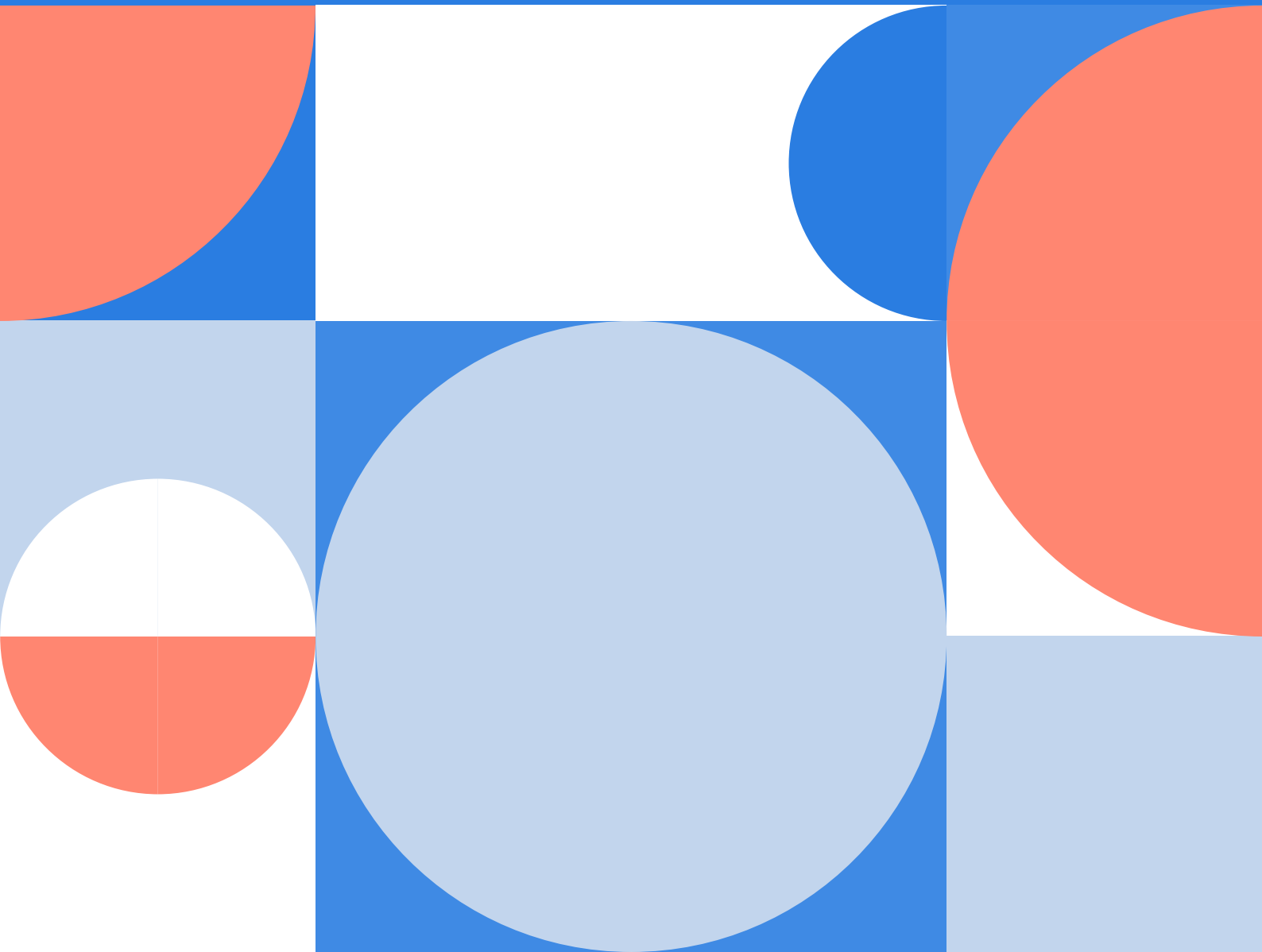


Kenya national action plan on antimicrobial resistance

Review of progress in the
human health sector

Antimicrobial resistance policy information
and action brief series



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(Antimicrobial resistance policy information and action brief series)

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Acronyms and abbreviations

AMC	antimicrobial consumption
AMR	antimicrobial resistance
AMS	antimicrobial stewardship
AMU	antimicrobial use
AST	antimicrobial susceptibility testing
AWaRE	Access, Watch, Reserve
CASIC(s)	County Antimicrobial Stewardship Interagency Committee(s)
CDC	Centers for Disease Control and Prevention
CPD	continuing professional development
COVID-19	coronavirus disease
EML	essential medicines list
GAP	Global Action Plan
Gavi	Gavi, the Vaccine Alliance
GLASS	Global Antimicrobial Resistance Surveillance System
GNI	gross national income
HAI	health care-associated infection
Hib	Haemophilus influenzae type B
IPC	infection prevention and control
K Sh	Kenya shillings
KAP	knowledge, attitudes and practices

KEMSA	Kenya Medical Supplies Authority
KI	key informant
KII(s)	key informant interview(s)
M&E	monitoring and evaluation
MCV	measles-containing vaccine
MDR	multi-drug resistant
MTaPS	Medicines, Technologies, and Pharmaceutical Services
NAP	national action plan
NASIC	National Antimicrobial Stewardship Interagency Committee
NGO	nongovernmental organization
OOP	out-of-pocket
OTC	over the counter
PCV	pneumococcal conjugate vaccine
R&D	research and development
SOP	standard operating procedure
TB	tuberculosis
TrACCS	Tripartite AMR Country Self-Assessment Survey
TWG	technical working group
UHC	universal health coverage
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WAAW	World Antimicrobial Awareness Week
WASH	water, hygiene, and sanitation and hygiene
WHO	World Health Organization
XDR	extensively drug-resistant

Executive summary

In 2017, the Government of Kenya published its *National action plan on prevention and containment of antimicrobial resistance (NAP on AMR)* (1). The plan covered the period 2017–2022 and was based on previous situational analyses of the country’s AMR burden and response. The NAP is well aligned with WHO’s *Global action plan on antimicrobial resistance (GAP on AMR)* (2), outlines multisectoral and One Health policies and interventions, and assigns key roles and responsibilities to various stakeholders. The country’s AMR governance encompasses national and county levels; the National Antimicrobial Stewardship Interagency Committee (NASIC) is functional and meets regularly; and eight of 47 counties have formed County Antimicrobial Stewardship Interagency Committees (CASICs).

Kenya has established a good foundation for addressing AMR, but now needs to scale up and support efforts to make a sustainable impact. Progress is actively monitored through a monitoring and evaluation (M&E) framework. A critical development for the national AMR strategy has been the establishment of a national surveillance network for AMR in human health. However, additional financial and human resources are needed to accelerate this progress and alleviate heavy reliance on foreign donor assistance, which is not sustainable in the long term. Work to develop the next iteration of the NAP is underway based on evaluation of current progress. As is the case for many countries, the coronavirus disease (COVID-19) pandemic negatively impacted many AMR-related activities. However, extensive support as part of the pandemic response strengthened infection prevention and control (IPC) capacity.

In 2018, the Kenyan government developed a communication strategy to improve AMR awareness and knowledge. Since then, the government has supported periodic AMR awareness and knowledge campaigns focusing on prudent antimicrobial use (AMU). To realize the full impact of these campaigns, it would be beneficial to incorporate an M&E component into these activities. While the government has set a goal to include AMR in pre- and in-service training for human and animal health providers, most personnel do not as yet receive such training.

As of 2021, 12 human health facilities serve as AMR surveillance sites and are connected to the national AMR surveillance system and database; however, only six facilities actively submit AMR data. The Ministry of Health aims to have around 30 facilities connected to the national AMR surveillance system and database by the end of 2022. AMR surveillance in the animal health sector began in May 2021, with six laboratories reporting data to a separate national database.

As of 2016, 66% of health care facilities in Kenya had access to clean water sources, and 86% had access to improved sanitation (3). Kenya has a National IPC Advisory Committee; in 2021, Kenya updated and published a national IPC strategic plan. A recent situational analysis found that IPC policies and guidelines are in place at all level-four (sub-county hospitals and medium-sized private hospitals) and level-five (county-level referral and large private hospital) facilities. All 47 counties have formed county-level IPC advisory committees. IPC advisory committee members are also part of the AMR committees, creating a link between the two structures.

National vaccination rates are high, but not all vaccines have met the international goal of 90% coverage. Due to its economic growth, Kenya is expected to graduate from eligibility for support from Gavi, a public–private vaccine alliance partnership, and therefore will transition away from reliance on foreign donors for its national vaccination programme. The country will fully fund its immunization programme by 2027. From 2015 to 2019, Kenya’s economy achieved broad-based growth averaging 4.7% per year, significantly reducing poverty, which fell to an estimated 34.4% at the US\$ 1.9/day poverty line in 2019 (4). Gross domestic product growth is projected at 5.0% in 2022, and the poverty rate has resumed its declining trend after rising earlier during the pandemic (4). Eligibility for Gavi support is based on gross national income (GNI) less or equal to US\$ 1630 over the past 3 years; Kenya’s 3-year average GNI for the 2020 eligibility grouping was US\$ 1480 (5).

AMU surveillance in the human health sector is carried out through point prevalence surveys. Antimicrobial consumption (AMC) data have been collected from the national regulatory authority for the last 3 years. In addition, prescribing practices and appropriate antibiotic use are monitored in selected health care settings. The regulation on prescription-only sales of antimicrobials by qualified health professionals is enforced only to a limited extent, and there are ongoing challenges around the quality of medicines. The frequency and impact of stock-outs of antimicrobials are unknown. During the 2021 World Antimicrobial Awareness Week (WAAW), the Ministry of Health launched a clinician handbook that provides information to guide clinical diagnosis and treatment. Under the leadership of the Ministry of Health and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives, a national antimicrobial stewardship (AMS) integrated plan has been developed, encompassing AMS activities across the human, animal and environmental health sectors.

Key priorities for research and development (R&D) have been identified for the country (6). They include the development of point-of-care diagnostics, research on molecular mechanisms to inform the development of new anti-infective treatments and increasing social science research on how to make AMS programmes more sustainable. Several academic and medical institutions in Kenya conduct AMR research, and additional international efforts to bolster research activities are ongoing.

Key findings to accelerate future AMR mitigation efforts in Kenya

NAP on AMR status

Need to:

1. Ensure sufficient and sustained domestic funding for NAP on AMR implementation at the national and county level.
2. Address AMR as a cross-sectoral public health challenge and link AMR to other health plans, policies and budgets, such as those for universal health coverage (UHC), HIV/AIDS, tuberculosis (TB), malaria, immunization and emergency/pandemic preparedness, to leverage resources and maximize impact.
3. Through a participatory approach, develop and endorse the next iteration of the NAP on AMR based on review of the current NAP's progress and challenges.
4. Ensure inclusion of AMR-relevant interventions in the national health strategy.

AMR governance and coordination mechanisms

Need to:

1. Further strengthen communication and collaboration between county and national AMR governance structures through the ongoing work of developing and implementing an M&E system.

Awareness and knowledge

Need to:

1. Sustain regular AMR awareness and knowledge campaigns and add an M&E component to ensure efforts are impactful and address critical gaps.
2. Conduct a nationally representative knowledge, attitudes and practices (KAP) survey to assess current awareness and understanding of AMR among relevant stakeholders, including policy-makers, human and animal health care providers, livestock owners and the public, to establish a baseline.

Surveillance, laboratory and diagnostic capacity

Need to:

1. Improve the quality of existing antimicrobial susceptibility testing (AST) capacity and enhance its utilization.
2. Expand the number of human health care sites in the national AMR surveillance system to ensure national representation.
3. Expand the capacity to conduct AST in all level-four, -five and -six health care facilities to support appropriate diagnosis and prescription and ensure that AST is conducted and reported correctly.
4. Conduct education and training of health care

providers on the utilization of diagnostic and microbiological tests in clinical decision-making to improve appropriate use of antimicrobials.

5. Consider expanding AMR surveillance beyond facility-level surveillance to the community level.
6. Address the lack of diagnostic and laboratory equipment, and frequent stock-outs of critical laboratory reagents and consumables.
7. Consider funding for diagnostics in the NAP budget.

IPC, water, sanitation and hygiene (WASH), and immunization

Need to:

1. Ensure a seamless transition to sustainable domestic financing of routine immunization programmes by 2027 and increase coverage for all vaccines to 90%.
2. Address the role of vaccines in mitigating AMR in the next iteration of the plan.
3. Implement health care-associated infection (HAI) surveillance in 20 facilities by 2030.
4. Sustain investments in strengthening WASH in community and health care facilities.

Access to and optimal use of antimicrobials

Need to:

1. Continue working towards the establishment and implementation of a national AMU/AMC surveillance system and platform.
2. Increase allocation of human, financial and educational support to the medicines regulatory authority to aid enforcement of prescription-only sales of antimicrobials by qualified health care professionals as well as regular assessment of medicine quality, including antimicrobials.
3. Establish an M&E framework for AMS programmes to help identify barriers that need to be addressed to strengthen and expand them.
4. Develop a monitoring mechanism to understand the frequency and impact of medicine stock-outs to support work to reduce such stock-out events.
5. Ensure that national treatment guidelines are kept up to date based on local data, and that the guidelines are implemented and adhered to at all health care facilities (e.g. by conducting regular prescription audits and reporting back to prescribers).

R&D

Need to:

1. Advocate for increased domestic investment in R&D that will generate local evidence to support the optimal impact of interventions and improve collaborations between domestic and international researchers and institutes.

1. Overview

The following policy brief assesses Kenya's AMR mitigation and control policies and strategies and identifies key findings to aid in implementing and accelerating priority activities outlined in the NAP on AMR.

Findings contained in this brief are informed by a review and analysis of numerous sources, including government reports, peer-reviewed literature, press releases, funding proposals and periodicals. Semi-structured key informant interviews (KIIs) with select AMR focal points and stakeholders in Kenya were also conducted between August 2021 and February 2022.

This policy document is structured to align with the strategic objectives described in WHO's GAP on AMR. It encompasses public awareness and understanding of AMR, surveillance and research, prevention of infection, optimized use of antimicrobials and R&D in the human health sector.

2. Health and AMR in Kenya

In 2020, Kenya's estimated population was 53.7 million people, with a 2.3% annual population growth rate (7, 8). Over 70% of the population live in rural areas, and in 2015, approximately 12% lived at or below the international poverty line of US\$ 1.90 per day (9, 10). Life expectancy at birth has increased from 51 years in 2000 to 67 years in 2019 (11). Leading causes of mortality include HIV/AIDS, respiratory infections and diarrhoeal diseases (12).

National health system

Kenya's health system comprises both public and private sectors organized across six levels, including national referral and large private teaching hospitals (level six), county-level referral and large private hospitals (level five), sub-county hospitals and medium-sized private hospitals (level four), health centres and maternity and nursing homes (level three), dispensaries and clinics (level two), and community services (level one) (13). As of January 2022, there were 13 615 public and private health facilities (level two and higher) nationwide; two-thirds (four of six) of level-six facilities are located in the capital city of Nairobi (14).

The Kenya Medical Supplies Authority (KEMSA) is run by the national government and provides select medical supplies and pharmaceuticals, mainly drugs listed on the essential medicines list (EML), to public-sector health facilities, according to KIIs. There is a charge to patients for medicines, including antimicrobials, at the point-of-care except for patients under the age of 5 years, according to KIIs.

In 2018, government per capita health care expenditure was US\$ 83.41, while out-of-pocket (OOP) expenditure for Kenyans was US\$ 20.3 (15, 16). The World Bank estimates there were 1.2 nurses and midwives, 0.2 physicians and 1.4 hospital beds per 1000 people in 2018, higher than in neighbouring countries but below WHO recommendations (Table 1). Approximately 58% of all health care workers work in public health facilities; 52.7% work in urban settings, although 72% of Kenyans live in rural settings (9, 17).

Table 1. Overview of health care workforce (per 1000 citizens) in Kenya, neighbouring countries (United Republic of Tanzania, Uganda and Ethiopia) and the United States of America

	Kenya	United Republic of Tanzania	Uganda	Ethiopia	USA
Nurses and midwives	1.2 ^{'18}	0.6 ^{'17}	1.2 ^{'18}	0.7 ^{'18}	14.5 ^{'17}
Physicians	0.2 ^{'18}	0.0 ^{'18}	0.2 ^{'17}	0.1 ^{'18}	2.6 ^{'17}
Hospital beds	1.4 ^{'18}	0.7 ^{'10}	0.5 ^{'10}	0.3 ^{'16}	2.9 ^{'17}

Source: Data according to the World Bank with the reporting year in superscript.

Implementing UHC has gained momentum in recent years. The Kenya Health Sector Strategic and Investment Plan covering the period 2013–2017 (Transforming health: accelerating attainment of universal health coverage) focused on expanding access to health care to all Kenyans and improving health care quality (18). Health care administration was decentralized from the national to county level in 2013 as a step towards achieving UHC. However, while this strategy has increased the accessibility of health care services, stakeholders perceive that health care quality and equity have been neglected (19). The lack of quality assurance was also acknowledged by the Ministry of Health in 2019 (20).

The Kenya community health strategy 2020–2025 emphasized UHC, including health care equity and quality. However, there is no reference to AMR or inclusion of AMR-relevant interventions (17). Inclusion of AMR-relevant interventions in the national health strategy would support and facilitate implementation. Accessible health care is one of the four priorities of the current government, which set a goal that, by 2022, “all persons in Kenya will be able to use the essential services they need for their health and wellbeing through a single unified benefit package, without the risk of financial catastrophe” (20).

AMR in Kenya

AMR data for Kenya are limited to single-centre surveillance or point prevalence estimates, most often from tertiary care facilities. These estimates may not be nationally representative, given that patients at tertiary care facilities may represent sicker patients with previous treatment exposure or represent only specific socioeconomic classes or urban-dwelling populations. Given these limitations, analyses of available data suggest high levels of resistance, including multidrug resistance and extensive drug resistance among common pathogens in some situations. However, evidence on the global AMR burden is accumulating. Estimates from 2019 suggest that drug-resistant infections were associated with 4.95 million deaths globally and the direct cause of 1.27 million of those deaths, with sub-Saharan Africa carrying the heaviest burden (21).

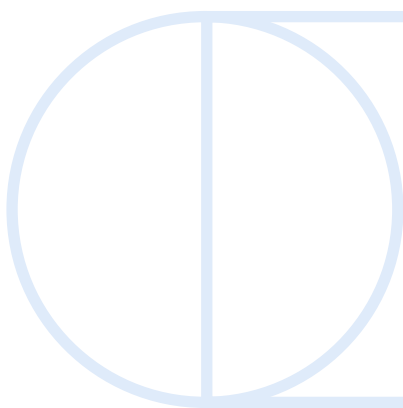
AMR surveillance data collected at a private tertiary hospital between 2012 and 2015 revealed that resistance of *Klebsiella pneumoniae* to aminoglycosides, carbapenems and third-generation cephalosporins increased from 58% to 75%, 3% to 23% and 61% to 88%, respectively, while resistance to aminopenicillins has been documented to be as high as 100% (22). In contrast, *Escherichia coli* resistance levels stayed relatively constant during this period (22). Clinical surveillance data collected between 2012 and 2016 from the Karen Hospital in Nairobi documented resistance rates of 89% among Enterobacterales isolates, 57% among *Staphylococcus aureus* isolates and 50% of *Pseudomonas* spp. isolates; however, no significant temporal trend in the overall burden of AMR was observed. Additionally, *Pseudomonas* isolates exhibited no resistance towards carbapenem, suggesting that last-line drugs are still effective against *Pseudomonas* infections. Multidrug resistance was observed in 51.0% of Enterobacterales isolates, 16.7% of *S. aureus* isolates, but no *Pseudomonas* isolates (23). Surveillance data collected between 2002 and 2013 at a level-six teaching hospital in Eldoret found that

the majority of *K. pneumoniae* isolates were multidrug resistant (MDR), with high levels of third-generation cephalosporin and gentamicin resistance; the resistance rate to carbapenems was considerably lower (23.2%) (24).

Phenotypic profiling of 651 paediatric diarrhoeal samples from four provinces revealed high levels of *E. coli* resistance to ampicillin (95.0%), trimethoprim/sulfamethoxazole (95.0%) and tetracycline (81.0%) (25). Between 2011 and 2013, the prevalence of methicillin-resistant *S. aureus* among samples collected from two Nairobi hospitals was estimated to be only 3.7% (26).

The 2015 annual surveillance data from inpatients at a level-six health facility, Kenyatta National Hospital in Nairobi, showed that multidrug resistance and extensive drug resistance levels among all pathogens analysed were 88% and 26%, respectively. The study also reported high levels of non-susceptibility of *E. coli*, *K. pneumoniae* and *S. aureus* to commonly used antibiotics such as penicillins (52–92%, 67–73% and 55–97%, respectively) and cephalosporins (57–80%, 64–84% and 30%, respectively) (27).

These surveillance data rely primarily on clinical isolates collected from tertiary-level health facilities; less is known about the prevalence of AMR in community settings in Kenya or sub-Saharan Africa more broadly. A 2015 meta-analysis of over 100 AMR prevalence studies from sub-Saharan African countries found that 98.0% of eligible human studies were based on hospital sampling (28). One of the few studies assessing the prevalence of AMR in a community setting reported that 80.0% of *E. coli* isolates collected from a high-density informal settlement in Nairobi were MDR (resistant to three or more antibiotic classes). In addition, AMU rates were a poorer predictor of AMR than poor sanitation rates, suggesting that transmission of resistant infections through poor sanitation may be a more important factor for AMR than small changes in AMU in this community setting (29).



3. Status of the NAP on AMR

2020/2021 Tripartite AMR Country Self-Assessment Survey (TrACCS) status

- The national AMR action plan is being implemented and actively monitored through an M&E framework.
- Human, animal and plant health sectors are actively involved in developing and implementing the NAP on AMR, but the environment, food safety and food production sectors are not.
- The NAP on AMR is linked to the NAP on Health Security.
- The NAP on AMR development and implementation process has been impacted by the COVID-19 pandemic.

Current status

- Kenya's NAP on AMR is based on previous policies and evidence-based recommendations drawn from situational analyses conducted in 2011 and 2016.
- There is a significant knowledge gap regarding financial resources for NAP implementation. The total estimated costs for NAP implementation are unknown, and it is unclear what budget the national government has reserved and allocated for NAP on AMR implementation.

- The NAP on AMR expires in 2022; the Ministry of Health and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives have commenced work to develop the next iteration through a multisectoral participatory approach.

Findings

There is a need to:

- ensure sufficient and sustained domestic funding for NAP on AMR implementation at the national and county level;
- address AMR as a cross-sectoral public health challenge and link AMR in other health plans, policies and budgets, such as those for UHC, HIV/AIDS, TB and malaria, pandemic preparedness and response plans;
- through a participatory approach, develop and endorse the next iteration of the NAP on AMR based on review of the current NAP's progress and challenges; and
- ensure inclusion of AMR-relevant interventions in the national health strategy.

Kenya's NAP on AMR was developed in 2017 and formally endorsed by the government (1). The NAP aims to improve the quality of health care and the health status of its citizens and reduce the economic toll AMR may pose. The objectives of the NAP on AMR are in accordance with the WHO's GAP and include:

- improving awareness and understanding of AMR through effective communication, education and training;
- strengthening the knowledge and evidence base on AMR through surveillance and research;
- reducing the incidence of infection through effective sanitation, hygiene and IPC;
- optimizing AMU in the human, animal and plant health sectors; and
- supporting sustainable investment, including for new medicines, diagnostic tools, vaccines and other interventions.

The NAP on AMR outlines multisectoral policies and interventions and assigns key roles and responsibilities to different stakeholders, including national and county governments. The NAP was based on the national policy on prevention and containment of AMR and other evidence-based recommendations from prior situational analyses conducted in 2011 and 2016. The NAP sets forth measurable outcomes for the five main objectives and integrates a One Health vision throughout the strategies. The current NAP expires in 2022, and the Ministry of Health will commence work to develop the next iteration in early to mid-2022, according to a key informant (KI).

In February 2021, USAID's Medicines, Technologies, and Pharmaceutical Services (MTaPS) group launched a 1-year initiative to develop an M&E framework for the NAP on AMR, according to a KI. The resulting framework is currently being operationalized, and the Ministry of Health recently nominated staff to serve on a national M&E technical working group (TWG), according to a KI.

4. AMR governance and coordination mechanisms

In 2015, the Ministry of Health and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives established the National Antimicrobial Advisory Committee to develop the NAP on AMR, which was published in 2017. The NAP called for establishing a NASIC composed of two subcommittees – a steering committee and a technical committee – and a TWG (Figure 1). According to a KI, the NASIC was established in 2017 and meets regularly. It is funded by the Ministry of Health with support from development partners. The steering committee was formed in 2019, includes representatives from six government ministries, is co-chaired by the Ministry of Health and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives and is responsible for overseeing policy direction and resource allocation.

The technical committee was first formed in 2017 and reconstituted in 2020: it meets quarterly and is responsible for technical oversight and policy implementation. The national TWG is composed largely of heads of ministry departments, agencies with interests in AMR and subject matter experts for each priority area. The TWG provides technical input, guidance and workplans for each objective area and oversees and/or participates in their implementation. The TWG is functional and meets regularly, according to KIIs.

CASICs oversee AMR-related activities, monitor NAP on AMR implementation and allocate resources at the county level. They are funded from county government budgets and are responsible for implementing the NAP at the subnational level. They have a responsibility to enforce regulations at the county level. CASICs prepare quarterly reports on their activities, which are shared nationally, and organize an annual forum to review NAP implementation from the previous year. According to one KI, eight counties (of a total 47 counties in Kenya) have formed CASICs; of those, four have developed an AMR workplan, but none have created county-level TWGs. KIs noted that the decentralization of Kenya's health system and the division of governance between the national and county level had posed challenges for coordinating NAP implementation; several counties are not actively engaged in AMR mitigation efforts. Challenges to implementing NAP on AMR activities at the county level include inadequate resources for scaling up efforts and competing priorities for county budgets, according to KIIs.

The AMR secretariat within the Ministry of Health is the link between national- and county-level AMR activities (30). Communication between the NASIC and CASICs occurs through multiple channels, including the Council of Governors and directly between AMR/AMS focal persons. There is also direct communication between the TWG and the AMR secretariat; regular reports and feedback are shared bidirectionally between the county- and national-level governance structures, according to KIIs. Communication and collaboration between the two levels will be further strengthened by ongoing work to finalize and implement an M&E system.

2020/2021 TrACCS status

- Multisectoral working groups are functional, with clear terms of reference, regular meetings and funding for working groups with defined activities and reporting arrangements.

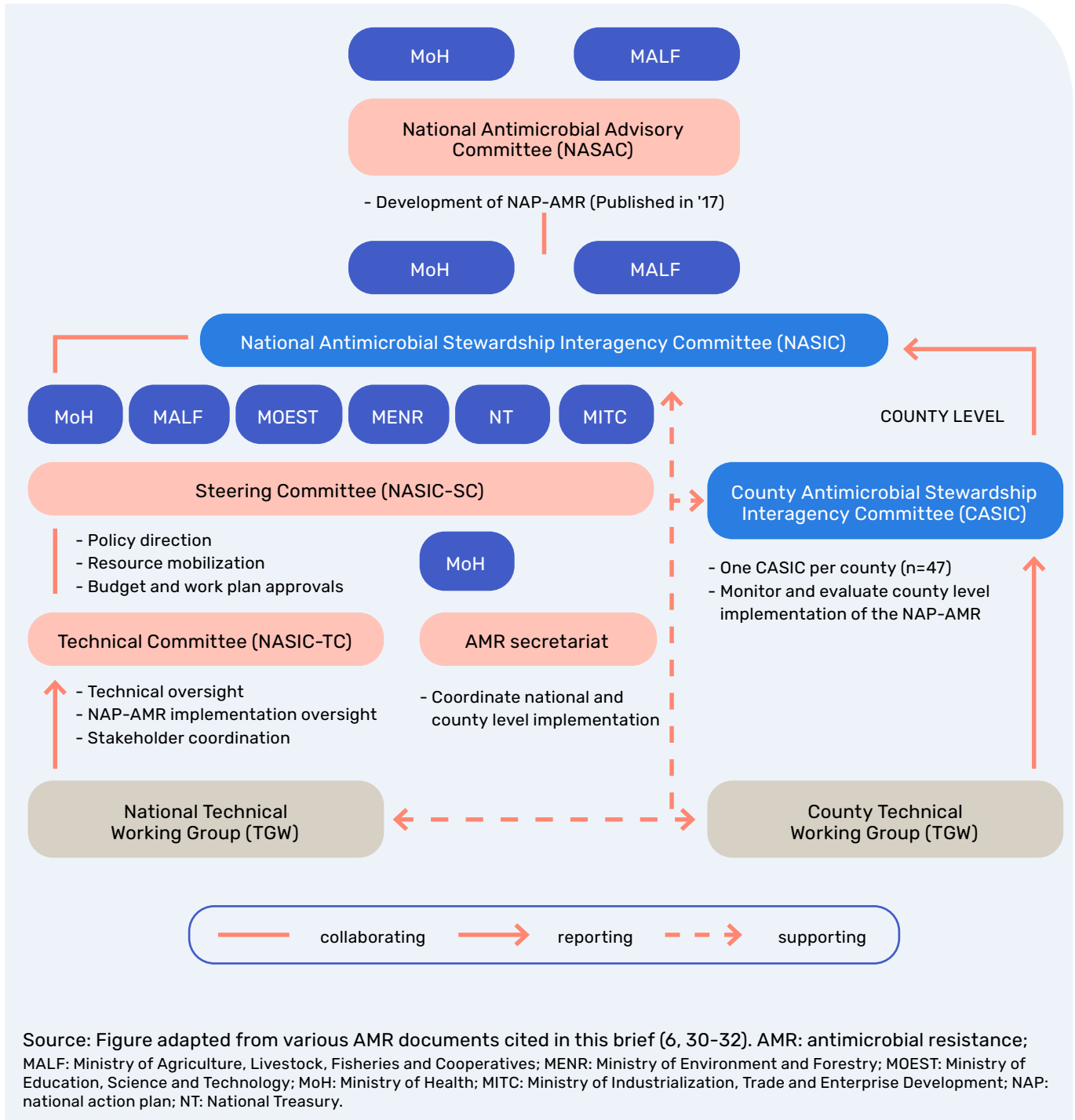
Current status

- Kenya has established a two-tiered coordinating system to implement the NAP on AMR at the national and county level, with the Ministry of Health being responsible for NAP implementation. There is a clear hierarchy consisting of responsible committees (NASIC and CASICs), a supporting AMR secretariat and a TWG.
- Eight out of a total 47 counties have formed CASICs. While county leadership is committed to addressing AMR, barriers to progress include inadequate resources to scale up efforts and competing priorities for county budgets.
- USAID's MTaPS programme supported the development of an M&E framework for NAP activities; the framework is currently being operationalized.

Findings

- There is a need to further strengthen communication and collaboration between county and national AMR governance structures through the ongoing work of developing and implement an M&E system.

Figure 1. Kenya’s national- and county-level governance structure for implementing and monitoring the NAP on AMR



5. AMR awareness and knowledge

Kenya's NAP on AMR acknowledges the lack of awareness and knowledge regarding AMR and sets forth national- and county-level strategies to:

- increase knowledge of AMR among the general public;
- incorporate AMR as a core, mandatory component of pre- and in-service professional training and medical school curricula;
- conduct nationwide AMR awareness campaigns, including in schools and the media; and
- create awareness of AMR across key ministries.

A nationally representative KAP survey regarding AMU and AMR has not yet been conducted in Kenya, according to KIIs; however, small KAP studies have been conducted among key stakeholder groups. In 2015, a survey conducted among physicians at a level-six hospital in Nairobi found that overall awareness and knowledge of AMR and AMU was high. Of a total 107 respondents, 81% self-reported that they would not directly start an antibiotic treatment if they suspected a case of acute diarrhoea, and 77% acknowledged AMR was a significant problem at their local hospital (33).

A study conducted among 200 households in Kibera, a large informal urban settlement in Nairobi, described misconceptions about antimicrobials among the general public. For example, 66% of survey respondents incorrectly stated that they believed antimicrobials are effective against influenza and the common cold (34). The study also found that more than 80% of respondents correctly believed antibiotics should not be shared or discontinued following the alleviation of symptoms; less than half of respondents remembered getting information on the correct use of antibiotics; and most respondents reported that clinicians and community pharmacists were highly trusted information sources. A 2017 study assessed KAP regarding AMR among adults from a rural community in Nyamira County (south Kenya) and reported that 60% of respondents had "always" practiced self-medication in the previous year; an additional 24% "sometimes" practiced self-medication; and knowledge on the potentially harmful effects of self-medication was considered low (35).

2020/2021 TrACCS status

- Nationwide, government-supported AMR awareness campaigns target all or the majority of priority stakeholder groups, based on stakeholder analysis, utilizing targeted messaging accordingly within sectors.
- AMR is covered in pre-service training for all relevant cadres. In-service training or other continuing professional development (CPD) covering AMR is available for all types of human health workers nationwide.
- Continuing professional training on AMR and AMU is available nationwide for veterinary-related professionals.

Current status

- A national communication strategy was published and costed in 2018.
- While several awareness and education campaigns have targeted the general public, there has been no assessment of their impact on KAP surveys regarding AMR and AMU.
- AMR is part of multiple CPD platforms across all cadres.

Findings

There is a need to:

- sustain regular AMR awareness and knowledge campaigns and add an M&E component to ensure efforts are impactful and address key gaps; and
- conduct a nationally representative KAP survey to assess current awareness and understanding of AMR among relevant stakeholders, including policy-makers, human and animal health care providers, livestock owners and the public, to establish a baseline.

AMR awareness and education campaigns

During the 2018 WAAW, the Ministry of Health and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives developed a communication strategy (36) covering the years 2018–2022 with the goal of:

- creating awareness among the primary audience (e.g. health workers, consumers, journalists);
- improving understanding among secondary audience groups (e.g. nongovernmental organizations (NGOs), researchers);
- advocating for a better policy framework; and
- developing and maintaining collaboration with other partners.

This plan was costed at K Sh 195.6 million (US\$ 1.8 million); however, the total funding required was unavailable

Following the release of that strategy, several AMR awareness and knowledge campaigns and educational efforts were initiated over the past several years (37). During WAAW in 2020, the Ministry of Health distributed educational materials to health care professionals and the general public about the correct use and storage of antibiotics. To realize the full impact of these campaigns, it would be beneficial to incorporate an M&E component into these activities.

In 2016, WHO conducted a global survey on antibiotic awareness campaigns in various countries and found that Kenya focused on imprudent AMU in animals, highlighting the One Health approach to addressing AMR (38).

Education and training of health care workers

The lack of high-quality medical training for health care workers and pharmacists is a significant barrier to AMS in Kenya and should be prioritized to mitigate the misuse and overuse of antimicrobials in the human health setting, according to KIIs. However, much work has been done to introduce AMR into training curricula for health care workers, and AMR is now part of multiple CPD platforms across all cadres. For example, a pre-service course has been introduced in the School of Pharmacy; there is a programme on AMR led by Students against Superbugs in collaboration with the NASIC and ReAct Africa (39); specific modules on AMR have been added to National IPC training; and a specific AMR surveillance training package is available on the Ministry of Health's e-learning virtual academy. Training has been conducted on IPC across the country, and AMR surveillance training has been conducted at all sites. A new postgraduate training course on hospital epidemiology and IPC has been introduced.

CPD work is carried out by professional associations such as the Pharmaceutical Society of Kenya, the Nursing Council of Kenya and Infection Prevention Network Kenya.

In the past 5 years, foreign donors and NGOs have supported this work, according to a KI. For example, in September 2021, the USAID MTaPS programme, in collaboration with the University of Nairobi's School of Pharmacy, launched a pre-service AMS course that addressed AMS and One Health principles of AMR (40).



6. Surveillance, laboratory and diagnostic capacity

2020/2021 TrACCS status

- A functioning national AMR surveillance system covers common bacterial infections in hospitalized and community patients, with external quality assurance, and a national coordinating centre produces reports on AMR.
- The national reference laboratory (NRL) supports the bacteriology laboratory network in identifying pathogens and AMR through a systematic approach to cascade training and supportive supervision. The NRL has also established a national external quality assurance programme to support the national bacteriology laboratory network.

Current status

- The national AMR surveillance system monitors eight priority pathogens and includes 12 health care facilities.
- The national antibiotic surveillance working group meets quarterly to review and discuss data that have been submitted.
- Even when AST capacities are available, health care workers do not always utilize them and poor quality results may impact the quality of care.
- The development of the surveillance strategy and accompanying standard operating procedures (SOPs) and training modules plus actual capacity building, including mentorship, have gone a long way towards building lasting in-country capacity.
- Despite inadequate resources, a system is in place for purchasing and maintaining laboratory equipment and laboratory-based training is ongoing

Findings

There is a need to:

- improve the quality of existing AST capacity and enhance its utilization;
- expand the number of human health care sites in the national AMR surveillance system to ensure national representation;
- expand the capacity to conduct AST in all level-four, -five and -six health care facilities to support appropriate diagnosis and prescription and ensure that AST is conducted and reported correctly;
- conduct education and training of health care providers on the utilization of diagnostic and microbiological tests in clinical decision-making to improve appropriate use of antimicrobials;
- consider expanding AMR surveillance beyond facility-level surveillance to the community level;
- address the lack of diagnostic and laboratory equipment and frequent stock-outs of critical laboratory reagents and consumables; and
- consider funding for diagnostics in the NAP budget.

Kenya's NAP on AMR outlined priority laboratory and surveillance capacity-building activities, including:

- developing a national public health network for AST, a national specimen repository for resistant strains and a national AMR database;
- implementing routine reporting of AMU and AMR data to the NASIC; and
- implementing routine AST for zoonotic and animal pathogens at regional veterinary laboratories.

AMR surveillance

In addition to the NAP on AMR, a national AMR surveillance strategy (2018–2022) was developed to help leverage data collection and reporting mechanisms from existing surveillance structures, such as those for TB and HIV/AIDS (32). The strategy's main objectives include building capacity and promoting routine AST at county- and national-level health facilities; establishing and maintaining national AMR databases and biobanks for bacterial isolates; monitoring AMR trends to inform national clinical treatment guidelines; and identifying key research questions related to AMR.

Efforts to implement and improve AMR surveillance efforts in Kenya have been supported by several foreign donors, including the Government of the United Kingdom (UK aid/the Fleming Fund), the United States Centers for Disease Control and Prevention (CDC), USAID, the World Bank and Pfizer (41, 42). Pilot projects to implement routine AMR surveillance systems began in 2017. By 2019, those efforts had expanded to cover four hospitals in four counties: Kiambu, Trans Nzoia, Kilifi and Machakos

(43). The country's surveillance focuses on eight priority pathogens which align with WHO priority pathogens (Table 2).

In 2020, eight health care facilities (four hospitals and four outpatient facilities) reported data to the Global Antimicrobial Resistance Surveillance System (GLASS) (44), in which the country first enrolled in 2016. In the 2021 GLASS report, five surveillance sites and five health care facilities participated in the national surveillance system; however, the country did not report AMR data. According to KIs, as of 2021, 12 human health care facilities serving as AMR surveillance sites are connected to the national AMR database; however, only six actively submit AMR data due to challenges of internet connectivity and the interoperability of laboratory information management systems. At the national level, the Ministry of Health has set a goal to have around 30 facilities connected to the national AMR database by the end of 2022. But, according to a KI, limited financial and human resources may be barriers to achieving this goal. The national antibiotic surveillance working group meets quarterly to review and discuss data that have been submitted.

There is no AMR surveillance in community settings beyond individual studies (29). AMR surveillance in the animal health sector began in May 2021, with six laboratories reporting data to a national database managed by the Veterinary Epidemiology and Economics Unit. Currently, the human and animal health AMR surveillance databases are maintained separately; however, there are plans to integrate both systems in the future, according to KIs.

Table 2. National AMR priority pathogens under surveillance in Kenya

Organism	Significance
<i>Escherichia coli</i>	Zoonotic, good indicator organisms because easy to test for in humans and animals, clinically significant and predominantly pathogens
<i>Staphylococcus aureus</i>	
<i>Salmonella</i> spp.	Important diarrhoeal and blood pathogen
<i>Shigella</i> spp.	Important diarrhoeal pathogen
<i>Streptococcus pneumoniae</i>	Significant cause of morbidity/mortality in children < 5 years, understudied
<i>Pseudomonas aeruginosa</i>	Important nosocomial infection, cause of morbidity/mortality in HDU/ICUs, highly MDR
<i>Acinetobacter</i> spp.	
<i>Klebsiella</i> spp.	Highly MDR organism, a predominant cause of infections particularly in sepsis and UTI

Source: Kenya national antimicrobial resistance surveillance strategy 2018–2022 (32). HDU/ICUs: high dependency unit/intensive care units; MDR: multidrug resistant; UTI: urinary tract infection.

Diagnostic and laboratory capacity

Despite significant progress, the lack of laboratory and diagnostic capacity is an ongoing challenge in Kenya's efforts to mitigate AMR. Key challenges include a lack of trained microbiologists and clinical pathologists, a lack of diagnostic and laboratory equipment and frequent stock-outs of critical laboratory reagents and consumables, according to KIs. In recent years, foreign donors have increased funding and technical support for building diagnostic and laboratory capacity; however, sufficient capacity and human resources remain a challenge.

Limited capacity to conduct diagnostic tests contributes to the misuse and overuse of antibiotics. In one study from 2017, 20 clinicians who worked across five public health facilities ranging from a small, rural dispensary to subdistrict, district and referral facilities were interviewed about the treatment of febrile children. The study reported that febrile paediatric patients who tested negative for malaria are sometimes treated with antibiotics due to the insufficient diagnostic capacity needed to further identify the etiology of the disease. However, other factors were also cited for the decision to prescribe antibiotics, including pressure from families and discomfort with the possibility that the child's condition could deteriorate before returning to care (45).

The number of laboratories with the capacity to conduct microbiological and other diagnostic tests, including AST, is unknown, according to KIs. However, even when infrastructural capacity and human resources are in place, health care workers do not always request diagnostic tests. KIs noted that many health facilities affiliated with universities where physicians have trained lack laboratory and diagnostic capacity; as a result, requesting AST and incorporating results from diagnostic testing into clinical decision-making is not common practice. Moreover, there are quality issues with diagnostic testing, as poorly trained laboratory technicians may provide poor-quality AST and other diagnostic test results. These in turn may contribute to the overuse and misuse of antimicrobials. For instance, if a specimen contaminant is reported as the causative agent of a disease, an inappropriate antimicrobial is prescribed, a KI explained.

In 2021, the Ministry of Health published a handbook that set forth guidelines for using microbiological diagnostic tests. Among other guidelines, the handbook states, "[A]ntibiotic susceptibility testing (AST) should be obtained from patients with suspected infections before antibiotics are initiated [and a]ntibiotics should not be prescribed for contamination or colonization...to avoid unnecessary antibiotic prescriptions" (emphasis in the original) (31).

Several donor-supported initiatives have been instituted to improve laboratory and diagnostic capacity through training and material support, such as purchasing laboratory equipment. For example, the American Society of Microbiology established laboratory training that used videoconferencing technology and a case-based learning approach to educate and train technicians and health care workers in various methods for detecting, isolating and identifying AMR priority pathogens (43). In addition, USAID and UK aid/the Fleming Fund have developed and implemented laboratory curricula and training at facilities across the country. The development of the surveillance strategy and accompanying SOPs and training modules plus actual capacity building including mentorship has gone a long way towards building lasting in-country capacity. Despite inadequate resources, there is a system to purchase and maintain laboratory equipment, and laboratory-based training is ongoing.

7. IPC, WASH and immunization

2020/2021 TrACCS status

- A national IPC programme is available and IPC plans and guidelines have been implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.

Current status

- Kenya has a National IPC Advisory Committee in place. The national IPC strategic plan was updated in 2021, and a recent situational analysis found that IPC policies and guidelines are in place at level-four and -five health care facilities.
- IPC Advisory Committee members are also part of the AMR committee.
- Fifteen counties have formed county-level IPC advisory committees, and all 47 counties have appointed an IPC coordinator.
- As of 2016, 66% of health care facilities in Kenya had access to clean water sources, and 86% had access to improved sanitation.

- National vaccination rates are high, with most vaccines reaching or approaching the international goal of 90% coverage. Kenya is transitioning away from foreign donor support for its national vaccination programme and is expected to fully fund its immunization programme by 2027.

Findings

There is a need to:

- address the role of immunization in mitigating AMR in the next iteration of the plan;
- ensure a seamless transition to sustainable domestic financing of routine immunization programmes by 2027 and increase coverage for all vaccines to 90%;
- implement HAI surveillance in 20 facilities by 2030; and
- sustain investments in strengthening WASH in community and health care facilities.

IPC, WASH and immunization are closely intertwined with AMU and AMR. Preventing infections through vaccinations, improved WASH and other hospital- and community-level policies and practices can reduce the overall incidence of infections, including those caused by drug-resistant organisms, thus lowering the need for antibiotic treatment. One study assessed risk factors

for AMR in a high-density informal settlement in Nairobi and found that poor sanitation was a better predictor of AMR infections than individual antibiotic usage. These results suggest that transmission of resistant infections through poor sanitation may be a more important factor with regard to AMR than small changes in AMU in this community setting (29).

IPC

In 2021, Kenya's national IPC strategic plan was updated to cover the years 2021–2025 (46). The plan includes core objectives to:

- scale up surveillance sites for HAIs and AMR to at least 20 by 2030;
- conduct annual assessments of HAIs and AMR; and
- establish information-sharing platforms for IPC, HAIs and AMR.

A recent policy brief from the Ministry of Health reported that IPC policy and guidelines for AMR are in place at level-four and -five health care facilities (20). According to KIIs, 15 counties have formed county-level IPC advisory committees, and 46 (out of 47) counties have appointed IPC coordinators. No survey has yet been done to assess IPC capacity at the county level (apart from a countrywide survey done in 2020/21 on health care facility IPC readiness to respond to the COVID-19 pandemic). However, there is interest in doing so once access to sufficient human and financial resources has been established. Currently, active national HAI surveillance is nonexistent, but individual facilities have conducted studies on HAI prevalence. During the COVID-19 pandemic, extensive support was provided to developing and implementing an M&E system

WASH

In 2016, an estimated 66% of health care facilities in Kenya had access to clean water sources, and 86% had access to improved sanitation (defined as facilities where excreta are separated from human contact, such as piped-sewage systems, septic tanks and latrines). One in three facilities used basic health care waste management (3). A point prevalence survey on the availability of hand hygiene consumables in health care facilities found that 79% had soap and water at the point-of-care in 2019 and 98% of outpatient exam rooms had disinfectant (47).

Immunization

The Kenya Expanded Programme on Immunization, first developed in 1980, recommends immunization against six infectious diseases, including TB, polio, diphtheria, whooping cough, tetanus and measles (48). Since 1980, immunizations have been provided to all children

under 1 year of age; the tetanus toxoid vaccination is also available to pregnant women. By 1990, an 80% vaccination coverage rate for all six vaccines was achieved. In 2001, three additional vaccines – targeting yellow fever, hepatitis B and Haemophilus influenzae type B (Hib) – were added to the national vaccine strategy, followed by pneumococcal conjugate vaccine (PCV) in 2011, a second dose of measles-containing vaccine (MCV2) in 2013 and rotavirus vaccine in 2014 (49). In addition, the national government coordinates emergency response vaccination campaigns in the event of polio, measles, meningitis and influenza outbreaks (48).

Despite significant progress over the past few decades, vaccination coverage for some vaccines remains below the international target of 90%. Official 2019 country estimates for PCV3 and Hib vaccine were 83% and 86%, respectively. The WHO/UNICEF (United Nations Children's Fund) official estimates for the population coverage of these vaccines were slightly higher at 92% (50). Observational studies found vaccination coverage rates similar to the WHO/UNICEF estimates. Between 2010 and 2017, data on vaccine coverage for 49 000 infants and 48 000 children were collected from the Kilifi Health and Demographic Surveillance System. The data indicated that Penta¹ 3 (including Hib) and PCV3 vaccination coverage was over 90% (51). However, the WHO/UNICEF estimate for MCV2 coverage was only 49% (52).

The national vaccination plan is financially supported by Gavi. Due to its economic growth, Kenya is expected to graduate out of Gavi eligibility and therefore will transition away from foreign donor support for its national vaccination programme; the country will fully fund its immunization programme by 2027.

In 2020, 23% of the nearly US\$ 34 million annual expenditure on routine immunization was covered by domestic financial support (53). Kenya's NAP on AMR, which expires in 2022, does not address the role of vaccines in mitigating AMR; the next iteration of the plan could fill this gap. Addressing the role of vaccines will help ensure that the additional benefits of vaccines in the context of AMR are realized at the policy and implementation level. In addition, recognizing the links between AMR and vaccines will ensure that human and financial investments for AMR mitigation and vaccine improvement and expansion efforts will be sustainable.

¹Pentavalent vaccine provides protection to a child from 5 life-threatening diseases – Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib

8. Access and optimal use of antimicrobials

2020/2021 TrACCS status

- Practices to assure appropriate antimicrobial use are being implemented in some health care facilities, and guidelines for appropriate use of antimicrobials are available.
- Kenya has incorporated AWaRe (Access, Watch, Reserve) classification of antibiotics into its AMS strategies.
- AMS activities were strengthened and continued despite COVID-19.

Current status

- There is currently no national surveillance system for AMU or AMC in the human health sector; however, the Ministry of Health is developing a strategy for AMU and AMC surveillance.
- The prescription-only sale of antimicrobials is enforced only to a limited extent, and there are ongoing challenges regarding the quality of medicines.
- The frequency and impact of stock-outs of antimicrobials are unknown. Since the 2019/2020 TrACCS report, Kenya has banned the use of antimicrobials for growth promotion in the animal health sector. The national government also has legislative provisions in place that guide AMU in the animal health and agricultural sectors.
- AMS activities are implemented and coordinated at the facility level. The Ministry of Health has provided multiple resources to guide the national AMS agenda, in both government and private facilities, including national standard treatment guidelines and AMS and diagnostic guidelines.

- Under the leadership of the Ministry of Health and the Ministry of Agriculture, Livestock, Fisheries and Cooperatives, a national AMS integrated plan has been developed, encompassing AMS activities across the human, animal and environmental health sectors.

Findings

There is a need to:

- continue working towards the establishment and implementation of a national AMU/AMC surveillance system and platform;
- increase allocation of human resources, and financial and educational support, to the medicines regulatory authority to aid enforcement of prescription-only sales of antimicrobials by qualified health professionals as well as regular assessment of medicine quality, including antimicrobials;
- establish an M&E framework for AMS programmes to identify facilitators and barriers for their expansion;
- develop a monitoring mechanism to understand the frequency and impact of medicine stock-outs to support work to reduce such stock-out events; and
- ensure that national treatment guidelines are kept up to date based on local data, and implemented and adhered to at all health facilities (e.g. by conducting regular prescription audits and reporting back to prescribers).

Key NAP on AMR objectives to improve access to and appropriate use of antimicrobials include:

- developing and implementing treatment guidelines;
- enhancing regulation of antimicrobial use and sales;
- ensuring access to essential antimicrobials;
- implementing mandatory reporting of AMU data by health care facilities; and
- reviewing laws and regulations.

¹Pentavalent vaccine provides protection to a child from 5 life-threatening diseases – Diphtheria, Pertussis, Tetanus, Hepatitis B and Hib

AMU and AMC in Kenya

There is currently no national surveillance system for AMU or AMC in the human health sector. Consequently, data describing AMU and AMC are limited, although evidence suggests high levels of AMU. One study conducted in an informal urban settlement in Nairobi found that 87% of survey respondents self-reported using antibiotics in the previous 12 months (34). An observational study conducted at a referral hospital in western Kenya reported that 67.7% of all patients were on antimicrobial treatment; medical prophylaxis was the most common reason for prescribing antimicrobials, accounting for 29.0% of all cases (54). The top three prescribed antimicrobials were third-generation cephalosporins (55.0%), metronidazole (41.8%) and broad-spectrum penicillins (41.8%) (54).

The Ministry of Health is currently developing a strategy for national AMU/AMC surveillance; however, a detailed timeline of its implementation is not known, according to KIIs.

Regulations, access and quality

Several laws and regulations stipulate that antimicrobial agents only be dispensed, sold and used with a prescription from a licensed clinician or animal health professional. Nevertheless, Kenya's NAP on AMR recognizes that antimicrobials are commonly sold over the counter (OTC) in both the human and animal health sectors, which may lead to their overuse and misuse. One study conducted among 40 community drugstores in Nairobi in 2018 found that 52% sold antibiotics without a prescription (55). However, a 2017 cross-sectional study that assessed antibiotic dispensing practices at three pharmacies found low levels of OTC antimicrobial sales; 94% (209 out of 222) of all antibiotics dispensed had a corresponding prescription (56).

In addition to overuse and misuse, Kenya's NAP on AMR and other studies have reported that the sale of substandard and falsified antimicrobials is common in the country, which not only impacts the effectiveness of therapy but also causes clinicians to be suspicious of drug quality at their hospital (33, 57). In a 2016 study, researchers assessed the quality of 53 representative samples of amoxicillin or amoxicillin/clavulanic acid from different brands purchased at pharmacies in Nairobi and found that 37.7% of them did not comply with United States Pharmacopoeia quality standards (58). According to KIIs, efforts are ongoing to increase post-market surveillance to verify the quality of antibiotics. In addition, clinically important antimicrobials are frequently out of stock, which may also contribute to the misuse of medicines. However, no national assessment exists to quantify the lack of access and its contribution to antimicrobial misuse.

Since it reported data to the 2019/2020 TrACCS, Kenya has banned AMU for growth promotion in the animal health sector. The national government also has legislative provisions in place that guide AMU in the animal health and agricultural sectors, according to

KIIs. It is, however, not clear to what extent farmers and livestock owners adhere to these regulations.

AMS in health care settings

In response to a survey, more than 90% of physicians at a level-six hospital in Nairobi agreed that antibiotics were overused in hospitals and communities nationwide; in addition, 33.6% of respondents reported difficulties selecting the right antibiotic (33). A 2018–2020 cross-sectional retrospective study examined the reasons for irrational antibiotic prescription for patients in critical care units at Kenyatta National Hospital and found that irrational prescribing resulted most often from clinicians prescribing the incorrect antibiotic, prescribing an incorrect duration of the antibiotic course or prescribing an incorrect frequency for the antibiotic course (59).

AMS activities are implemented and coordinated at the facility level, according to KIIs; however, the Ministry of Health has provided guidelines and resources to guide the national AMS agenda, in both government and private facilities. While still in the early stages of implementation, private hospitals provide mentorship to government facilities and are represented in the AMS TWG. In March 2020, the Ministry of Health published an AMS guideline document titled *National antimicrobial stewardship: guidelines for health care settings in Kenya* (6). The guidelines outline an AMS framework and goals and describe priority areas for investment and intervention, including for R&D, regulation and manufacturing, procurement and distribution, and responsible use. During the 2021 WAAW, the Ministry of Health launched an additional guideline titled *Diagnostic stewardship: a clinician's handbook on appropriate use of microbiologic diagnostic tests*, which provides information to guide clinical diagnosis and treatment (31). The Ministry also released a national AMS integrated plan, which encompasses AMS activities across sectors, including human, animal and environmental health, according to KIIs. According to KIIs, some individual facilities have implemented various AMS activities; however, there has been no systematic implementation or M&E of AMS programmes and activities in public health facilities, nor is it currently known to what extent AMS activities have been implemented in facilities.

In 2019, the Ministry of Health released a revised national EML which introduced the WHO AWaRe classification of antimicrobials (60). The EML will be reviewed again in 2022. Differences in classification (i.e. some antibiotics classified as Watch by WHO that are in the EML as Access antibiotics) have been discussed at length at the country level, and the antibiotics were classified as indicated in the EML based on prescribed indications in the national treatment guidelines. In addition, Kenya has published various national clinical treatment guidelines covering malaria, TB and other infectious and non-infectious diseases (61–63). As yet no assessments or M&E activities have been conducted to understand adherence to such guidelines.

9. R&D

National target

- Develop an economic case for sustainable investment that takes into account the needs of Kenya and increase investment in new medicines, diagnostic tools, vaccines and other interventions.

Current status

- The national AMS guidelines for health care settings outline gaps in R&D, including affordable point-of-care diagnostics, research on molecular mechanisms to inform the development of new anti-infective treatments and social science research on making AMS programmes more sustainable.
- Several academic and medical institutions in Kenya conduct research on AMR, and there are additional international efforts to bolster AMR research.

- While investment in R&D is currently minimal, advocacy efforts to develop an economic case for sustainable investment in new medicines, diagnostic tools, vaccines and other interventions are underway.

Findings

- There is a need to advocate for increased domestic investment in R&D that will generate local evidence to support the optimal impact of interventions and improve collaborations between domestic and international researchers and institutes.

To promote R&D on AMR-related topics, the NAP on AMR set forth several strategies, which include:

- promoting research on public awareness of AMR, including commissioning surveys to assess KAP and the impact of awareness-raising activities;
- promoting R&D of new methods for prevention, diagnosis and treatment of AMR;
- increasing collaboration between public and private research partners; and
- securing budget allocation.

The national AMS guidelines for health care settings outlines key gaps and priority areas for R&D, including development of affordable and easy-to-use point-of-care diagnostics, research on molecular mechanisms to inform the development of new anti-infective treatments and increasing social science research on making AMS

programmes more sustainable (6). Several academic and medical institutions in Kenya conduct research on AMR, including Kenyatta National Hospital (27), the University of Nairobi, the Aga Khan University Hospital (26) and Moi University (24). Additionally, collaborative efforts are ongoing with international institutions such as Washington State University (29) and the United States Army Research Unit (64).

According to one KI, there is very little interest in R&D, and the area has not received much attention from stakeholders. However, advocacy efforts to develop an economic case for sustainable investment in new medicines, diagnostic tools, vaccines and other interventions are in progress, according to a KI.

10. Key findings to accelerate NAP on AMR implementation

Kenya has established a good foundation for addressing AMR, but now needs to scale up and support efforts to make a sustainable impact. National-level governance structures are functional, and progress is being made to develop county-level structures. Periodic education and awareness campaigns are supported by a dedicated national budget. There is AMR surveillance in the human and animal health sectors, and efforts to introduce an AMU/AMC surveillance platform are underway. The Ministry of Health has recently enhanced efforts to improve IPC and AMS by providing national-level guidelines and resources. Despite these successes, continued progress is needed to adequately address the AMR challenge.

Key findings for policy and action indicate the following needs:

1 NAP on AMR status

- Ensure sufficient and sustained domestic funding for NAP on AMR implementation at the national and county level.
- Address AMR as a cross-sectoral public health challenge and acknowledge AMR in other health plans, policies and budgets, such as those for UHC, HIV/AIDS, TB and malaria, emergency/pandemic preparedness and immunization response plans.
- Ensure inclusion of AMR-relevant interventions in the national health strategy.
- Through a participatory approach, develop and endorse the next iteration of the NAP on AMR based on review of the progress and challenges of the current NAP.

2 AMR governance and coordination mechanisms

- Further strengthen communication and collaboration between county and national AMR governance structures through ongoing work to finalize and implement an M&E system.

3 Awareness and knowledges

- Sustain regular AMR awareness and knowledge campaigns and add an M&E component to ensure efforts are impactful and address critical gaps.

- Conduct a nationally representative KAP survey to assess current awareness and understanding of AMR among relevant stakeholders, including policy-makers, human and animal health care providers, livestock owners and the public, to establish a baseline.

4 Surveillance, laboratory and diagnostic capacity

- Improve the quality of existing AST capacity and enhance its utilization.
- Expand the number of human health care sites to 30 sites in the national AMR surveillance system to ensure national representation.
- Expand the capacity to conduct AST in all level-four, -five and -six health care facilities to support appropriate diagnosis and prescription and ensure that AST is conducted and reported correctly.
- Conduct education and training of health care providers on utilizing diagnostic and microbiological tests in clinical decision-making to improve appropriate use of antimicrobials.
- Consider expanding AMR surveillance beyond facility-level surveillance to the community level.
- Address the lack of diagnostic and laboratory equipment, and frequent stock-outs of critical laboratory reagents and consumables.
- Consider funding for diagnostics in the NAP budget.

5 IPC, WASH and immunization

- Ensure a seamless transition to sustainable domestic financing of routine immunization programmes by 2027 and increase coverage for all vaccines to 90%.
- Address the vital role of vaccines in mitigating AMR in the next iteration of the NAP on AMR.
- Implement HAI surveillance in 20 facilities by 2030.
- Sustain investments in strengthening WASH in the community and in health care facilities.

6 Access and optimal use of antimicrobials

- Continue working towards the establishment and implementation of a national AMU/AMC surveillance system and platform.
- Increase allocation of human and financial support to the medicines regulatory authority to aid enforcement of prescription-only sales of antimicrobials by qualified health professionals as well as the regular assessment of medicine quality, including antimicrobials.

- Establish an M&E framework for AMS programmes to understand progress and identify priority actions for expanding programmes to a greater number of facilities.
- Develop a monitoring mechanism to understand the frequency and impact of medicine stock-outs to support work to reduce such stock-out events.
- Ensure that national treatment guidelines are kept up to date based on local data, and are implemented and adhered to at all health facilities (e.g. by conducting regular prescription audits and reporting back to prescribers).

7 R&D

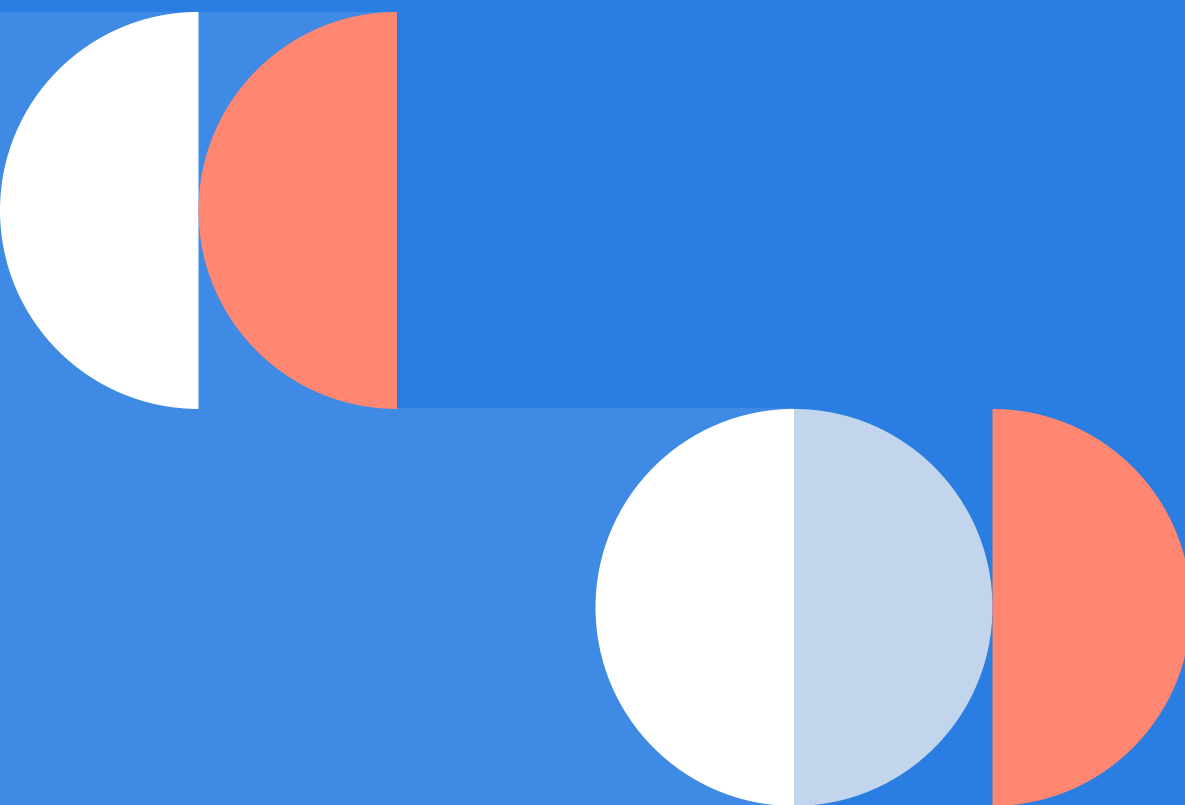
- Advocate for increased domestic investment in R&D that will generate local evidence to support the optimal impact of interventions and improve collaborations between domestic and international researchers and institutes.

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