Prevention Pays Off: Vaccines to Address Antimicrobial Resistance

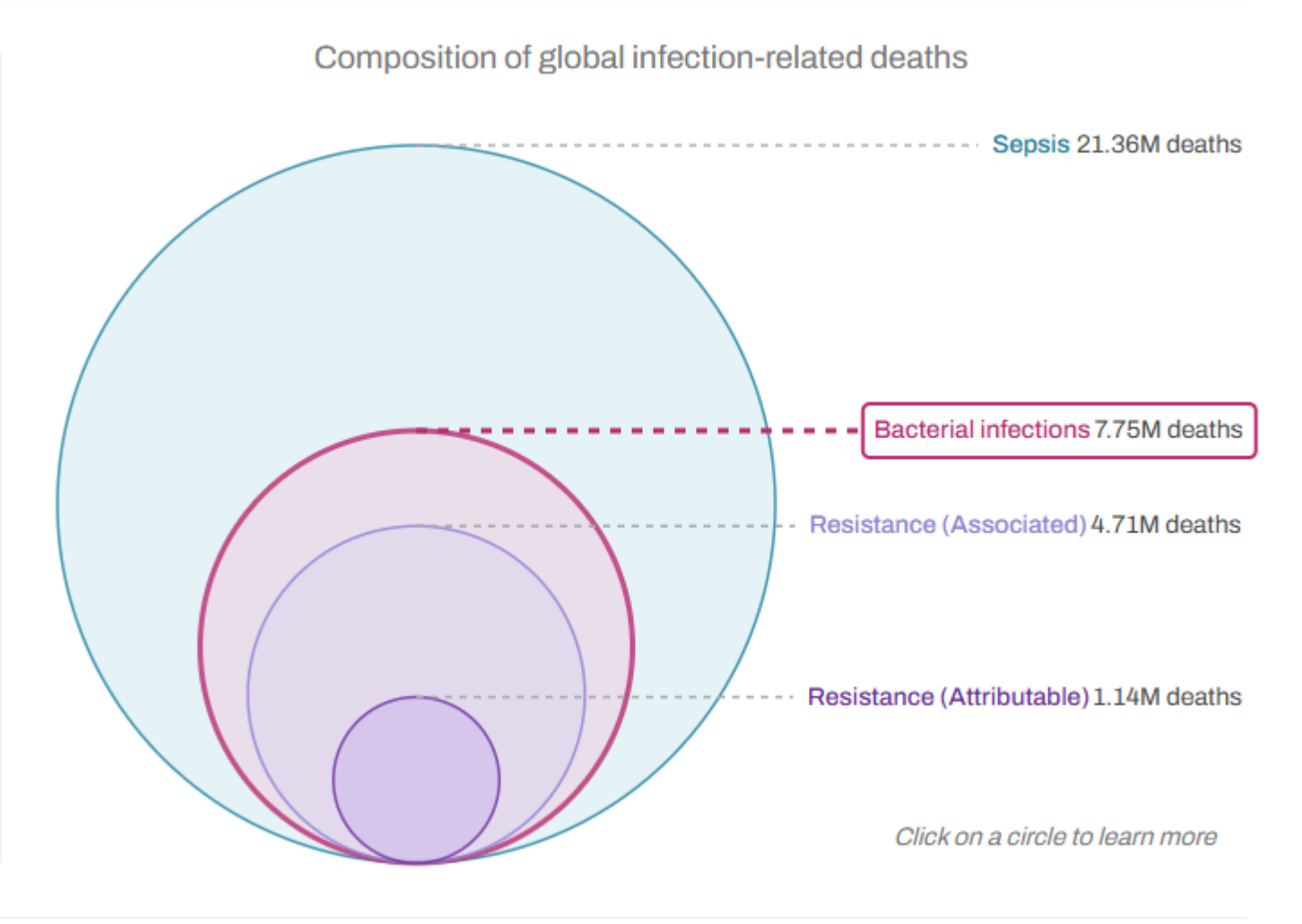
ESCMID AMR Science-Policy Forum

April 17, 2026

Padmini Srikantiah, MD MPH
Deputy Director, Global Health Division

Gates Foundation

Global Burden of Antimicrobial Resistance, 2021



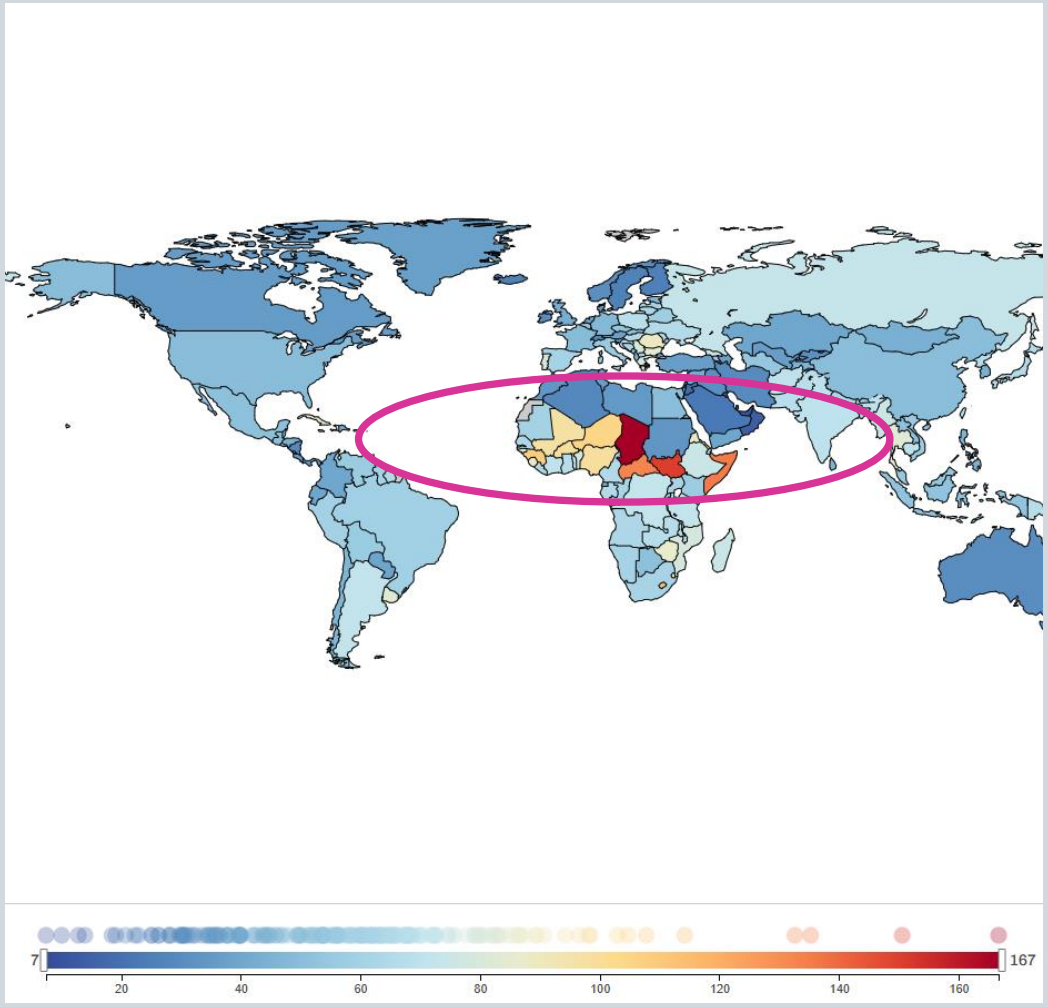
- Global AMR attributable deaths
  - 1.1 million
- Global AMR associated deaths
  - 4.7 million

- **AMR burden is driven by burden of bacterial infections**
  - Prevention of bacterial infections is key to addressing AMR associated deaths

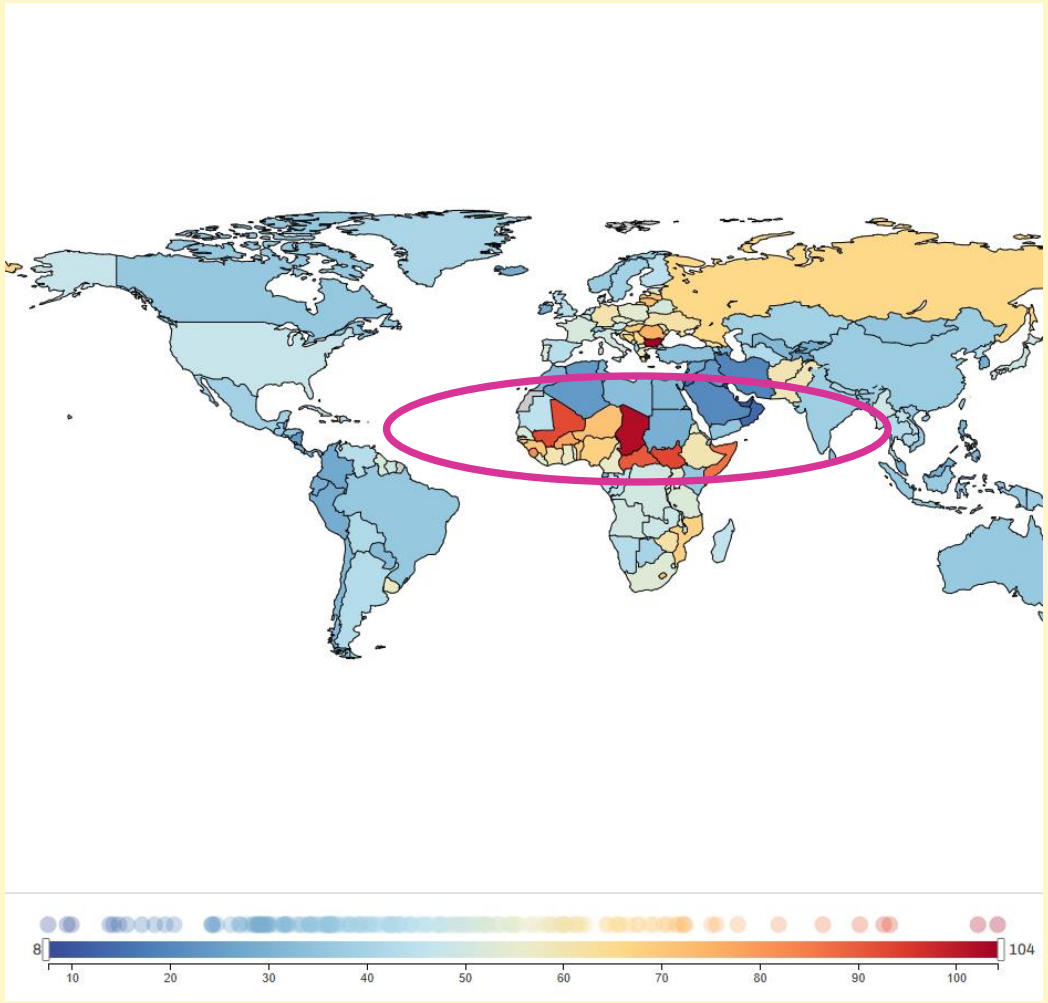
Source: https://vizhub.healthdata.org/microbe/

Burden of AMR Associated Deaths Overlaps with Burden of Infectious Deaths

Total deaths per 100K population, all pathogens, bloodstream infections, 2021

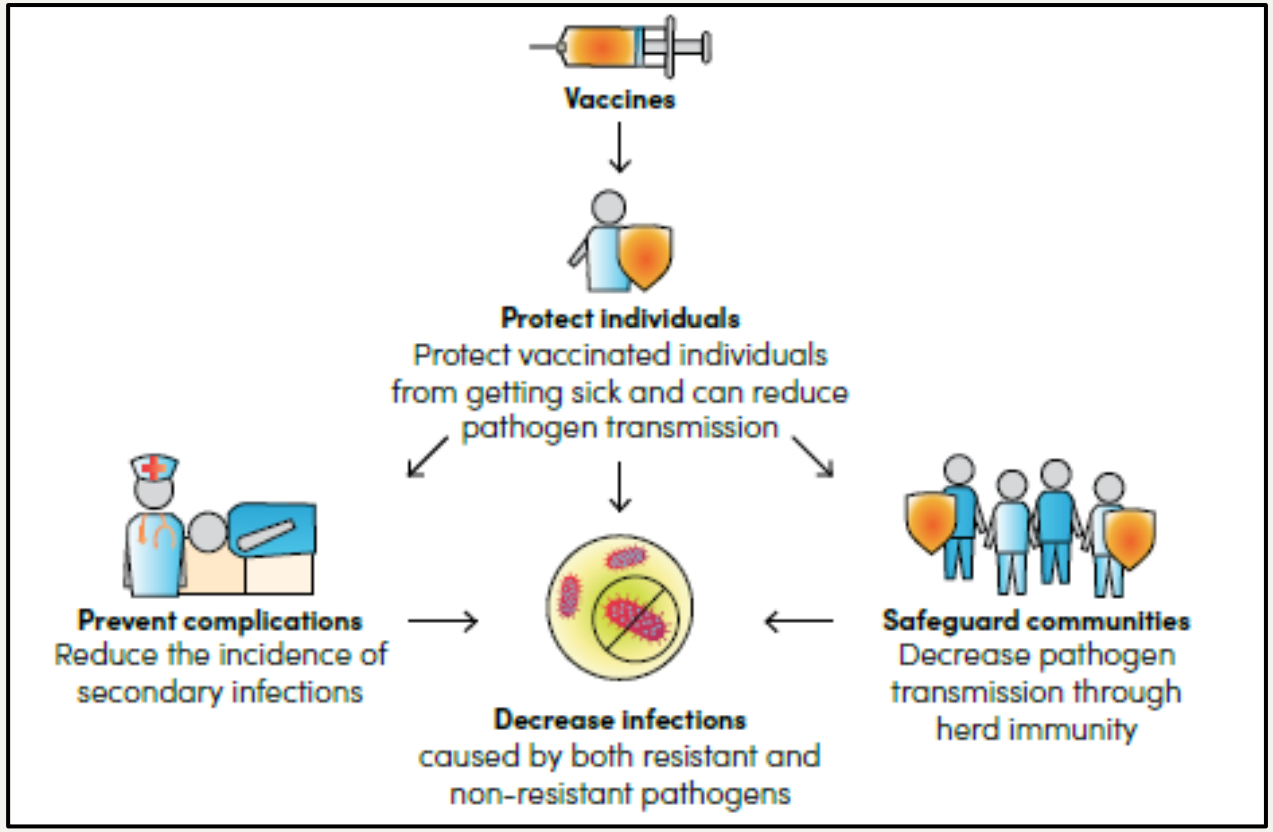


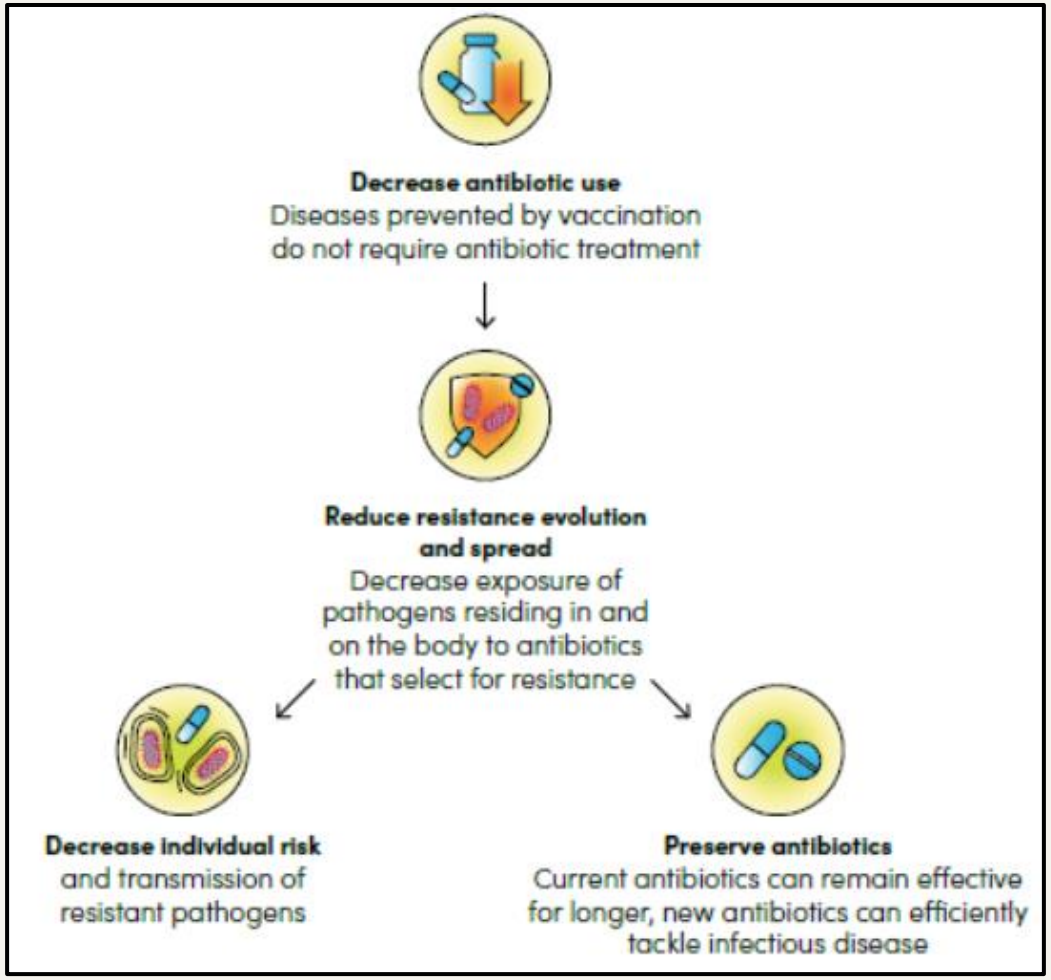
Total deaths per 100K population associated with AMR, 2021



Source: https://vizhub.healthdata.org/microbe/

WHO Framework for Vaccines to Address AMR





Estimating the impact of vaccines in reducing antimicrobial resistance and antibiotic use: technical report. Geneva: World Health Organization; 2024.

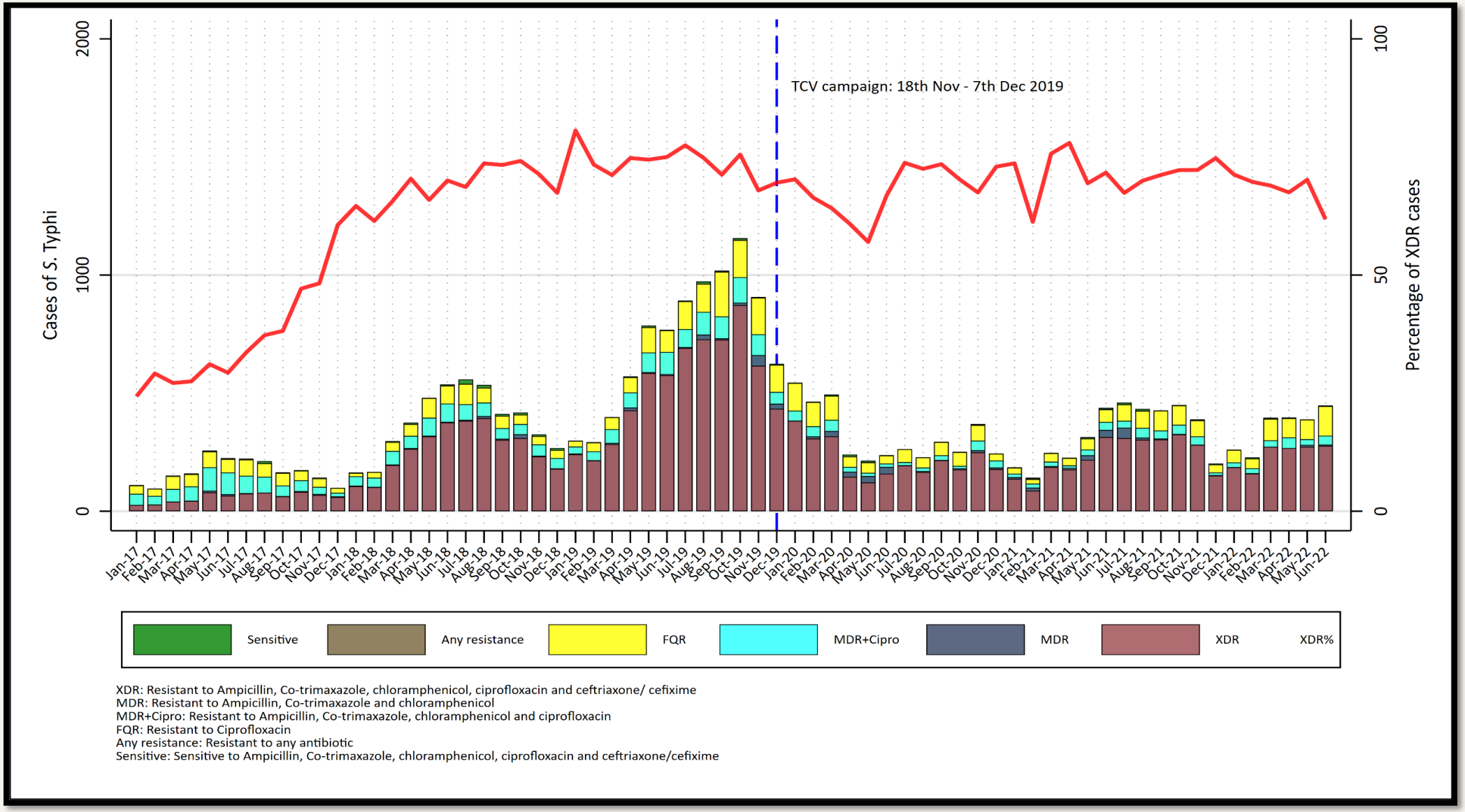
Effect of typhoid conjugate vaccine on culture confirmed *Salmonella* Typhi cases and XDR *S.* Typhi cases, Pakistan 2019

	Number of participants (n)	At-risk population (n)	Total person-time at risk, years*	S Typhi incidence; number of cases per 100 000 population (95% CI)	S Typhi incidence; number of cases per 100 000 person-years (95% CI)	S Typhi incidence rate ratio (95% CI)	Vaccine effectiveness* (95% CI)
Culture-confirmed S Typhi cases							
Age 6–59 months							
Vaccinated	22	5521	8646	398·5 (232·3–564·7)	254·5 (249·1–259·8)	0·06 (0·03–0·09)	94·5 (91·5–96·6)
Unvaccinated	349	4647	7599	7510·2 (6752·4–8268·0)	4592·5 (4489·3–4695·8)	..	..
Age ≥5 years							
Vaccinated	25	7915	12 103	315·9 (192·2–439·5)	206·6 (202·9–210·2)	0·05 (0·03–0·07)	95·2 (92·9–97·0)
Unvaccinated	379	5324	8722	7118·7 (6428·0–7809·4)	4345·1 (4253·9–4436·3)	..	..
Overall							
Vaccinated	47	13436	20749	349·8 (250·0–449·6)	226·5 (223·4–229·6)	0·05 (0·04–0·07)	94·9 (93·2–96·3)
Unvaccinated	728	9971	16322	7301·2 (6790·5–7811·8)	4460·3 (4391·9–4528·8)	..	..
XDR S Typhi cases							
Age 6–59 months							
Vaccinated	14	5521	8646	253·6 (120·9–386·2)	161·9 (158·5–165·3)	0·06 (0·03–0·10)	94·4 (90·4–97·0)
Unvaccinated	220	4647	7599	4734·2 (4123·6–5344·8)	2895·0 (2829·9–2960·1)	..	..
Age ≥5 years							
Vaccinated	4	7915	12 103	50·5 (1·0–100·1)	33·1 (32·5–33·6)	0·01 (0·00–0·04)	98·6 (96·4–99·6)
Unvaccinated	206	5324	8722	3869·3 (3351·2–4387·3)	2361·7 (2312·2–2411·3)	..	..
Overall							
Vaccinated	18	13436	20749	134·0 (72·1–195·8)	86·8 (85·6–87·9)	0·03 (0·02–0·05)	96·7 (94·7–98·0)
Unvaccinated	426	9971	16322	4272·4 (3875·4–4669·3)	2610·0 (2570·0–2650·1)	..	..

(Table 2 continues on next page)

Source: Yousafzai et al, *Lancet Global Health*, 2021

Trend of XDR *S.* Typhi in Sind Province, Pakistan (2017-22)

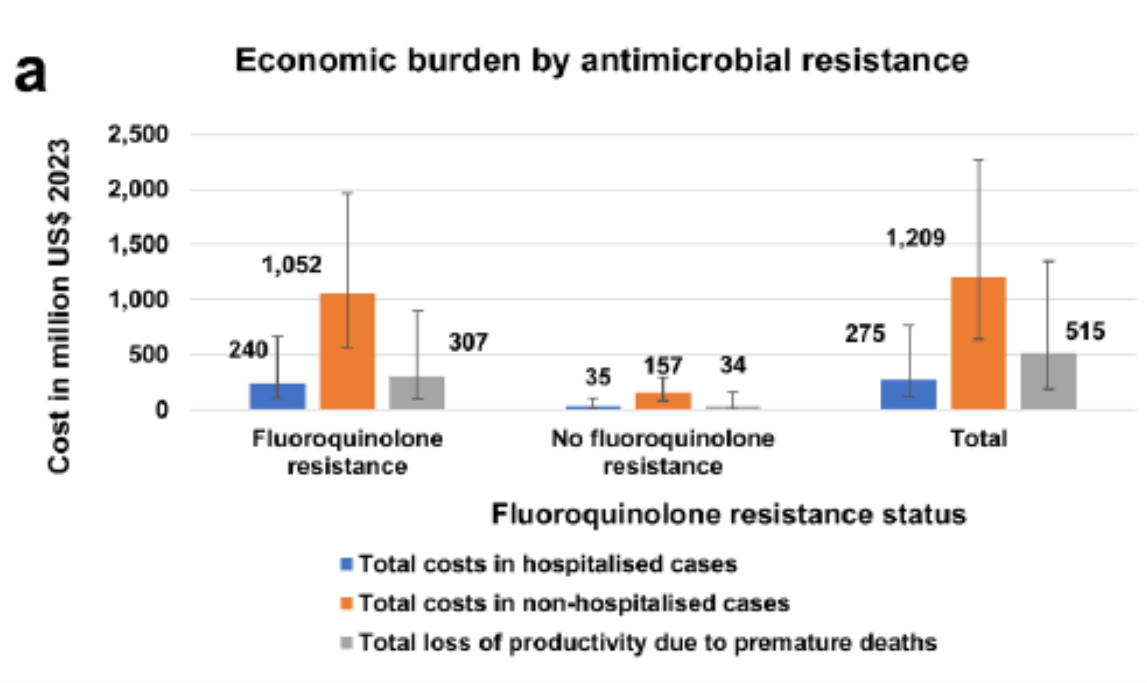


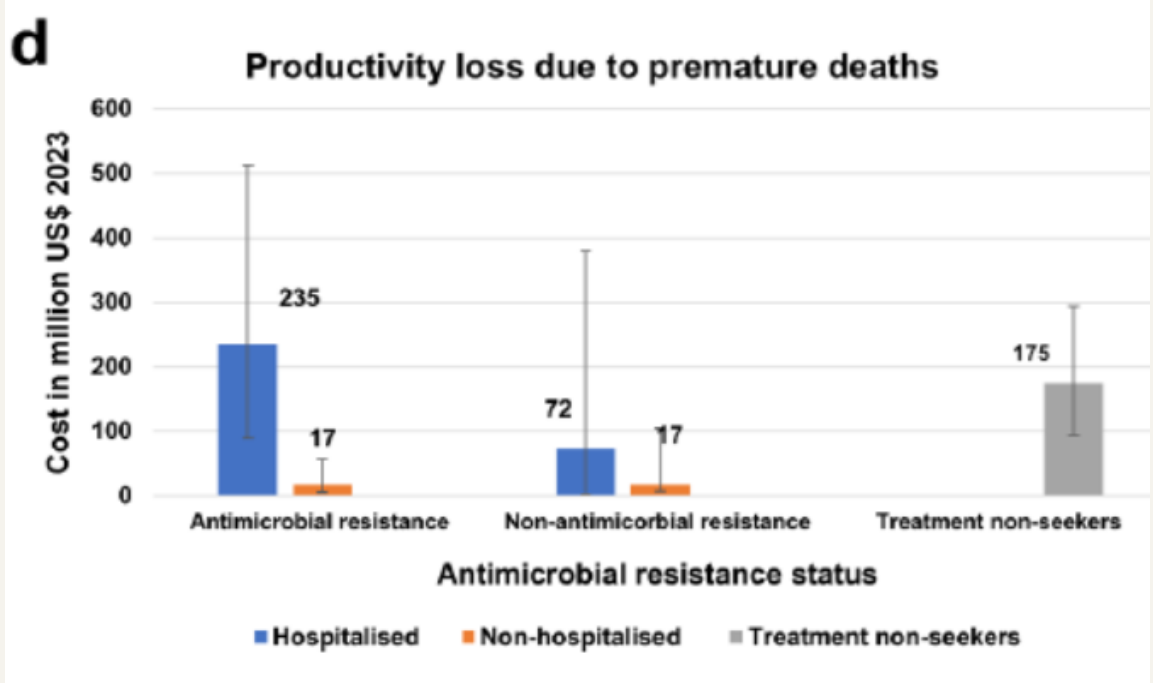
Source: Dr. Farah Qamar, Grand Challenges Annual Meeting, Brussels 2022

Economic burden of typhoid fever by antimicrobial resistance in India

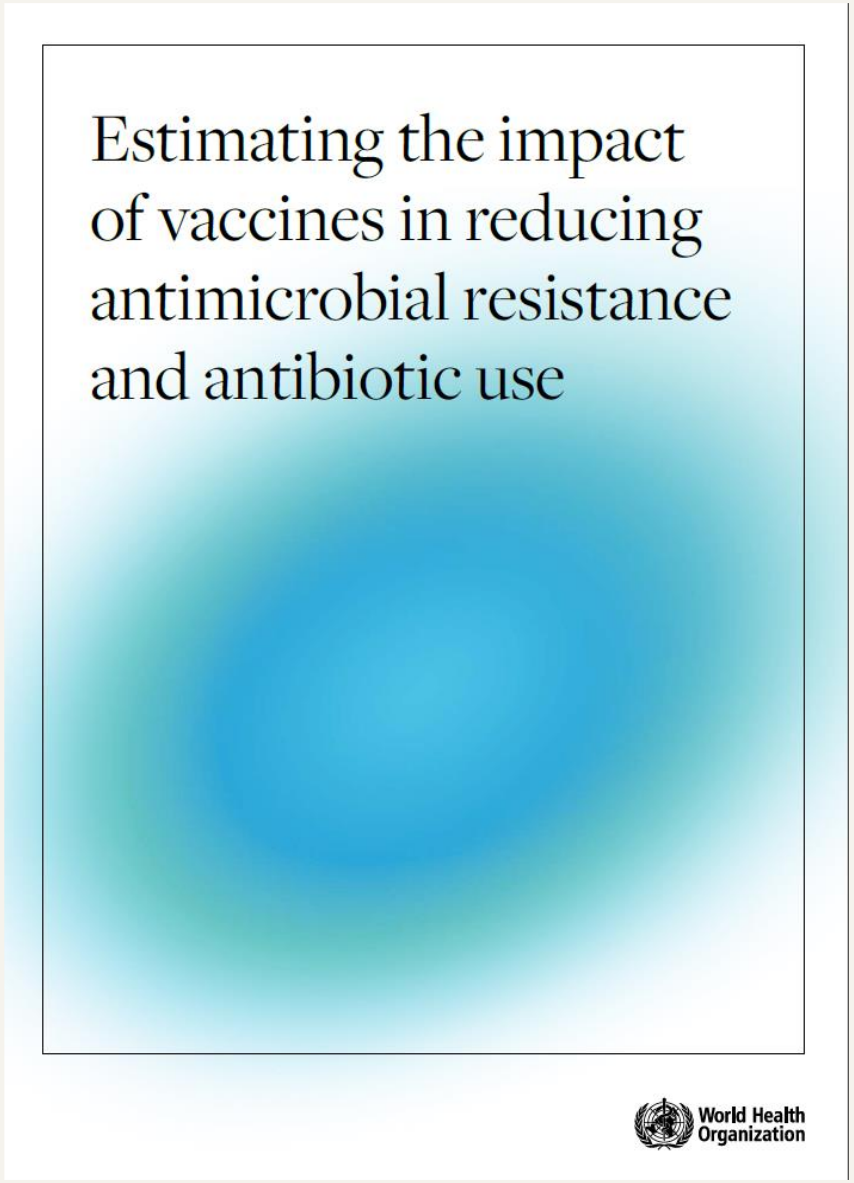
A modelling study-- 2023

- The economic burden of typhoid fever in India in 2023 was estimated at US$ 1.5 billion (95% UI 0.9–2.6B)
- Fluoroquinolone-resistant infections accounted for 87% of total costs





WHO Framework for Vaccines to Address AMR



- Vaccines have the potential to avert an estimated 515,000 AMR-associated deaths each year

- Existing vaccines could avert annually 106,000 deaths
  - **9.1 million disability-adjusted life years (DALYs)**
  - **US$ 861 million in hospital costs and US$ 5.9 billion in productivity losses**

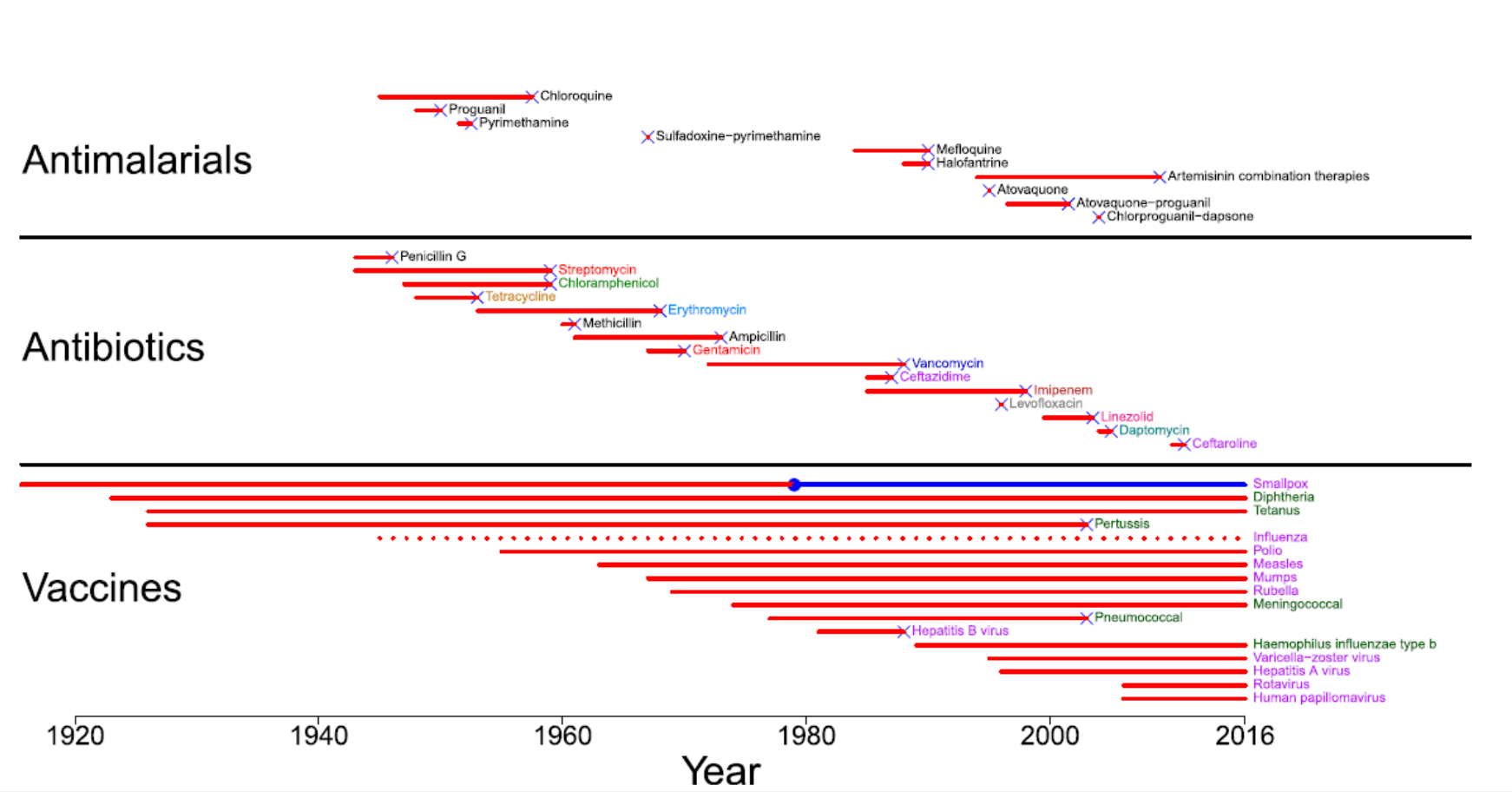
- Vaccines in late-stage development could avert annually 135,000 deaths
  - **5.0 million DALYs, US$ 1.2 billion in hospital costs and US$ 2.2 billion in productivity losses**

- Vaccines in early development could avert annually up to 408 000 deaths
  - **23.0 million DALYs, US$ 30.0 billion in hospital costs and US$ 17.7 billion in productivity losses**

Estimating the impact of vaccines in reducing antimicrobial resistance and antibiotic use: technical report. Geneva: World Health Organization; 2024.

The durable effectiveness of vaccines

Time between deployment of an intervention and the first documented failure in humans due to resistance



Source: Kennedy, et al. *PNAS*, 2019

Insight paper

May 2024 | gavi.org

Gavi The Vaccine Alliance

Vaccines: a key tool to tackle antimicrobial resistance (AMR)

The Value of Vaccines in Mitigating Antimicrobial Resistance in Kenya

GARP-Kenya Chair - Dr. Robert S. Onsare

GARP - Kenya Policy Brief

GARP

In Search of Better Health

ONE HEALTH TRUST

SUMMARY

- Vaccines are critical and **cost-effective** tool in the fight against AMR and the burden of infectious diseases
- Vaccine must be integrated in:
  - National and global AMR mitigation strategies
  - Decision-making about vaccine development, introduction and use
- The impact of vaccines in reducing AMR needs to be recognized by stakeholders in AMR and immunization
- Global, regional and national AMR and immunization strategies and implementation frameworks should include vaccines as interventions to reduce AMR, advocating for their broader implementation and integration

Thank you