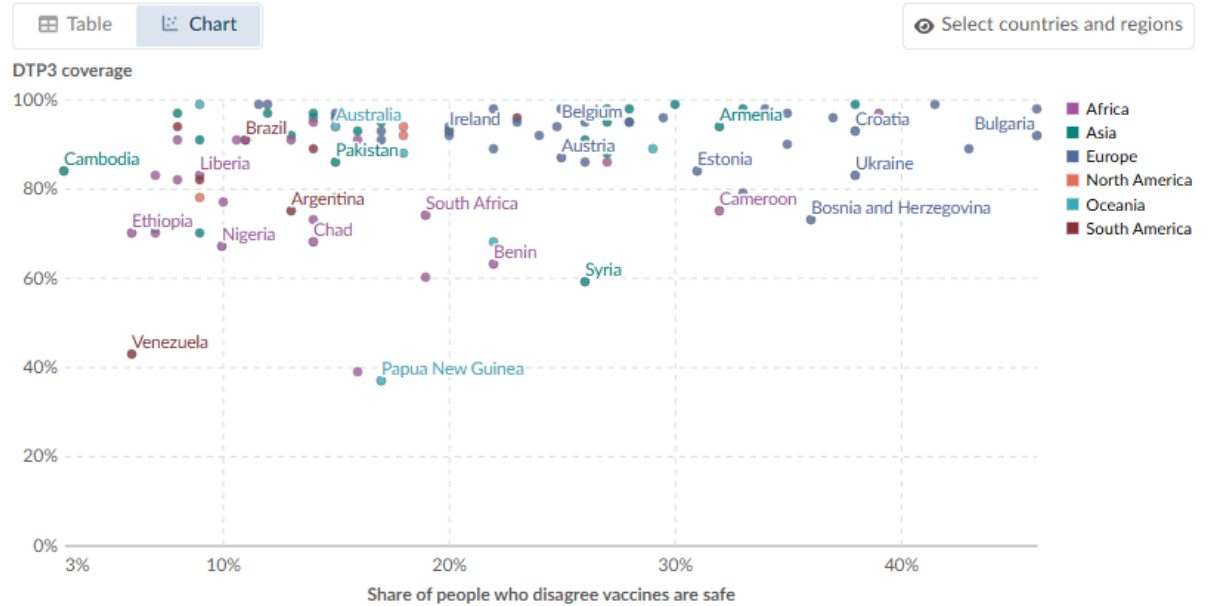
Access



## Vaccination against DTP vs. perception of the safety of vaccines, 2025

The share of one-year-olds vaccinated against diphtheria, pertussis, and tetanus versus the share of people who disagree with the statement: "Vaccines are safe".

Our World in Data



Data source: WHO & UNICEF (2025); UN, World Population Prospects (2024); Vaccine Confidence Project (2025) -

[Learn more about this data](#)

OurWorldinData.org/vaccination | CC BY





## Top Ten Anti-Vaccine Myths Debunked, Again | History of Vaccines

The DNA Dilemma: Do Vaccines Rewrite Your Genetic Code?

The Autism Allegation: A Debunked Connection That Persists

The Microchip Myth: When Sci-Fi Meets Vaccine Fears

Fertility Fables: Addressing Reproductive Health Concerns

The Herd Immunity Hoax: Why Individual Choices Matter

The Speed Stereotype: Understanding Accelerated Development

The VAERS Vortex: Interpreting Adverse Event Reports

Natural vs. Artificial Immunity: A False Dichotomy

The Variant Vexation: How Vaccines Actually Fight Mutations

The Toxin Fallacy: Understanding Vaccine Ingredients

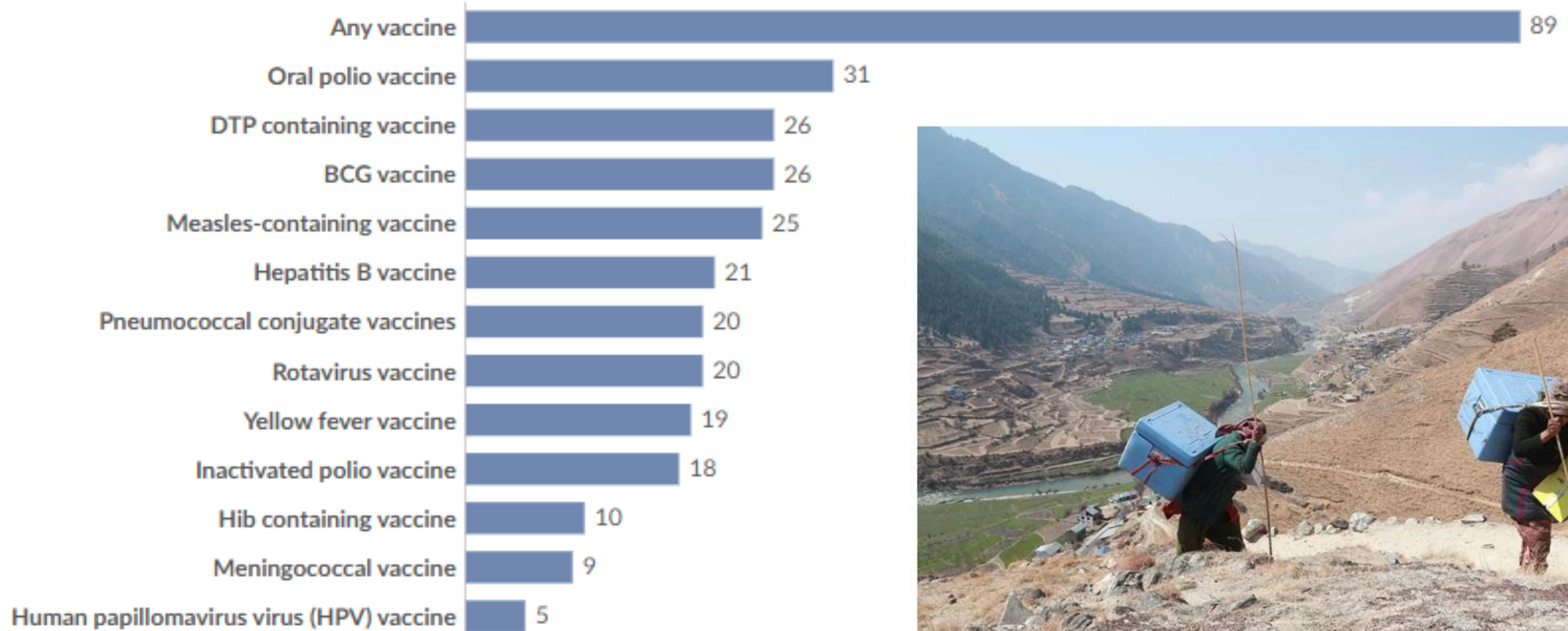


# Number of countries with vaccine supply issues, World, 2022

Number of countries where the stock levels of a specific vaccine become exhausted or fall below the recommended three-month buffer stock.



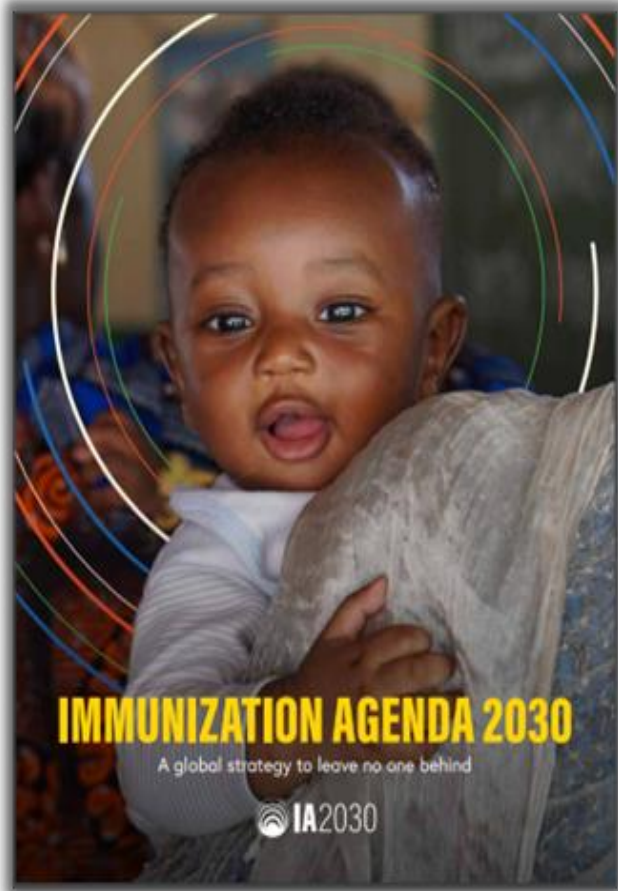
Table Chart



© UNICEF/UN0431118/LPNgakhusi

Using cold boxes provided by UNICEF, porters carry COVID-19 vaccines to health facilities in Jumla District in far-western Nepal, in March 2021.

# Immunisation strategies



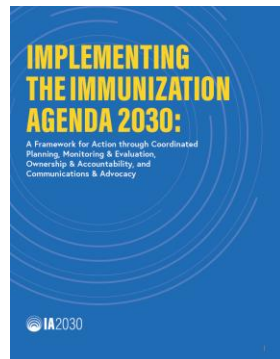
Many countries currently developing or updating their National Immunisation Strategies

### IA2030 GOALS AND OBJECTIVES

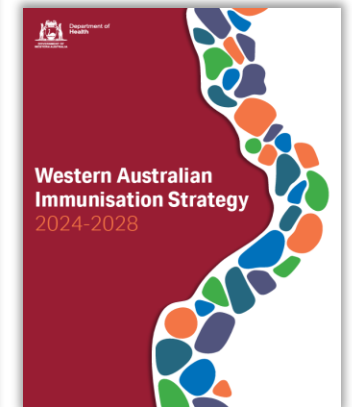
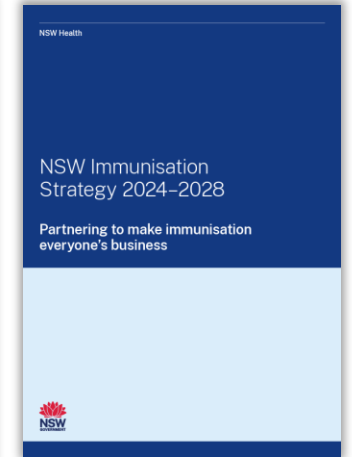
#### 3 Impact Goals

- 1 Reduce mortality and morbidity from vaccine-preventable diseases for everyone throughout the life course
- 2 Leave no one behind, by increasing equitable access and use of new and existing vaccines
- 3 Ensure good health and well-being for everyone by strengthening immunisation within primary health care and contributing to universal health coverage and sustainable development

#### 21 Strategic Priorities Objectives



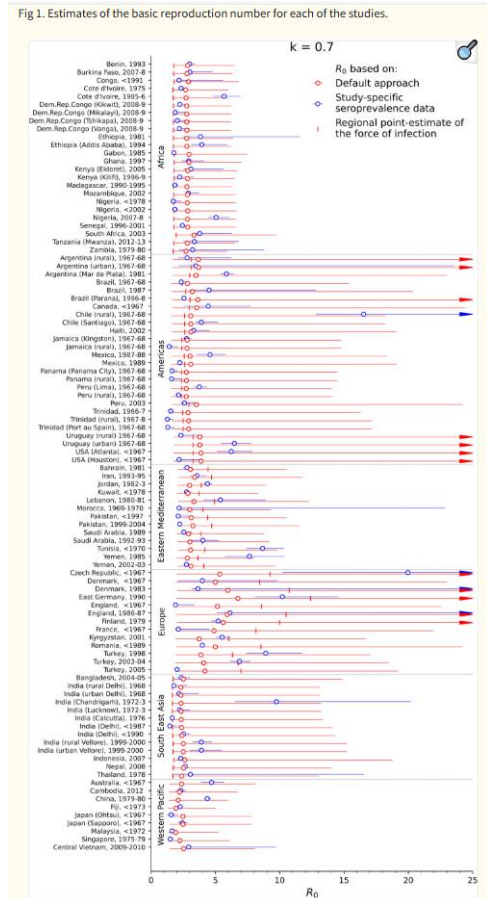
NCIRS contributed extensively to the Australia's new [National Immunisation Strategy](#) (launched June 2025)



# Mentimeter

What viral disease has NOT been found in bats?

- A. Ebola virus
- B. Coronaviruses
- C. Hendra virus
- D. Rubella virus
- E. Japanese encephalitis virus
- F. Australian Bat Lyssavirus



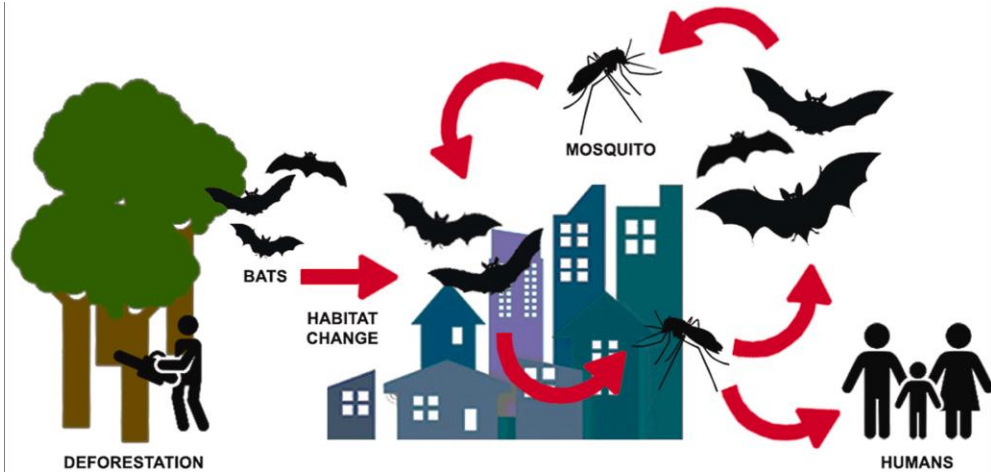
Rubella basic reproductive number <5:

[Estimates of the basic reproduction number for rubella using seroprevalence data and indicator-based approaches - PMC](#)



The detection of Japanese encephalitis virus in Megachiropteran bats in West Kalimantan, Indonesia: A potential enzootic transmission pattern in the absence of pig holdings

Ajib Diptyanusa <sup>a,b</sup>, Elisabeth Siti Herini <sup>c</sup>, Soedarmanto Indarjulianto <sup>d</sup>, Tri Baskoro Tunggal Satoto <sup>b,\*</sup>



## A rare case of rabies-like Australian bat lyssavirus infection

The death on July 3 of an Australian man with untreatable lyssavirus has highlighted the challenge posed by zoonotic viruses endemic to the country. *Samaan Lateef reports.*

An Australian man has died 8 months after contracting a rare, untreatable, rabies-like Australian bat lyssavirus (ABLV) infection, believed to have been transmitted through a bat bite. The patient, from northern New South Wales (NSW), died on July 3 after becoming critically ill from a bat bite sustained while attempting to free a bat from his balcony in November, 2024. This is the first reported human case of ABLV in NSW, and only the fourth reported case since the virus was first identified in Australia in 1996. All cases have been fatal. The patient's wife said he died from

human infection with bat lyssavirus is extremely rare. "It is incredibly rare for the virus to transmit to humans", said Keira Glasgow, a director in health protection at NSW Health. "But once symptoms of lyssavirus start in people who are scratched or bitten by an infected bat, sadly there is no effective treatment." Immediate treatment after exposure but before symptom onset can stop symptoms from ever developing. The line of treatment is similar to rabies and includes rapid wound care and use of immunoglobulins and vaccines. This intervention is highly effective if

since 2001, 423 sick bats have tested positive for lyssavirus, including eight bats last year. The virus affects a variety of bats, but its prevalence in the total population is very low—less than 0.5% according to a 2018 study. "We don't know much about ABLV dynamics in bats", Alison Peel, a veterinarian and wildlife disease ecologist at the University of Sydney, told *The Lancet Infectious Diseases*. "But the risk to people is higher when contact is more likely, so it's important to think about the factors that might increase direct human-bat contact. When bats lose their natural food sources and roosting sites, they might



*Lancet Infect Dis* 2025  
Published Online  
July 29, 2025  
[https://doi.org/10.1016/S1473-3099\(25\)00480-3](https://doi.org/10.1016/S1473-3099(25)00480-3)

Newsdesk



“ Be curious  
Share your knowledge  
Challenge yourselves  
Challenge us  
Have fun  
Take something from this  
course to make a  
change.....