Update on Vaccines and AMR

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PDVAC

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Political Declaration on AMR– 26th September

Acknowledgment that infection prevention, including through vaccination can significantly reduce the need for antimicrobials and avert AMR related deaths.

Commitment to align National Action Plans on AMR with vaccination and immunization strategies

Stresses the importance of equitable and timely access to vaccines, diagnostics, and antimicrobials, particularly in LMICs.

Recognizing the One Health approach, the declaration also promotes the use of vaccines in to reduce the reliance on antimicrobials in animal husbandry.

Commitment to increasing investment in research and development for new vaccines that can prevent infections and reduce the need for antimicrobials

9 September 2024

Political Declaration of the High-level Meeting on Antimicrobial Resistance

We, Heads of State and Government and representatives of States and Governments, are assembled at the United Nations on 26 September 2024, in accordance with General Assembly resolution 78/269, to review progress on global, regional and national efforts to tackle antimicrobial resistance, to identify gaps and invest in sustainable solutions to strengthen and accelerate multisectoral progress at all levels, through a One Health approach, with a view to scaling up the global effort to build a healthier world based on equity and leaving no one behind, and in this regard we:

1. Recognize that antimicrobial resistance is one of the most urgent global health threats and development challenges and demands immediate action to safeguard our ability to treat human, animal, and plant diseases, as well as to enhance food safety, food security and nutrition, foster economic development, equity and a healthy environment, and advance the 2030 Agenda for Sustainable Development Goals,

2. Reaffirm that the 2030 Agenda for Sustainable Development offers a framework to ensure healthy lives, and recall commitments to fight malaria, HIV/AIDS, tuberculosis, hepatitis, the Ebola virus disease, neglected tropical diseases and other communicable diseases and epidemics that disproportionately affect developing countries, including by addressing growing antimicrobial resistance while reiterating that antimicrobial resistance challenges the sustainability and effectiveness of the public health response to these and other diseases as well as gains in health and development and the attainment of the 2030 Agenda,

3. Recall that within the broader context of antimicrobial resistance, resistance to antibiotics is a grave global challenge, and that effective, safe and affordable antibiotics are a prerequisite for providing quality, accessible and timely health-care services and are essential for the functioning of all health systems,

4. Recognize that while antimicrobial resistance affects people of all ages, knows no borders and is present in all countries, the burden is largely and disproportionately borne by developing countries and those in vulnerable situations, requiring global solidarity, joint efforts and international cooperation,

5. Note with concern that lack of access to appropriate, safe, effective and affordable antimicrobials and diagnostic tools, particularly in developing countries, is responsible for more deaths than antimicrobial resistance, while stressing that in 2019, 4.95 million deaths were associated with drug-resistant bacterial infections, including 1.27 million deaths directly attributable to bacterial antimicrobial resistance, 20 per cent of whom were children under five[1], and that without a stronger response there will be an estimated average loss of life expectancy of 1.8 years globally by 2035[2],

6. Note with further concern that, globally, antimicrobial resistance could result in US$ 1 trillion of additional health-care costs per year by 2050 and US$ 1 trillion to 3.4 trillion of gross domestic product losses per year by 2030[3], and that treating drug-resistant bacterial infections alone could cost up to US$ 412 billion annually, coupled with workforce participation and productivity losses of US$ 443 billion[4], with antimicrobial resistance predicted to cause an 11 per cent decline in livestock

[1] Global burden of bacterial antimicrobial resistance in 2019: a systematic analysis - The Lancet
[2] GLG report: Towards specific commitments and action in the response to antimicrobial resistance
[3] Drug-resistant Infections: A Threat to Our Economic Future
[4] Quadripartite Economics of AMR Study

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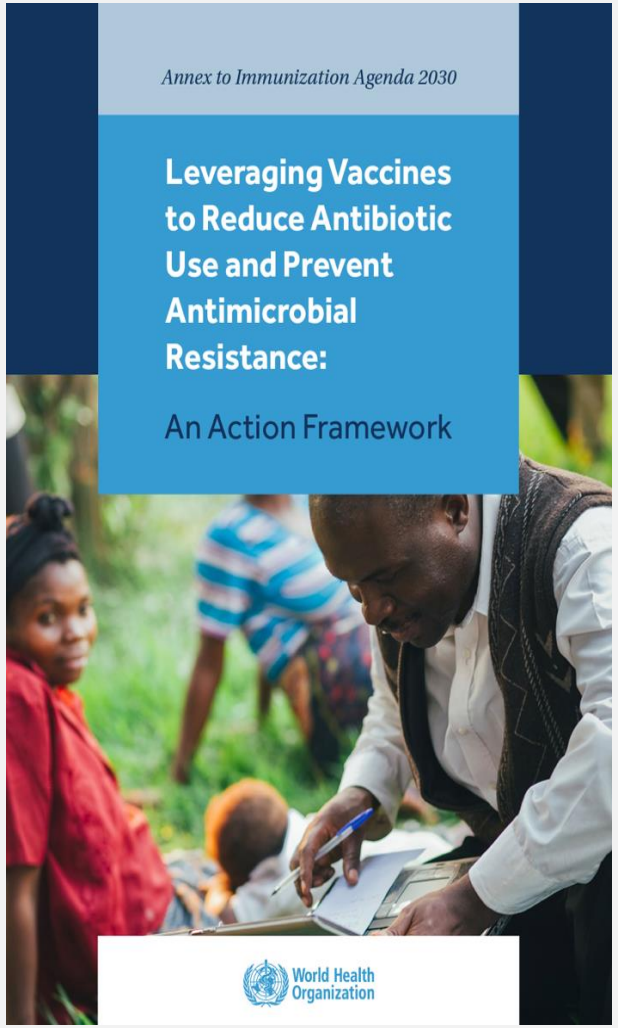
WHO's role in advancing the role of vaccines in AMR



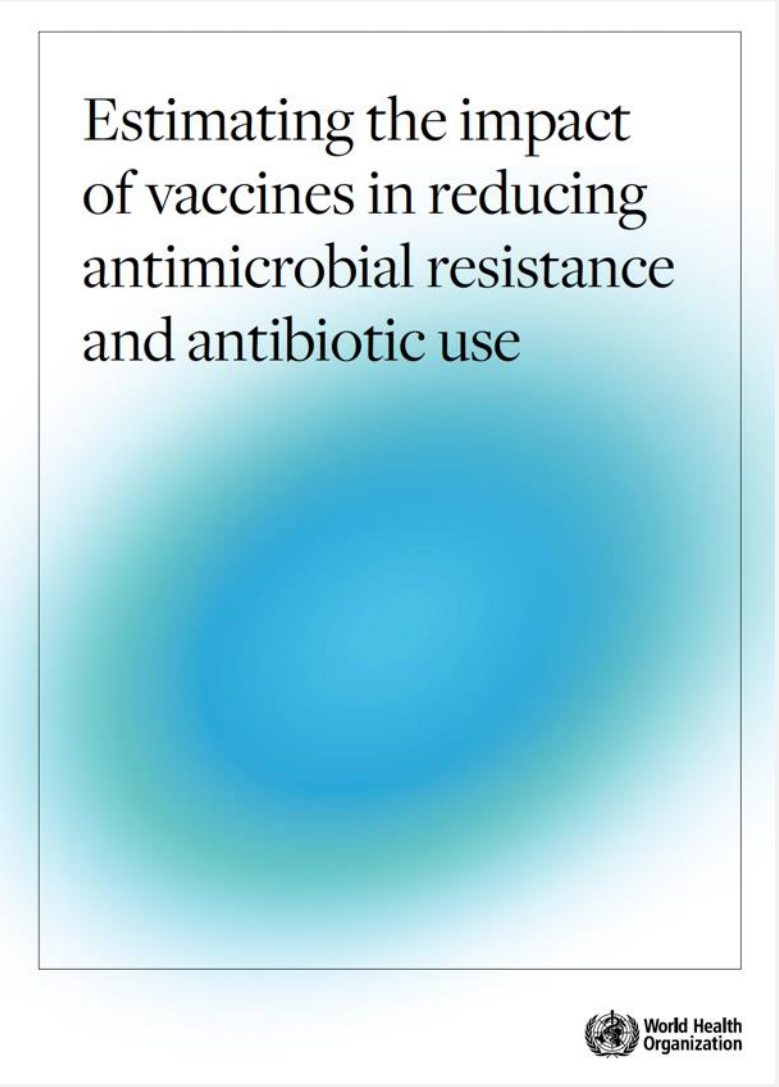
WHO report: Estimating the impact of vaccines in reducing antimicrobial resistance and use

Vaccines have the potential to annually avert up to:

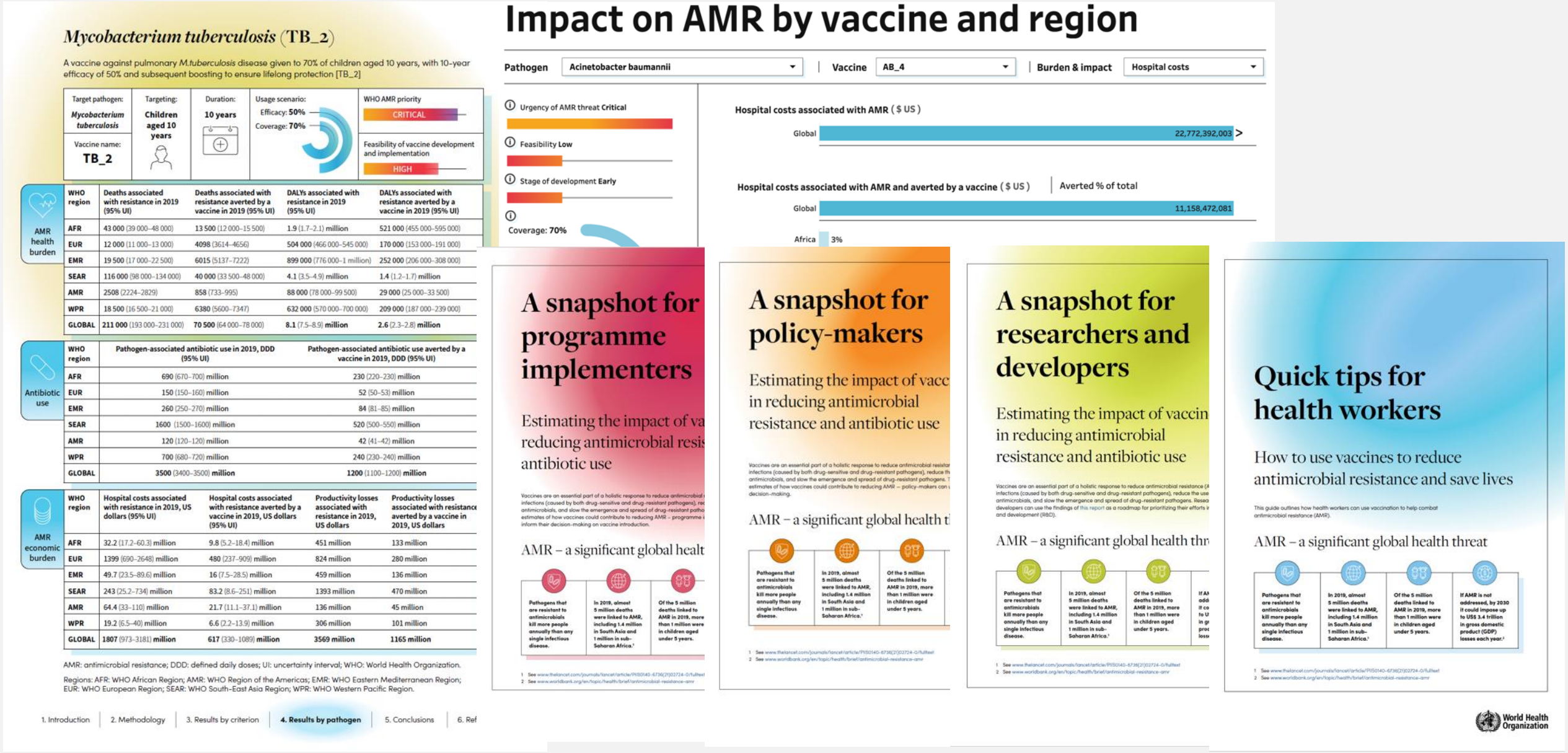
- **515 000 deaths**
- **28 million DALYs**
- **US$ 30 billion in hospital costs**
- **US$ 20 billion in productivity losses**
- all associated with AMR,

and **2.5 billion antibiotic doses**.

https://www.who.int/teams/immunization-vaccines-and-biologicals/product-and-delivery-research/anti-microbial-resistance



Additional Resources



Mycobacterium tuberculosis (TB_2)

A vaccine against pulmonary *M.tuberculosis* disease given to 70% of children aged 10 years, with 10-year efficacy of 50% and subsequent boosting to ensure lifelong protection [TB_2]

Target pathogen:	Targeting:	Duration:	Usage scenario:	WHO AMR priority
Mycobacterium tuberculosis	Children aged 10 years	10 years	Efficacy: 50% Coverage: 70%	CRITICAL
Vaccine name: TB_2				Feasibility of vaccine development and implementation: HIGH

AMR health burden

WHO region	Deaths associated with resistance in 2019 (95% UI)	Deaths associated with resistance averted by a vaccine in 2019 (95% UI)	DALYs associated with resistance in 2019 (95% UI)	DALYs associated with resistance averted by a vaccine in 2019 (95% UI)
AFR	43 000 (39 000–48 000)	13 500 (12 000–15 500)	1.9 (1.7–2.1) million	521 000 (455 000–595 000)
EUR	12 000 (11 000–13 000)	4098 (3614–4656)	504 000 (466 000–545 000)	170 000 (153 000–191 000)
EMR	19 500 (17 000–22 500)	6015 (5137–7222)	899 000 (776 000–1 million)	252 000 (206 000–308 000)
SEAR	116 000 (98 000–134 000)	40 000 (33 500–48 000)	4.1 (3.5–4.9) million	1.4 (1.2–1.7) million
AMR	2508 (2224–2829)	858 (733–995)	88 000 (78 000–99 500)	29 000 (25 000–33 500)
WPR	18 500 (16 500–21 000)	6380 (5600–7347)	632 000 (570 000–700 000)	209 000 (187 000–239 000)
GLOBAL	211 000 (193 000–231 000)	70 500 (64 000–78 000)	8.1 (7.5–8.9) million	2.6 (2.3–2.8) million

Antibiotic use

WHO region	Pathogen-associated antibiotic use in 2019, DDD (95% UI)	Pathogen-associated antibiotic use averted by a vaccine in 2019, DDD (95% UI)
AFR	690 (670–700) million	230 (220–230) million
EUR	150 (150–160) million	52 (50–53) million
EMR	260 (250–270) million	84 (81–85) million
SEAR	1600 (1500–1600) million	520 (500–550) million
AMR	120 (120–120) million	42 (41–42) million
WPR	700 (680–720) million	240 (230–240) million
GLOBAL	3500 (3400–3500) million	1200 (1100–1200) million

AMR economic burden

WHO region	Hospital costs associated with resistance in 2019, US dollars (95% UI)	Hospital costs associated with resistance averted by a vaccine in 2019, US dollars (95% UI)	Productivity losses associated with resistance in 2019, US dollars	Productivity losses associated with resistance averted by a vaccine in 2019, US dollars
AFR	32.2 (17.2–60.3) million	9.8 (5.2–18.4) million	451 million	133 million
EUR	1399 (690–2648) million	480 (237–909) million	824 million	280 million
EMR	49.7 (23.5–89.6) million	16 (7.5–28.5) million	459 million	136 million
SEAR	243 (25.2–734) million	83.2 (8.6–251) million	1393 million	470 million
AMR	64.4 (33–110) million	21.7 (11.1–37.1) million	136 million	45 million
WPR	19.2 (6.5–40) million	6.6 (2.2–13.9) million	306 million	101 million
GLOBAL	1807 (973–3181) million	617 (330–1089) million	3569 million	1165 million

AMR: antimicrobial resistance; DDD: defined daily doses; UI: uncertainty interval; WHO: World Health Organization.

Regions: AFR: WHO African Region; AMR: WHO Region of the Americas; EMR: WHO Eastern Mediterranean Region; EUR: WHO European Region; SEAR: WHO South-East Asia Region; WPR: WHO Western Pacific Region.

1. Introduction | 2. Methodology | 3. Results by criterion | **4. Results by pathogen** | 5. Conclusions | 6. Ref

Impact on AMR by vaccine and region

Pathogen: Acinetobacter baumannii | Vaccine: AB_4 | Burden & impact: Hospital costs

Urgency of AMR threat **Critical**

Feasibility **Low**

Stage of development **Early**

Coverage: **70%**

Hospital costs associated with AMR ($ US)

Global: 22,772,392,003 >

Hospital costs associated with AMR and averted by a vaccine ($ US) | Averted % of total

Global: 11,158,472,081

Africa: 3%

A snapshot for programme implementers

Estimating the impact of va… reducing antimicrobial resis… antibiotic use

Vaccines are an essential part of a holistic response to reduce antimicrobial … infections (caused by both drug-sensitive and drug-resistant pathogens), … antimicrobials, and slow the emergence and spread of drug-resistant patho… estimates of how vaccines could contribute to reducing AMR – programme … inform their decision-making on vaccine introduction.

AMR – a significant global healt…

Pathogens that are resistant to antimicrobials kill more people annually than any single infectious disease.

In 2019, almost 5 million deaths were linked to AMR, including 1.4 million in South Asia and 1 million in sub-Saharan Africa.[1]

Of the 5 million deaths linked to AMR in 2019, more than 1 million were in children aged under 5 years.

1 See www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext
2 See www.worldbank.org/en/topic/health/brief/antimicrobial-resistance-amr

A snapshot for policy-makers

Estimating the impact of vacc… in reducing antimicrobial resistance and antibiotic use

Vaccines are an essential part of a holistic response to reduce antimicrobial resistan… infections (caused by both drug-sensitive and drug-resistant pathogens), reduce th… antimicrobials, and slow the emergence and spread of drug-resistant pathogens. T… estimates of how vaccines could contribute to reducing AMR – policy-makers can … decision-making.

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A snapshot for researchers and developers

Estimating the impact of vaccin… in reducing antimicrobial resistance and antibiotic use

Vaccines are an essential part of a holistic response to reduce antimicrobial resistance (A… infections (caused by both drug-sensitive and drug-resistant pathogens), reduce the use … antimicrobials, and slow the emergence and spread of drug-resistant pathogens. Resea… developers can use the findings of this report as a roadmap for prioritizing their efforts i… and development (R&D).

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Quick tips for health workers

How to use vaccines to reduce antimicrobial resistance and save lives

This guide outlines how health workers can use vaccination to help combat antimicrobial resistance (AMR).

AMR – a significant global health threat

Pathogens that are resistant to antimicrobials kill more people annually than any single infectious disease.

In 2019, almost 5 million deaths were linked to AMR, including 1.4 million in South Asia and 1 million in sub-Saharan Africa.[1]

Of the 5 million deaths linked to AMR in 2019, more than 1 million were in children aged under 5 years.

If AMR is not addressed, by 2030 it could impose up to US$ 3.4 trillion in gross domestic product (GDP) losses each year.[2]

1 See www.thelancet.com/journals/lancet/article/PIIS0140-6736(21)02724-0/fulltext
2 See www.worldbank.org/en/topic/health/brief/antimicrobial-resistance-amr

World Health Organization

Research Roadmap for vaccines against *K. pneumoniae*

- *Klebsiella pneumoniae* is the **leading cause of neonatal sepsis in LMICs**, responsible 45.4% of neonatal deaths in South-Asia due to an infectious cause.
- **Highly resistant**, noted cases of **multi-drug resistance and/or hypervirulence**
- **Top five priority in every WHO region** in the WHO prioritisation exercise for vaccine R&D
- In 2024 WHO has published a Vaccine Value Profile for *Klebsiella pneumoniae*
- No vaccines in clinical development, although **four known pre-clinical programmes** (GVGH, Ominose, Inventprise, Vaxdyn)
- **Significant challenges to vaccine development**: biological feasibility in views of the multitude of strains and CPS/LPS variants, broad host range, identification of highly conserved alternatives for vaccine targets, surveillance, and design of trials
- WHO proposes to develop a **Research Roadmap** for vaccines against *K. pneumoniae* with support from a TAG

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Vaccine value profile for *Klebsiella pneumoniae*

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ARTICLE INFO

The development of this Vaccine Value Profile has been commissioned by WHO's

ABSTRACT

Klebsiella pneumoniae causes community- and healthcare-associated infections in children and adults. Globally in 2019, an estimated 1.27 million (95% Uncertainty Interval [UI]: 0.91–1.71) and 4.95 million (95% UI:

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Advisory Group on Vaccines against *K. pneumoniae*

1. To provide **strategic guidance** to WHO on the **identification and prioritization of critical research areas necessary to advance vaccine development for *K. pneumoniae***.

2. To **support** WHO in **reviewing and assessing the progress of ongoing vaccine research and clinical trials.** This involves **examining the scientific and technical challenges** that need to be overcome, such as identifying suitable antigens, optimizing vaccine delivery strategies, and addressing gaps in clinical evidence.

3. To **support** WHO in **building partnerships with key stakeholders**, including governments, non-governmental organizations, vaccine manufacturers, and research institutions, essential for mobilizing resources and expertise to accelerate the development and implementation of *K. pneumoniae* vaccines.

Thank you!

Does PDVAC support the development of a Research Roadmap for vaccines against *K. pneumoniae*?