



The Value of Vaccines in Mitigating Antimicrobial Resistance in Kenya

GARP-Kenya Chair - Dr. Robert S. Onsare

GARP - Kenya Policy Brief



In Search of Better Health



© One Health Trust (OHT) 2026

Reproduction is authorized provided the source is acknowledged. This report is based on research supported by Gates Foundation.

The findings and conclusions contained within are those of the authors and do not necessarily reflect the positions or policies of OHT, Gates Foundation, or partnering institutions. Related research and additional information on vaccines and antimicrobial resistance are available at onehealthtrust.org.

Suggested citation: GARP-Kenya (2026). The Value of Vaccines in Mitigating Antimicrobial Resistance in Kenya - GARP-Kenya Policy Brief. Washington, DC. One Health Trust.

Cover photo courtesy of Dr. Robert Onsare

ONE HEALTH TRUST
5636 Connecticut Ave NW
PO Box 42735
Washington, DC, 20015
United States of America

ONE HEALTH TRUST, INDIA
Nimai Valley, Site No.47
Motlur Cross, Jadalhimmanahalli,
Chikkaballapur,
Karnataka – 562103, India



In Search of Better Health

ACKNOWLEDGEMENTS

Global Antibiotic Resistance Partnership (GARP)-Kenya A Kenya Medical Research Institute (KEMRI) – OHT Initiative

GARP-Kenya Technical Work Group Members & Institutional Affiliations:

Chairperson:

Dr. Robert Onsare, Ag. Deputy Director, One Health Approach Research Program & Principal Research Scientist, KEMRI

Members:

Prof. Samuel Kariuki, Eastern Africa Director, DNDi

Prof. Gunturu Revathi, Aga Khan University Hospital

Dr. Sylvia Gachoka, Defense Forces Memorial Hospital

Dr. Annemarie Macharia, University of Nairobi (UoN)

Dr. Anthony Sifuna, Masinde Muliro University

Dr. Andrew Nyerere, Jomo Kenyatta University

Dr. Patrick Irungu, UoN

Dr. Christine Karanja Chege, Kenyatta University

Dr. David Githanga, Nairobi Hospital

Dr. Marybeth C. Maritim, UoN

Dr. Christine Makena, KEMRI (GARP - Kenya Project Coordinator)

One Health Trust:

Dr. Erta Kalanxhi, Dr. Oluwatosin Ajayi, Mr. Felix Bahati, Mr. Rishi Bhagawati, Dr. Oluoma Agiri, Ms. Simran More,

Dr. Samantha Serrano

TABLE OF CONTENTS

List of Tables	4
List of Figures	5
List of Abbreviations and Acronyms	6
Executive Summary	7
Country Profile	8
AMR in Kenya	9
The Role of Vaccines in Mitigating AMR	11
Vaccine Impact on AMR in Kenya	12
The Economic Impact of Vaccines	15
Immunization Programs in Kenya	16
References	18

LIST OF TABLES

Table 1.	Vaccine-Preventable Disease Burden and AMR in Kenya	9
Table 2.	Infectious Disease Burden in Kenya	10
Table 3.	Estimated Impact of Vaccines on AMR - Related Cases and Deaths	12
Table 4.	Key Vaccines in Reducing Infectious Diseases and AMR in Kenya	14
Table 5.	Cost-Effectiveness and Projected Impacts of Vaccination Strategies in Kenya	15
Table 6.	Insights and Recommendations from the GARP - Kenya Technical Working Group	17

LIST OF FIGURES

Figure 1.	How Vaccination Reduces AMR Burden	11
Figure 2.	Vaccination Coverage for Selected Vaccine-Preventable Diseases in Kenya (2010–2024)	16

LIST OF ABBREVIATIONS AND ACRONYMS

AGE	acute gastroenteritis
AIDS	acquired immunodeficiency syndrome
AMR	antimicrobial resistance
DALY	disability-adjusted life year
FQNS	Fluoroquinolone nonsusceptible
GARP	Global Antibiotic Resistance Partnership
GAVI	Vaccine Alliance (formerly the Global Alliance for Vaccines and Immunization)
Hib	<i>Haemophilus influenzae</i> type B
HIV	human immunodeficiency virus
IPD	invasive pneumococcal disease
KEMRI	Kenya Medical Research Institute
MCV	measles-containing vaccine
MDR	multidrug resistant
NAP	National Action Plan
NTDs	neglected tropical diseases
OPV	oral polio vaccine
PCV	pneumococcal conjugate vaccine
PI	prediction interval
PLHIV	people living with HIV
RR-TB	rifampicin-resistant tuberculosis
RV	rotavirus vaccine
TB	tuberculosis
TCV	typhoid conjugate vaccine
WASH	water, sanitation, and hygiene

EXECUTIVE SUMMARY

Antimicrobial resistance (AMR) is a growing global public health crisis that threatens to undo decades of progress. In 2019, an estimated 1.27 million deaths were directly attributed to bacterial AMR globally, with sub-Saharan Africa bearing the highest burden. Adults aged 70+ have experienced a more than 80 percent increase in AMR-related mortality, underscoring the heightened vulnerability of older populations. AMR occurs when microorganisms, such as bacteria, viruses, parasites, or fungi, become resistant to antimicrobial treatments to which they were susceptible. One primary driver of AMR is the overuse and misuse of antibiotics in both human medicine and agriculture. In many countries, including Kenya, antibiotics are sometimes prescribed unnecessarily or used incorrectly. This can lead to the survival and proliferation of resistant bacteria, complicating treatment outcomes and increasing disease burden.

The best approach to mitigate the rising AMR burden is to significantly reduce infection vulnerabilities across human and animal populations through prevention measures. Vaccines represent a solution that prevents infections and their onward transmission, whether they are antimicrobial-resistant or not. This reduces the need for antimicrobial treatments, which lowers the selective pressure on microbial populations that drives the development and spread of AMR. The vaccination approach is cost-effective and an appropriate strategy in Kenya, where healthcare resources are limited and health systems already under significant financial strain. Prominent examples of the impact of vaccines on infectious disease and AMR include a 92 percent reduction in PCV-10-type invasive pneumococcal disease (IPD) among children under five years by 2019 and a decline in penicillin-resistant *Streptococcus pneumoniae* prevalence from 28 percent in 2009 to 12 percent in 2014, following the introduction of the pneumococcal conjugate vaccine (PCV) in 2011. Efforts to combat

AMR in humans through vaccination require a One Health approach, with similar vaccination efforts extended to animals.

Although the role of vaccines in combating AMR is well recognized, it remains underutilized in national AMR action plans. For instance, Kenya's 2023–2027 plan emphasizes investment in research for new medicines and vaccines but lacks a defined strategy for adopting and integrating available vaccines into AMR control efforts. Addressing this gap through explicit vaccine deployment strategies is essential for strengthening the AMR mitigation framework. This policy brief leverages local expertise and current data to highlight Kenya's AMR status and propose vaccine adoption as a solution to the growing AMR threat.

Key Emphasis of the Technical Working Group on the Adoption of Vaccines as an AMR Mitigation Tool

1. Vaccination should be leveraged to combat AMR by preventing infections and reducing antibiotic misuse.
2. Addressing vaccine hesitancy is critical for the success of immunization programs.
3. Maintaining or increasing coverage for vaccines within Kenya's immunization schedule is essential for a sustained public health impact.
4. Introducing new vaccines with an impact on AMR and antibiotic use, such as the recently introduced typhoid conjugate vaccine (TCV), should be prioritized to address endemic diseases and reduce the burden on healthcare systems.
5. Addressing gaps in vaccine accessibility and distribution is necessary to achieve equitable health outcomes and strengthen AMR mitigation efforts.

COUNTRY PROFILE

Kenya, a country with a population of 55.3 million, has seen a steady increase in life expectancy at birth, reaching 64 years in 2023. However, communicable diseases, along with maternal, prenatal, and nutritional-related conditions, accounted for approximately 50 percent of deaths in 2019 (IHME 2020). By 2021, the leading causes of death included malaria, lower respiratory infections, and neonatal disorders (IHME 2020; WHO 2022a). In 2023, communicable diseases remained the leading cause of mortality, responsible for 43.4 percent of total deaths (Kenya Civil Registration Services 2024).

Kenya's healthcare expenditure is projected to increase to US\$27.85 per capita by 2050 due to rising healthcare costs and population growth (World Bank 2023a). Despite efforts such as Universal Health Coverage programs and the abolition of user fees in public health facilities, the burden of out-of-pocket costs remains high (Salari et al. 2019). These costs contribute to barriers in healthcare access and are linked to an under-five mortality rate of 41.1 deaths per 1,000 live births in 2021 (UNICEF 2021).

Access to essential services remains uneven, particularly in rural areas. In 2019, the mortality rate attributed to unsafe water, sanitation, and lack of hygiene was 23.5 per 100,000 (WHO 2023). By 2022, 68 percent of the population had access to basic drinking water services, but only 51 percent had access to basic handwashing facilities at their premises (Kenya National Bureau of Statistics and ICF International 2023). Limited access to water, sanitation, and hygiene (WASH) facilities has been associated with high rates of infectious diseases and contributes to the growing challenge of AMR (Prüss-Ustün et al. 2014). In response, Kenya has implemented a National Action Plan (NAP) on AMR that incorporates a One Health approach; it includes surveillance, infection prevention and control, and antimicrobial stewardship programs (Government of Kenya 2023).



ANTIMICROBIAL RESISTANCE IN KENYA

In 2019, Kenya recorded 8,500 deaths directly attributable to and 37,300 deaths associated with antimicrobial resistance (AMR) (Murray et al. 2022). The country ranked 28th out of 204 nations in terms of age-standardized mortality rate due to AMR, highlighting the scale of the crisis within national borders. Five key pathogens were associated with AMR-related mortality: *Klebsiella pneumoniae* (6,200 deaths), *Escherichia coli* (5,900 deaths), *Streptococcus pneumoniae* (5,600 deaths), *Staphylococcus aureus* (5,000 deaths), and *Salmonella typhi* (2,400 deaths) (Murray et al. 2022; Antimicrobial Resistance Collaborators 2022). Among children under five, the leading causes of death include dehydration and sepsis from diarrheal pathogens and bacterial pneumonia, both largely preventable by vaccines (Bassat et al. 2023; Breiman et al. 2021). The high burden of vaccine-preventable bacterial infections reinforces the critical role of immunization in reducing AMR, by decreasing infection incidence and curbing unnecessary antibiotic use.

The high levels of extended-spectrum cephalosporin resistance and multidrug resistance (MDR) among

Enterobacteriaceae isolates in Kenya are particularly concerning (Lord et al. 2021). These resistance patterns undermine the effectiveness of commonly used antibiotics and complicate treatment outcomes, especially in vulnerable patient populations.

More than 68 percent of fever cases are empirically treated with antibiotics, often without confirmatory diagnostics (Hooft et al. 2021). This practice is widespread in both public and private health facilities, where clinicians frequently prescribe antibiotics as a precautionary measure, especially for undifferentiated fever.

However, many of these fevers are caused by viral or nonbacterial illnesses, including malaria, dengue fever, Rift Valley Fever, and chikungunya, for which antibiotics are ineffective; empirical treatment leads to antibiotic misuse, accelerating the development of AMR (Auta et al. 2019; WHO 2022b). Improved WASH can prevent diarrheal diseases, which are often treated with antibiotics despite being primarily viral (Bassat et al. 2023).

Table 1. Vaccine-Preventable Disease Burden and AMR in Kenya

Disease (Pathogen)	Vulnerable Population	Key Statistics/ Burden	AMR/ Treatment Challenges
Pneumonia (<i>S. pneumoniae</i>)	Children (5–14), Adults	11.7 percent of pediatric admissions; 7.9 percent mortality in children (Macpherson et al. 2019)	Resistance in children: chloramphenicol, cotrimoxazole; adults: doxycycline, penicillin; beta-lactam (Kobayashi et al. 2017)
Typhoid Fever (<i>S. typhi</i>)	Children, Adults	126,098 cases (2019); 1,568 deaths (2019), 54 percent <15 yrs (Simiyu and Jamka 2018; Coalition Against Typhoid 2021)	82.4 percent resistant to 5 common antibiotics; 43 percent to ciprofloxacin; rising fluoroquinolone resistance (Kasiano et al. 2024)
Tuberculosis (<i>M. tuberculosis</i>)	General; especially HIV+ (~35,000 cases/year) (Waruru et al. 2022)	~139,000 new cases; 21,600 deaths/year (Stop TB Partnership 2025)	Multidrug resistant: 3.6 percent new, 18 percent retreatment cases; overall 5.6 percent (MacNeil 2019)
Rotavirus (Rotavirus A)	Children <5 (pre-vaccine)	~4,471 deaths, 8,781 hospitalizations/year; \$10.8M annual cost (Wandera et al. 2017)	34.2 percent inappropriate antibiotic use; high rates of missed appropriate treatment in dysentery cases (Saqeeb et al. 2024)

Table 1. Vaccine-Preventable Disease Burden and AMR in Kenya (continued)

Disease (Pathogen)	Vulnerable Population	Key Statistics/Burden	AMR/Treatment Challenges
Malaria (<i>Plasmodium spp.</i>)	>70 percent of population at risk; mainly <5 yrs (Sultana et al. 2017)	~6.7M cases/year; ~4,000 deaths; 13–15 percent of outpatient visits. (Elnour et al. 2023)	Resistance to chloroquine and sulfadoxine-pyrimethamine documented (Akala et al. 2011; Conrad and Rosenthal 2019)

The rising threat of AMR in Kenya is particularly concerning, as it is already grappling with multiple systemic health and social challenges. First, a significant proportion of the population lives in poverty, and access to quality healthcare remains a challenge, especially in rural and marginalized regions (World Bank 2023b). Second, the public healthcare system is under immense strain due to high workloads, frequent healthcare worker strikes, recurring shortages of essential medicines and supplies, and a lack of capacity for routine microbiological diagnostics and antimicrobial susceptibility testing (Omulo et al. 2015; Kenya Ministry of Health 2023). Kenya also faces other pressing health issues, including elevated rates of maternal and child mortality and a substantial burden of infectious diseases, such as human immunodeficiency virus (HIV), tuberculosis (TB), and

malaria (IHME 2020; WHO 2023). As a result, the rise in AMR to commonly used first-line drugs and increasing infections from life-threatening pathogens demand urgent attention (Murray et al. 2022).

Infectious diseases comprise a significant proportion of avertable disability and mortality (IHME 2020; UNICEF 2021). The top causes of the national infectious disease burden include HIV, TB, malaria, acute respiratory tract infections, and diarrheal diseases (WHO 2022a; Kenya National Bureau of Statistics 2022) (Table 2). Many of these diseases are preventable through vaccines already available or in development (WHO 2021; Plotkin et al. 2017).

Table 2. Infectious Disease Burden in Kenya

Rank ^a	Category	Percentage of total deaths	Percentage of total DALYs
1	Respiratory infections, TB	29.15	20.04
3	HIV/AIDS, STIs	9.23	9.81
8	Enteric infections	4.24	5.48
12	NTD, malaria	2.36	3.92
14	Other infectious diseases	2.21	2.57

Source: Global Burden of Disease (IHME 2025).

DALYs describes disease burden in terms of years of life lost prematurely and loss of productive years due to ill health.

a) Rank represents each infectious disease category's contribution to total DALYs compared to all other causes.

NTD – neglected tropical disease; STI – sexually transmitted infection

DALYs – disability-adjusted life years; TB – Tuberculosis; HIV – human immunodeficiency virus; AIDS – acquired immunodeficiency syndrome



THE ROLE OF VACCINES IN MITIGATING AMR

Vaccines are among the key strategies for fighting infectious diseases and reducing AMR. By preventing infections, they reduce the overall use of antimicrobials and, consequently, the selective pressure that drives resistance (Figure 1) (Laxminarayan et al. 2016).

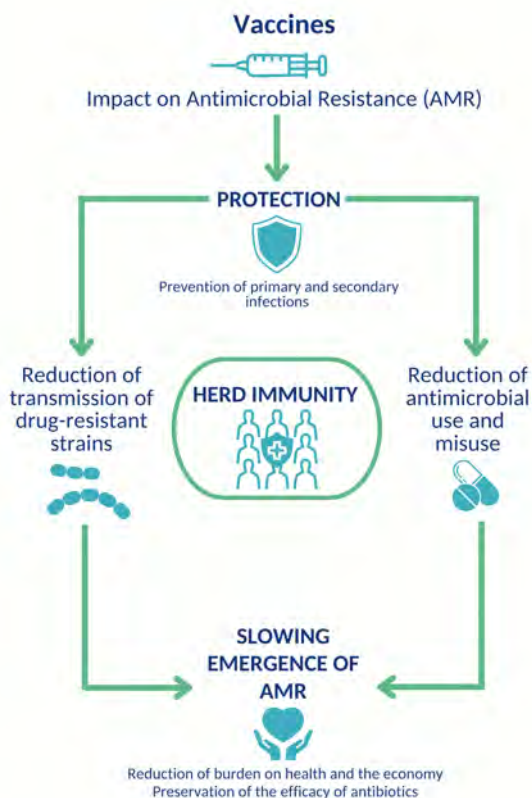


Figure 1. How vaccination reduces AMR burden

Source: Kalanxhi et al. 2023

The COVID-19 pandemic underscored the critical importance of vaccination, as the rapid development of safe and effective vaccines became an urgent global

priority to curb the spread of the SARS-CoV-2 virus (WHO 2021; Corey et al. 2020). The pandemic demonstrated the power of coordinated scientific efforts to deliver effective vaccines in record time and highlighted their role in protecting populations and health systems.

Unlike antibiotics, which are designed against specific microbial targets and subject to rapid resistance development, vaccines typically target multiple antigens, making resistance much less likely (Rappuoli et al. 2017). Furthermore, the long duration of vaccine-induced protection and the benefits of herd immunity enhance their role as more sustainable and reliable tools than antibiotics in the fight against infectious diseases and AMR (Plotkin et al. 2017).

Kenya is facing the phased withdrawal of donor funding for antiretroviral medications, leading to increased viral replication, disease progression, and higher HIV-related morbidity and mortality. People living with HIV (PLHIV) are at higher risk of severe outcomes from opportunistic infections, such as influenza, pneumococcal disease, and hepatitis B (Samaha et al. 2024). These often lead to hospitalizations, prolonged illness, and increased antibiotic exposure, further driving AMR. Pneumococcal vaccines (PCV and PPSV23) significantly lower the incidence of IPD, a common cause of morbidity in PLHIV, especially in Africa, where *S. pneumoniae* is endemic (French et al. 2016). Adult vaccination needs to be mainstreamed, especially for those who have HIV, have chronic diseases, or are elderly, with weakened immunity.



VACCINE IMPACT ON AMR IN KENYA

Three large Phase 3 efficacy trials in Bangladesh, Malawi, and Nepal showed that TCV prevented 85, 84, and 79 percent of typhoid cases in children aged 9 months to 16 years, respectively (Qadri et al. 2021). KEMRI launched a Phase 3 trial of European Union TCV, a new candidate, in Kericho in 2022. Modeling studies predict that routine immunization with TCV at 9 months, along with a catch-up campaign up to age 15, could avert 46–74 percent of all typhoid cases in Gavi-supported countries and reduce antimicrobial-resistant typhoid by 16 percent (Birger et al. 2022). Over 10 years, TCV introduction is projected

to avert 151,000 AMR cases and 1,266 deaths due to fluoroquinolone-nonsusceptible typhoid and 570,000 AMR cases and 4,674 deaths from multidrug-resistant typhoid fever (Birger et al. 2022), Table 3. In July 2025, Kenya added the TCV vaccine to its routine immunization schedule and launched a nationwide campaign to introduce the TCV to over 21 million children aged 9 months to 14 years (Kenya Ministry of Health 2025). The initiative aims to reduce drug-resistant typhoid (Kenya Ministry of Health 2025).

Table 3. Estimated Impact of Vaccines on AMR-Related Cases and Deaths

Vaccine	Averted AMR cases		Averted deaths		DALYs
	Number	%	Number	%	
TCV^a (10-year prediction)	Fluoroquinolone-nonsusceptible (FQNS) typhoid fever				
Kenya^a	151,000	71.2	1,266	76.3	65,000
Sub-Saharan Africa	6,819,000	68.8	65,762	65.8	3,093,000
Lower-income countries^b	42,515,000	61	506,026	59.6	27,923,000
TCV^a (10-year prediction)	Multidrug-resistant (MDR) typhoid fever				
Kenya	570,000	74.8	4,674	73.3	243,000
Sub-Saharan Africa	14,392,000	68	173,735	65.9	8,019,000
Lower-income countries^b	21,218,000	65.8	342,725	71.5	16,508,000
TB^c vaccine (15-year prediction)	Rifampicin-resistant TB (RR-TB)				
Kenya	2,100	8	460	6.3	—
Africa	66,000	7.7	18,000	6.5	—
Global^d	620,000	10	119,000	7.3	—

Table 3. Estimated Impact of Vaccines on AMR-Related Cases and Deaths (continued)

Vaccine	Averted AMR cases		Averted deaths		DALYs
	Number	%	Number	%	
TB vaccine plus improved RR-TB management (15-year prediction)	RR-TB				
Kenya^c	2,200	8.3	900	12	—
Africa	101,000	12	48,000	18	—
Global^d	831,000	14	499,000	31	—

a) Estimates of typhoid conjugate vaccines on FQNS and MDR typhoid fever, Birger et al. (2022)

b) Average for 73 Gavi-eligible lower-income countries (Birger et al. 2022)

c) Estimates of the effect of TB vaccines with and without an additional improvement program for RR-TB management, Fu et al. (2021)

d) Average for the top 30 countries contributing 90 percent of global RR-TB burden (Fu et al. 2021)

Before PCV10 was introduced in 2011 in Kenya, the annual incidence of clinically defined pneumonia was 1,220 per 100,000. This was reduced to 329 per 100,000 when PCV10 was introduced in Kilifi County (Silaba et al. 2019). Reports indicate a 92 percent reduction in PCV10-type IPD among children under five and 74 percent among unvaccinated children aged 5–14 (Hammit. 2019).

Projections suggest that if PCV use had ceased in 2022, the IPD incidence would nearly double by 2032, increasing from 8.5 to 16.2 per 100,000 due to waning population immunity (Ojal et al. 2019). Continuing the PCV program could prevent more than 101,513 cases and 14,329 deaths over the next decade.

In 2018, a Phase IIb trial of the M72/AS01E TB vaccine showed 50 percent efficacy (95 percent CI: 2–74 percent) in preventing pulmonary TB in infected adults aged 18–50 (Tait et al. 2019). If successfully deployed, this vaccine could significantly reduce TB incidence, lower antibiotic use, and help mitigate AMR in high-burden settings, such as Kenya (Table 3).

Before vaccine introduction, *Haemophilus influenzae* type B (Hib) was responsible for 50–60 percent of bacterial meningitis cases in Kenyan children under five (Cowgill et al. 2006). A study in Kilifi observed an 88 percent reduction in Hib meningitis post-vaccine; national data showed a more than 90 percent reduction in Hib pneumonia and meningitis in vaccinated children (Akumu et al. 2007). The vaccine has played a vital role in reducing antibiotic demand by preventing Hib infections.

A surveillance study on the impact of rotavirus vaccine (RV) in Kenya showed a 75.3 percent decline in monthly median acute gastroenteritis (AGE) cases (from 97 to 24) and a 53.4 percent reduction in rotavirus-specific AGE (Otieno et al. 2020). The largest reductions occurred in children under 12 months, the vaccine-eligible group. Between 2014 and 2033, RV is projected to prevent 60,935 deaths, 216,454 hospital admissions, and US\$30 million in healthcare costs (Sigei et al. 2015). Table 4 summarizes the specific role of vaccines in reducing disease burden and AMR.

Table 4. Key Vaccines in Reducing Infectious Diseases and AMR in Kenya

Vaccine/ Disease	Key Findings	Impact/Projection	Source(s)
PCV10 (Pneumococcal infections)	Pre-2011 pneumonia incidence: 1,220/100,000; reduced to 329/100,000 post-PCV10	92 percent reduction in invasive pneumococcal disease (IPD) (5 yrs), 74 percent reduction in unvaccinated (5–14 yrs); stopping PCV could double IPD by 2032; continuation may prevent 101,513 cases and 14,329 deaths over 10 years	(Hammitt et al. 2019; Silaba et al. 2019; Ojal et al. 2019)
M72/AS01E (Tuberculosis [TB])	50 percent efficacy in adults (18–50 yrs) with latent TB	Could reduce TB burden and antibiotic use in Kenya	(Tait et al. 2019)
Hib (<i>Haemophilus influenzae</i> type B)	50–60 percent of meningitis cases in under-5s prevaccine	88 percent reduction in meningitis (Kilifi County); >90 percent national reduction in pneumonia & meningitis	(Cowgill et al. 2006; Akumu et al. 2007)
Rotavirus	75.3 percent drop in median monthly AGE cases (from 97 to 24); 53.4 percent drop in rotavirus-specific acute gastroenteritis	Projected to prevent 60,935 deaths, 216,454 hospitalizations	(Otieno et al. 2020; Sigei et al. 2015)



THE ECONOMIC IMPACT OF VACCINES

The economic burden of AMR is substantial, straining healthcare systems and national economies. Investing in vaccines offers a cost-saving intervention by reducing the incidence of resistant infections and the associated treatment expenses, as summarized in Table 5.

Table 5. Cost-Effectiveness and Projected Impacts of Vaccination Strategies in Kenya

Vaccine/ Intervention	Target Disease/Outcome	Economic/Cost-Effectiveness Findings	Reference
Pneumococcal Conjugate Vaccine (PCV)	Invasive pneumococcal disease	Incremental cost per DALY averted: US\$153 (95 percent PI: US\$70–411). Transitioning to PCV13 improves cost-effectiveness ratios by approximately 20 percent , and including indirect effects (e.g., herd immunity) further enhances cost-effectiveness by 43–56 percent .	(Ojal et al. 2019; Ayieko et al. 2013)
Rotavirus Vaccine (2-dose series)	Rotavirus infection (diarrhea in children <5 years)	Vaccination can avert 60,935 deaths and 216,454 hospital admissions, among children <5 years. Over 20 years, US\$80 million vaccine investment would save the government US\$30 million in healthcare costs and US\$38 per DALY averted.	(Tate et al. 2009; Sigei et al. 2015)
Malaria Vaccine	Malaria (in children and infants)	Incremental cost-effectiveness ratio: US\$200 and US\$225 per DALY averted for child and infant vaccination, respectively. These ratios represent 14 and 17 percent of the gross domestic product per capita thresholds, respectively, indicating high cost-effectiveness.	(Ochieng 2023; Sauboin et al. 2019)
M72 TB Vaccine	Pulmonary TB	Over 25 years, a vaccine with at least 50 percent efficacy could prevent up to 76 million new cases and 8.5 million deaths . It could also avert 42 million courses of antibiotic treatment and prevent US\$41.5 billion in TB-related catastrophic household costs.	(Otieno et al. 2020; Sigei et al. 2015)
Haemophilus influenzae type B (Hib) Vaccine	Hib disease (meningitis, invasive disease, pneumonia in children <5 years)	Cost per discounted DALY averted: US\$38 . Cost per death averted: US\$1,197 . Determined to be a cost-effective intervention.	(Tate et al. 2009; Sigei et al. 2015)
Measles Vaccination Outreach	Measles in hard-to-reach children	Cost per DALY averted was estimated at US\$76 when 25 percent received measles-containing vaccine (MCV) and US\$122 when 50 percent received MCV.	(Tate et al. 2009; Sigei et al. 2015)



IMMUNIZATION PROGRAMS IN KENYA

Kenya has made immunization a health priority, introducing new vaccines ahead of many other low- and middle-income countries in sub-Saharan Africa, such as PCV in 2011 and RV in 2014 (Sambala et al. 2019). As of 2020, the routine childhood immunization schedule included one dose each of Bacillus Calmette–Guérin and oral polio vaccine (OPV) at birth; three doses each of diphtheria–tetanus–whole cell pertussis–*Hemophilus*

influenzae type b–hepatitis B (pentavalent), OPV, and PCV at 6, 10, and 14 weeks; two doses of RV at 6 and 10 weeks; one dose of inactivated polio vaccine at 14 weeks; and two doses of measles and rubella at 9 and 18 months (Janusz et al. 2021). Although vaccine coverage is heterogeneous, some vaccines have achieved high rates, as shown in Figure 2.

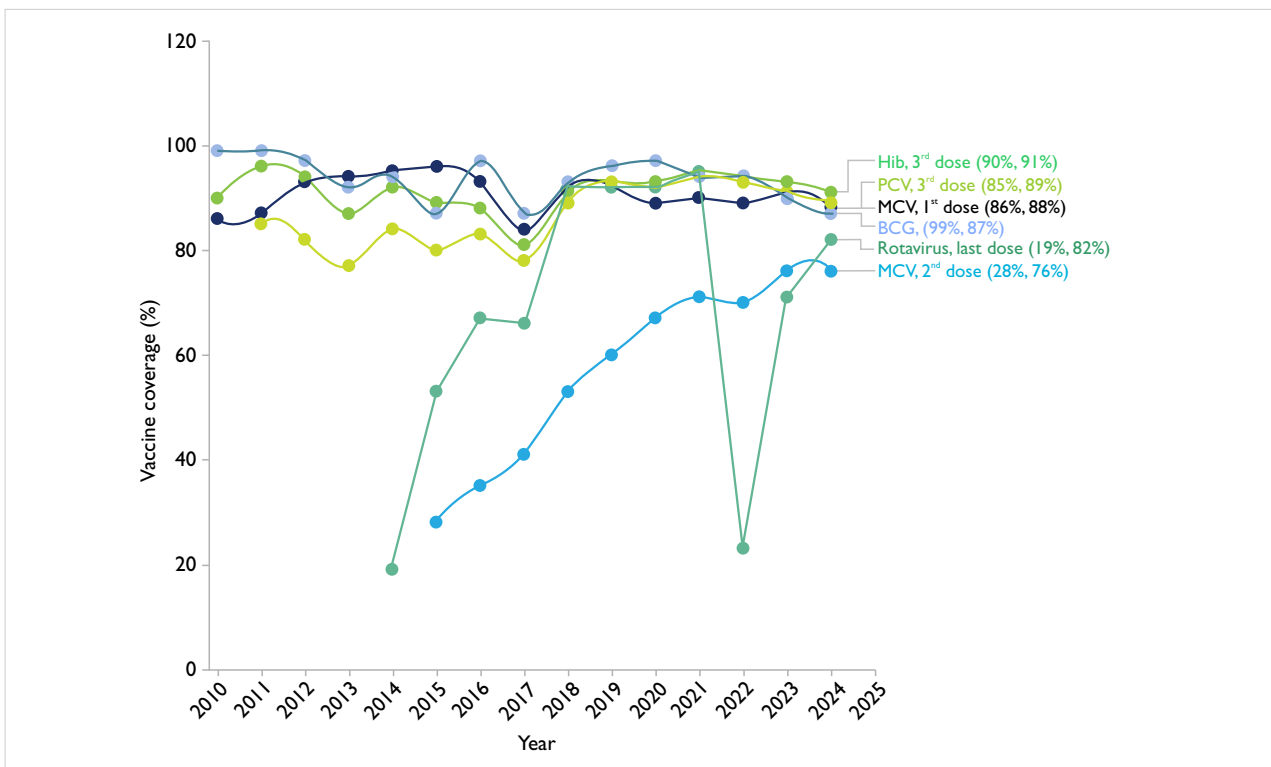


Figure 2: Vaccination Coverage for Selected Vaccine-Preventable Diseases in Kenya (2010–2024)

Values in brackets indicate coverage at the initial year of reporting and most recently (2024). The graph was generated based on the World Health Organization WUENIC (2025) immunization coverage data.

Table 6. Insights and Recommendations from the GARP - Kenya Technical Working Group

Category	Issue	Intervention
1. Policy and Strategic Planning		
Policy and Strategic Goals	Weak implementation of AMR and vaccine policies	Develop actionable, measurable policies and create advocacy networks.
One Health Approach	Lack of coordination across sectors	Foster multisectoral collaboration (human, veterinary, environmental health).
2. Antibiotic Use and Antimicrobial Resistance (AMR)		
Antibiotic Use	Poor regulation, high cost and lack of policy guidelines	Develop antimicrobial guidelines and national frameworks modeled after TB/HIV programs.
AMR Threat	Low awareness and poor policymaker engagement	Conduct awareness campaigns and data-driven advocacy.
Hospital Oversight	Overprescription and weak stewardship policies	Enforce stewardship, train staff, and strengthen pharmacy boards.
Inappropriate Treatment	Inadequate outpatient care	Strengthen outpatient and emergency care systems.
3. Health System Strengthening		
Limited County Hospital Resources	Limited diagnostics and reliance on first-line drugs	Improve diagnostics, and streamline treatment options.
Diagnostics	Dependence on clinical diagnosis	Invest in rapid diagnostics
Funding and Resources	High cost of diagnostics and vaccines	Secure sustainable funding, and integrate vaccines in insurance schemes.
4. Vaccine Challenges and Opportunities		
Vaccine Development & Self-Reliance	Dependence on foreign suppliers	Promote local manufacturing and technology transfer.
Vaccine Hesitancy	Cultural resistance and misinformation	Engage community/religious leaders, and fund tailored advocacy campaigns.
Stakeholder Engagement	Weak engagement for universal vaccination	Involve insurers, youth groups, and community promoters.
Targeted Vaccination Programs	Lack of coordination across sectors	Foster multisectoral collaboration (human, veterinary, environmental health).
5. Education and Awareness		
Education and Public Awareness	Misinformation among public and healthcare workers	Educate both groups on AMR, vaccine benefits, and appropriate antibiotic use.

REFERENCES

- Akala, Hoseah M., Fredrick L. Eyase, Agnes C. Cheruiyot, Angela A. Omondi, Bernhards R. Ogutu, Norman C. Waters, Jacob D. Johnson, Mark E. Polhemus, David C. Schnabel, and Douglas S. Walsh. 2011. Antimalarial Drug Sensitivity Profile of Western Kenya *Plasmodium falciparum* Field Isolates Determined by a SYBR Green I in Vitro Assay and Molecular Analysis. *American Journal of Tropical Medicine and Hygiene* 85(1): 34.
- Akumu, Angela O., Mike English, Anthony J. Scott, and Ulla K. Griffiths. 2007. "Economic evaluation of delivering *Haemophilus influenzae* type b vaccine in routine immunization services in Kenya," *Bulletin of the World Health Organization* 85(7): 511–8. [doi: <https://doi.org/10.2471/blt.06.034686>]
- Antimicrobial Resistance Collaborators. 2022. Global Burden of Bacterial Antimicrobial Resistance in 2019: A Systematic Analysis. *Evidence-Based Nursing*.
- Auta, Asa, Muhammad A. Hadi, Enoche Oga, Emmanuel O. Adewuyi, Samirah N. Abdu-Aguye, Davies Adeloye, and Barry Strickland-Hodge, and Daniel J. Morgan. 2019. Global Access to Antibiotics Without Prescription in Community Pharmacies: A Systematic Review and Meta-Analysis. *Journal of Infection and Public Health* 78(1): 8–18.
- Ayieko, Philip, Ulla K. Griffiths, Moses Ndiritu, Jennifer Moisi, Isaac K. Mugoya, Tatu Kamau, Mike English, and Anthony G. Scott. 2013. Assessment of Health Benefits and Cost-Effectiveness of 10-Valent and 13-Valent Pneumococcal Conjugate Vaccination in Kenyan Children. *PLoS One* 8(6): e67324.
- Bassat, Quique, Dianna M. Blau, Ikechukwu Udo Ogbuanu, Solomon Samura, Erick Kaluma, Ima-Abasi Basse, Samba Sow, Adama M. Keita, Milagritos D. Tapia, Ashka Mehta, Karen L. Kotloff, Afruna Rahman, Kazi M. Islam, and Shabir A. Madhi. 2023. Causes of Death Among Infants and Children in the Child Health and Mortality Prevention Surveillance (CHAMPS) network. *JAMA Network Open* 6(7): e2322494.
- Bill & Melinda Gates Foundation. 2023. Wellcome and the Gates Foundation to Fund Late-Stage Development of a Tuberculosis M72 Vaccine Candidate That Could Be the First in 100 Years If Proven Effective. <https://www.gatesfoundation.org/ideas/media-center/press-releases/2023/06/funding-commitment-m72-tb-vaccine-candidate>. Accessed February 28, 2025.
- Birger, Ruthie, Marina Antillón, Joke Bilcke, Christiane Dolecek, Gordon Dougan, Andrew J. Pollard, Kathleen M. Neuzil, Isabel Frost, Ramanan Laxminarayan, and Virginia E. Pitzer. 2022. "Estimating the effect of vaccination on antimicrobial-resistant typhoid fever in 73 countries supported by Gavi: A mathematical modelling study," *Lancet Infectious Diseases* 22(5): 679–91. [https://www.thelancet.com/journals/laninf/article/PIIS1473-3099\(21\)00627-7/fulltext](https://www.thelancet.com/journals/laninf/article/PIIS1473-3099(21)00627-7/fulltext)
- Breiman, Robert F., Dianna M. Blau, Portia Mutevedzi, Victor Akelo, Inacio Mandomando, Ikechukwu U. Ogbuanu, Samba O. Sow, Lola Madrid, Shams El-Arifeen, Mischka Garel, Nana B. Thwala, Dickens Onyango, Antonio Siteo, Ima-Abasi Basse, Adama M. Keita, Addisu Alemu, Muntasir Alam, Sana Mahtab, Dickson Gethi, Rosauro Varo, Julius Ojulong, Solomon Samura, Ashka Mehta, Alexander M. Ibrahim, Afruna Rahman, Pio Vitorino, Vicky L. Baillie, Janet Agaya, Milagritos D. Tapia, Nega Assefa, Atique Iqbal Chowdhury, Anthony G. Scott, Emily S. Gurley, Karen L. Kotloff, Amara Jambai, Quique Bassat, Beth A. Tippet-Barr, Shabir A. Madhi, and Cynthia G. Whitney. 2021. Postmortem Investigations and Identification of Multiple Causes of Child Deaths: An Analysis of Findings from the Child Health and Mortality Prevention Surveillance (CHAMPS) Network. *PLoS Medicine* 18(9): e1003814.
- Coalition Against Typhoid. 2021. Burden of Typhoid in Kenya. Take On Typhoid. https://www.coalitionagainsttyphoid.org/wp-content/uploads/2024/08/TakeonTyphoid_FactSheet_Kenya_2024_L2.pdf
- Conrad, Melissa D., and Philip J. Rosenthal. 2019. Antimalarial Drug Resistance in Africa: The Calm Before the Storm? *Lancet Infectious Diseases* 19(10): e338–351.
- Corey, Lawrence, John R. Mascola, Anthony S. Fauci, and Francis S. Collins. 2020. A Strategic Approach to COVID-19 Vaccine R&D. *Science* 368(6494): 948–50.

- Cowgill, Karen D., Moses Ndiritu, Joyce Nyiro, Mary Slack, Salome Chiphatsi, Amina Ismail, Tatu Kamau, Isaiah Mwangi, Mike English, and Charles Newton. 2006. Effectiveness of *Haemophilus influenzae* Type b Conjugate Vaccine Introduction into Routine Childhood Immunization in Kenya. *JAMA* 296(6): 671–8.
- Elmour, Zuhail, Harald Grethe, Khalid Siddig, and Stephen Munga. 2023. "Malaria Control and Elimination in Kenya: Economy-Wide Benefits and Regional Disparities." *Malaria Journal* 22 (1): 117.
- French, Neil, Stephen B. Gordon, Thandie Mwalukomo, Sarah A. White, Gershom Mwafulirwa, Herbert Longwe, Martin Mwaiponya, Eduard E. Zijlstra, and Malcolm E. Molyneux, and Charles F. Gilks. 2016. A Trial of a 7-Valent Pneumococcal Conjugate Vaccine in HIV-Infected Adults. *Malawi Medical Journal* 28(3): 115–22.
- Fu, Han, Joseph A. Lewnard, Isabel Frost, Ramanan Laxminarayan, and Nimalan Arinaminpathy. 2021. "Modelling the global burden of drug-resistant tuberculosis avertable by a post-exposure vaccine," *Nature Communications* 12(1): 424. [doi: <https://www.nature.com/articles/s41467-020-20731-x>]
- Government of Kenya. 2023. *National Action Plan for the Prevention and Containment of Antimicrobial Resistance*. Cabinet Secretary, Ministry of Health.
- Hammitt, Laura L., Anthony O. Etyang, Susan C. Morpeth, John Ojal, Alex Mutuku, Neema Mturi, Jennifer C. Moisi, Ifedayo M. Adetifa, Angela Karani, Donald O. Akech, Mark Otiende, Tahreni Bwanaali, Jackline Wafula, Christine Mataza, Edward Mumbo, Collins Tabu, Maria D. Knoll, Evasius Bauni, Kevin Marsh, Thomas N. Williams, Tatu Kamau, Shahnaaz K. Sharif, Orin S. Levine, and Anthony G. Scott. 2019. "Effect of ten-valent pneumococcal conjugate vaccine on invasive pneumococcal disease and nasopharyngeal carriage in Kenya: A longitudinal surveillance study," *Lancet* 393(10186): 2146–54. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6548991/>
- Hoof, Annela M., Bryson Ndenga, Francis Mutuku, Victoria Otuka, Charles Ronga, Philip K. Chebii, Priscillah W. Maina, Zainab Jembe, Justin Lee, David M. Vu, Dunstan Mukoko, Desiree A. LaBeaud. 2021. "High frequency of antibiotic prescription in children with undifferentiated febrile illness in Kenya." *Clinical Infectious Diseases* 73(7): e2399-e2406.
- IHME (Institute for Health Metrics and Evaluation). 2025. *Global Burden of Disease Compare (GBD 2021)*. University of Washington, Washington, United States of America. <https://vizhub.healthdata.org/gbd-compare/>
- Janusz, Cara B., Martin K. Mutua, Abram L. Wagner, and Matthew L. Boulton. 2021. New Vaccine Introduction and Childhood Vaccination Timeliness in Two Urban, Informal Settlements in Nairobi, Kenya. *American Journal of Tropical Medicine and Hygiene* 105(1): 245.
- Kalanxhi, Erta, Nicole Roberts, Lucy Miller, Felix Bahati, and Ramanan Laxminarayan. 2023. *The Value of Vaccines to Mitigate Antimicrobial Resistance—Evidence from Low- and Middle-Income Countries*. One Health Trust, Washington, United States of America. <https://www.ifpma.org/wp-content/uploads/2023/10/The-Value-of-Vaccines-to-Mitigate-AMR.pdf>
- Kasiano, Purity, Susan Kawai, Susan Kiiru, Andrew Nyerere, and Samuel Kariuki. 2024. "Typhoidal salmonella disease in Mukuru informal settlement, Nairobi Kenya; carriage, diversity, and antimicrobial resistant genes," *PLoS One* 19 (2): e0298635. [doi: <https://doi.org/10.1371/journal.pone.0298635>]
- Kenya Civil Registration Services. 2024. *Kenya Vital Statistics Report 2023*. Department of Civil Registration, Lower Hill Road, Nairobi.
- Kenya Ministry of Health. 2023. *Kenya Essential Medicines List*. Nairobi, Kenya: Ministry of Health.
- Kenya Ministry of Health. 2025. "CS Duale Launches Nationwide Measles-Rubella and Typhoid Vaccine Campaign to Strengthen Child Immunization." Ministry of Health. July 7, 2025. Accessed September 5, 2025. <https://www.health.go.ke/cs-duale-launches-nationwide-measles-rubella-and-typhoid-vaccine-campaign-strengthen-child>.
- Kenya National Bureau of Statistics. 2022. *Kenya Demographic and Health Survey 2022*. <https://www.knbs.or.ke/reports/kdhs-2022/>

- Kenya National Bureau of Statistics and ICF International. 2023. Kenya Demographic and Health Survey 2022. Nairobi, Kenya.
- Kobayashi, Miwako, Laura M. Conklin, Godfrey Bigogo, Geoffrey Jagero, Lee Hampton, Katherine E. Fleming-Dutra, Muthoni Junghae, Maria da Gloria Carvalho, Fabiana Pimenta, and Bernard Beall. 2017. Pneumococcal Carriage and Antibiotic Susceptibility Patterns from Two Cross-Sectional Colonization Surveys Among Children Aged <5 Years Prior to the Introduction of 10-Valent Pneumococcal Conjugate Vaccine—Kenya, 2009–2010. *BMC Infectious Diseases* 17: 1–12.
- Laxminarayan, Ramanan, Precious Matsoso, Suraj Pant, Charles Brower, John-Arne Røttingen, Keith Klugman, and Sally Davies. 2016. Access to Effective Antimicrobials: A Worldwide Challenge. *Lancet* 387(10014): 168–75.
- Lee, Bruce Y., Shawn T. Brown, Leila A. Haidari, Samantha Clark, Taiwo Abimbola, Sarah E. Pallas, Aaron S. Wallace, Elizabeth A. Mitgang, Jim Leonard, and Sarah M. Bartsch. 2019. Economic Value of Vaccinating Geographically Hard-to-Reach Populations with Measles Vaccine: A Modeling Application in Kenya. *Vaccine* 37(17): 2377–86.
- Lord, Jennifer, Anthony Gikonyo, Amos Miwa, and Agricola Odoi. 2021. "Antimicrobial Resistance among Enterobacteriaceae, Staphylococcus Aureus, and Pseudomonas Spp. Isolates from Clinical Specimens from a Hospital in Nairobi, Kenya." *PeerJ* 9: e11958. <https://doi.org/10.7717/peerj.11958>.
- MacNeil, Adam. 2019. Global Epidemiology of Tuberculosis and Progress Toward Achieving Global Targets—2017. *MMWR* 68.
- Macpherson, Liana, Morris Ogero, Samuel Akech, Jalemba Aluvaala, David Gathara, Grace Irimu, Mike English, and Ambrose Agweyu. 2019. Risk Factors for Death Among Children Aged 5–14 Years Hospitalised with Pneumonia: A Retrospective Cohort Study in Kenya. *BMJ Global Health* 4(5): e001715.
- Murray, Christopher J.L., Kevin S. Ikuta, Fablina Sharara, Lucien Swetschinski, Gisela R. Aguilar, Authia Gray, Chieh Han, Catherine Bisignano, Puja Rao, and Eve Wool. 2022. Global Burden of Bacterial Antimicrobial Resistance in 2019: A Systematic Analysis. *Lancet* 399(10325): 629–55.
- Ochieng, Oscar. 2023. Malaria Undermines Economic Growth and Traps House-holds in a Cycle of Poverty. Institute of Economic Affairs. <https://ieakenya.or.ke/blog/malaria-undermines-economic-growth-and-makes-house-holds-poorer/>
- Ojal, John, Ulla Griffiths, Laura L. Hammitt, Ifedayo Adetifa, Donald Akech, Collins Tabu, Anthony G. Scott, and Stefan Flasche. 2019. Sustaining Pneumococcal Vaccination After Transitioning from Gavi support: A Modelling and Cost-Effectiveness Study in Kenya. *Lancet Global Health* 7(5): e644–54.
- Omulo, Sylvia, Samuel M. Thumbi, Kariuki M. Njenga, and Douglas R. Call. 2015. A Review of 40 Years of Enteric Antimicrobial Resistance Research in Eastern Africa: What Can Be Done Better? *Antimicrobial Resistance and Infection Control* 4: 1–13.
- Otieno, Grieven P., Christian Bottomley, Sammy Khagayi, Ifedayo Adetifa, Mwanajuma Ngama, Richard Omore, Billy Ogwel, Betty E. Owor, Godfrey Bigogo, and John B. Ochieng. 2020. Impact of the Introduction of Rotavirus Vaccine on Hospital Admissions for Diarrhea Among Children in Kenya: A Controlled Interrupted Time-Series Analysis. *Clinical Infectious Diseases* 70(11): 2306–13.
- Plotkin, Stanley A., Walter A. Orenstein, Paul A. and Offit, and Kathryn M. Edwards. 2017. *Plotkin's Vaccines*. Elsevier, Amsterdam. <https://shop.elsevier.com/books/plotkins-vaccines/orenstein/978-0-323-35761-6>
- Prüss-Ustün, Annette, Jamie Bartram, Thomas Clasen, John M. Colford, Jr., Oliver Cumming, Valerie Curtis, Sophie Bonjour, Alan D. Dangour, Jennifer De France, and Lorna Fewtrell. 2014. Burden of Disease from Inadequate Water, Sanitation and Hygiene in Low and Middle-Income Settings: A Retrospective Analysis of Data from 145 Countries. *Tropical Medicine & International Health* 19(8): 894–905.
- Qadri, Firdausi, Farhana Khanam, Xinxue Liu, Katherine Theiss-Nyland, Prasanta Kumar Biswas, Amirul Islam Bhuiyan, Faisal Ahmmed, Rachel Colin-Jones, Nicola

- Smith, and Susan Tonks. 2021. Protection by Vaccination of Children Against Typhoid Fever with a Vi-Tetanus Toxoid Conjugate Vaccine in Urban Bangladesh: A Cluster-Randomised Trial. *Lancet* 398(10301): 675–84.
- Rappuoli, Rino, David E. Bloom, and Steve Black. 2017. Deploy Vaccines to Fight Superbugs. *Nature* 552(7684): 165–7.
- Salari, Paola, Laura Di Giorgio, Stefania Ilinca, and Jane Chuma. 2019. The Catastrophic and Impoverishing Effects of Out-of-Pocket Healthcare Payments in Kenya, 2018. *BMJ Global Health* 4(6).
- Samaha, Hady, Arda Yigitkanli, Amal Naji, Bahaa Kazzi, Ralph Tanios, Serena Maria Dib, and Ighowwerha Ofotokun, and Nadine Roupheal. 2024. Burden of Vaccine-Preventable Diseases in People Living with HIV. *Vaccines* 12(7): 780.
- Sambala, Evanson Z., Alison B. Wiyeh, Ntombenhle Ngcobo, Shingai Machingaidze, and Charles S. Wiysonge. 2019. New Vaccine Introductions in Africa Before and During the Decade of Vaccines—Are We Making Progress? *Vaccine* 37(25): 3290–5.
- Saqeeb, Kazi N., Tafsir S.M. Hasan, Soroar H. Khan, Alfazal Khan, A.S.G. Faruque, and Tahmeed Ahmed. 2024. Trends, Correlates, and Recent Pattern of Antibiotic Misuse in Acute Rotavirus Diarrhea in Urban and Rural Bangladesh. *medRxiv*: 2024.12.23.24319535.
- Sauboin, Christophe, Laure-Anne Van Bellinghen, Nicolas Van De Velde, and Ilse Van Vlaenderen. 2019. Economic Impact of Introducing the RTS, S Malaria Vaccine: Cost-Effectiveness and Budget Impact Analysis in 41 Countries. *MDM Policy & Practice* 4(2): 2381468319873324.
- Sigei, Charles, John Odaga, Mercy Mvundura, Yvette Madrid, Andrew D. Clark, Kenya ProVac Technical Working Group, and Uganda ProVac Technical Working Group. 2015. Cost-Effectiveness of Rotavirus Vaccination in Kenya and Uganda. *Vaccine* 33: A109–18.
- Silaba, Micah, Michael Ooko, Christian Bottomley, Joyce Sande, Rachel Benamore, Kate Park, James Ignas, Kathryn Maitland, Neema Mturi, Anne Makumi, Mark Otiende, Stanley Kagwanja, Sylvester Safari, Victor Ochola, Tahreni Bwanaali, Evasius Bauni, Fergus Gleeson, Maria Knoll, Ifedayo Adetifa, Kevin Marsh, Thomas N. Williams, T. Kamau, S. Sharif, O.S. Levine, L.L. Hammitt, and J.A.G. Scott. 2019. "Effect of 10-valent pneumococcal conjugate vaccine on the incidence of radiologically-confirmed pneumonia and clinically-defined pneumonia in Kenyan children: An interrupted time-series analysis," *Lancet Global Health* 7(3): e337–46. [https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(18\)30491-1/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30491-1/fulltext)
- Simiyu, Kenneth, and Leslie Jamka. 2018. "Typhoid in a Kenyan village: Its Impact, Its prevention," *American Journal of Tropical Medicine and Hygiene* 99(5): 1112–3. <https://www.ajtmh.org/view/journals/tpmd/99/5/article-p1112.xml>
- Stop TB Partnership. Kenya Digital TB Surveillance System Assessment Report. <https://tbassessment.stoptb.org/kenya.html#digital>. Accessed February 27, 2025.
- Sultana, Marufa, Nurnabi Sheikh, Rashidul A. Mahumud, Tania Jahir, Ziaul Islam, and Abdur R. Sarker. 2017. Prevalence and Associated Determinants of Malaria Parasites Among Kenyan Children. *Tropical Medicine and Health* 45: 1–9.
- Tait, Dereck R., Mark Hatherill, Olivier Meeren, Ann M. Ginsberg, Van Elana Brakel, Bruno Salaun, Thomas J. Scriba, Elaine J. Akite, Helen M. Ayles, Anne Bollaerts, Marie-Ange Demoitié, Andreas Diacon, Thomas G. Evans, Paul Gillard, Elizabeth Hellström, James C. Innes, Maria Lempicki, Mookho Malahleha, Neil Martinson, Doris M. Vela, Monde Muyoyeta, Videlis Nduba, Thierry G. Pascal, Michele Tameris, Friedrich Thienemann, Robert J. Wilkinson, and Francois Roman. 2019. "Final analysis of a trial of M72/AS01 (E) vaccine to prevent tuberculosis," *New England Journal of Medicine* 381 (25): 2429–39. [doi: <https://doi.org/10.1056/NEJMoa1909953>]
- Tate, Jacqueline E., Richard D. Rheingans, Ciara E. O'Reilly, Benson Obonyo, Deron C. Burton, Jeffrey A. Tornheim, Kubaje Adazu, Peter Jaron, Benjamin Ochieng, and Tara Kerin. 2009. Rotavirus Disease Burden and Impact and Cost-Effectiveness of a Rotavirus Vaccination Program in Kenya. *Journal of Infectious Diseases* 200(Supplement_1): S76–84.

UNICEF. 2021. Levels and Trends in Child Mortality. <https://data.unicef.org/resources/levels-and-trends-in-child-mortality-2021/>

Vos, Theo, Stephen S. Lim, Cristiana Abbafati, Kaja M. Abbas, Mohammad Abbasi, Mitra Abbasifard, Mohsen Abbasi-Kangevari, Hedayat Abbastabar, Foad Abd-Allah, and Ahmed Abdelalim. 2020. Global Burden of 369 Diseases and Injuries in 204 Countries and Territories, 1990–2019: A Systematic Analysis for the Global Burden of Disease Study 2019. *Lancet* 396(10258): 1204–22.

Wandera, Ernest A., Shah Mohammad, Martin Bundi, Satoshi Komoto, James Nyangao, Cyrus Kathiiko, Erick Odoyo, Gabriel Miring'u, Koki Taniguchi, and Yoshio Ichinose. 2017. "Impact of rotavirus vaccination on rotavirus and all-cause gastroenteritis in peri-urban Kenyan children," *Vaccine* 35(38): 5217–23. [doi: <https://doi.org/10.1016/j.vaccine.2017.07.096>]

Waruru, Anthony, Dickens Onyango, Lilly Nyagah, Alex Sila, Wanjiru Waruiru, Solomon Sava, Elizabeth Oele, Emmanuel Nyakeriga, Sheru W Muuo, and Jacqueline Kiboye. 2022. Leading Causes of Death and High Mortality Rates in an HIV Endemic Setting (Kisumu County, Kenya, 2019). *PLoS One* 17(1): e0261162.

World Bank. 2023a. Kenya Country Overview. <https://www.worldbank.org/en/country/kenya/overview>

World Bank. 2023b. World Development Indicators. <https://databank.worldbank.org/source/world-development-indicators>.

World Health Organization. 2021. Implementing the Immunization Agenda 2030. https://cdn.who.int/media/docs/default-source/immunization/strategy/ia2030/ia2030_frameworkforactionv04.pdf?sfvrsn=e5374082_1&download=true

World Health Organization. 2022a. Health I for the Republic of Kenya. <https://data.who.int/countries/404>

World Health Organization. 2022b. Kenya: National Action Plan on Antimicrobial Resistance: Review of Progress in the Human Health Sector.

World Health Organization. 2023. Burden of Disease Attributable to Unsafe Drinking-Water, Sanitation and Hygiene.

<https://www.who.int/publications/m/item/burden-of-disease-attributable-to-unsafe-drinking-water-sanitation-and-hygiene--executive-summary>

WUENIC. 2025. WHO/UNICEF Estimates of National Immunization Coverage.

<https://immunizationdata.who.int/dashboard/regions/african-region/KEN>



Initiated in 2008, the Global Antibiotic Resistance Partnership (GARP) has played a critical role in advancing country-led national strategies and policies to address antimicrobial resistance (AMR) in several countries in Africa and Asia.

GARP's current focus is generating cross-disciplinary evidence highlighting the impact of vaccines on AMR in country-specific contexts.

This policy brief lays out the situation in Kenya and recommends policy measures to use vaccines as tools to control AMR in the country.

© One Health Trust (OHT) 2026

Reproduction is authorized provided the source is acknowledged. This report is based on research supported by Gates Foundation.

The findings and conclusions contained within are those of the authors and do not necessarily reflect the positions or policies of OHT, Gates Foundation, or partnering institutions. Related research and additional information on vaccines and antimicrobial resistance are available at onehealthtrust.org.

One Health Trust
5636 Connecticut Ave NW
PO Box 42735
Washington, DC, 20015
United States of America

One Health Trust, India
Nimai Valley Site No.47
Motlur Cross, Jadalhimmanahalli
Chikkaballapur,
Karnataka – 562103, India