Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS) in Eight African Countries


June 2021

This draft report was led by The Commonwealth Pharmacists’ Association and developed in collaboration with multiple international stakeholders.
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This document is understood to be accurate as of June 2021, however, it is subject to final ratification and is therefore subject to change.

Please contact amr@commonwealthpharmacy.org to report any inaccuracies.

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## Acronyms and Abbreviations

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<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>AFIDEP</td>
<td>African Institute for Development Policy</td>
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<tr>
<td>AMC</td>
<td>Antimicrobial Consumption</td>
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<td>AMR</td>
<td>Antimicrobial Resistance</td>
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<td>AMRCC</td>
<td>AMR Coordinating Committee</td>
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<td>AMS</td>
<td>Antimicrobial Stewardship</td>
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<td>AMU</td>
<td>Antimicrobial Use</td>
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<td>ARVs</td>
<td>AntiRetrovirals</td>
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<td>AST</td>
<td>Antimicrobial Sensitivity Test</td>
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<tr>
<td>AWaRe</td>
<td>Access, Watch, and Reserve</td>
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<tr>
<td>CDC</td>
<td>Centers for Disease Control</td>
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<td>CE</td>
<td>Continuing Education</td>
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<td>CPA</td>
<td>Commonwealth Pharmacists Association</td>
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<tr>
<td>CPD</td>
<td>Continuing Professional Development</td>
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<tr>
<td>CQI</td>
<td>Continuous Quality Improvement</td>
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<tr>
<td>CwPAMS</td>
<td>Commonwealth Partnerships for Antimicrobial Stewardship</td>
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<tr>
<td>DALY</td>
<td>Disability-Adjusted Life Year</td>
</tr>
<tr>
<td>DHIS-2</td>
<td>District Health Information Software-2</td>
</tr>
<tr>
<td>DHSC</td>
<td>Department of Health and Social Care</td>
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<tr>
<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<tr>
<td>ESBL</td>
<td>Extended Spectrum Beta-lactamase</td>
</tr>
<tr>
<td>EQA</td>
<td>External Quality Assessment</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
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<tr>
<td>FF</td>
<td>Fleming Fund</td>
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<tr>
<td>GARP</td>
<td>Global Antibiotic Resistance Partnership</td>
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<tr>
<td>GLASS</td>
<td>Global Antimicrobial Resistance and Use Surveillance System</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>HAI/HCAI</td>
<td>Healthcare associated infection</td>
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<tr>
<td>HCFs</td>
<td>Healthcare Facilities</td>
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<td>HIV</td>
<td>Human Immunodeficiency Virus</td>
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<tr>
<td>ICU</td>
<td>Intensive Care Unit</td>
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<td>IHR</td>
<td>International Health Regulations</td>
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<tr>
<td>IPC</td>
<td>Infection Prevention and Control</td>
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<td>JEE</td>
<td>Joint External Evaluation</td>
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<tr>
<td>KCMC</td>
<td>Kilimanjaro Christian Medical Centre</td>
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<tr>
<td>KEMSA</td>
<td>Kenya Medical Supplies Authority</td>
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<tr>
<td>LMICs</td>
<td>Low and Middle Income Countries</td>
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<tr>
<td>LMIS</td>
<td>Logistics Management Information System</td>
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<tr>
<td>MAAP</td>
<td>Mapping Antimicrobial Resistance and Antimicrobial Use Partnership</td>
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<tr>
<td>M&amp;E</td>
<td>Monitoring and Evaluation</td>
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<tr>
<td>MDA</td>
<td>Ministries, Departments and Agencies</td>
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<tr>
<td>MoH</td>
<td>Ministry of Health</td>
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<tr>
<td>MRSA</td>
<td>Methicillin-resistant Staphylococcus aureus</td>
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<tr>
<td>MTaPS</td>
<td>Medicines, Technologies and Pharmaceutical Services</td>
</tr>
<tr>
<td>MTC</td>
<td>Medicine and Therapeutics Committee</td>
</tr>
<tr>
<td>NAP</td>
<td>National Action Plan</td>
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<tr>
<td>NASIC</td>
<td>National Antimicrobial Stewardship Interagency Committee</td>
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<tr>
<td>NCC</td>
<td>National Coordination Centre</td>
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<tr>
<td>NDA</td>
<td>National Drug Authority</td>
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<tr>
<td>NGO</td>
<td>Non-Governmental Organisation</td>
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<tr>
<td>NHS</td>
<td>National Health Service</td>
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<tr>
<td>NICD</td>
<td>National Institute for Communicable Disease</td>
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<tr>
<td>NMCG</td>
<td>National Multi-Sectoral Coordinating Group</td>
</tr>
<tr>
<td>NMRL</td>
<td>National Microbiology Reference Laboratory</td>
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<tr>
<td>OAQs</td>
<td>Overarching Evaluation Questions</td>
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<tr>
<td>OECD-DAC</td>
<td>Organisation for Economic Co-operation and Development-Development Assistance Committee</td>
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<tr>
<td>OH</td>
<td>One Health</td>
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<tr>
<td>OHP</td>
<td>One Health Platform</td>
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<td>OIE</td>
<td>World Health Organisation of Animal Health</td>
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<tr>
<td>PPB</td>
<td>Pharmacy and Poisons Board</td>
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<tr>
<td>PPE</td>
<td>Personal Protective Equipment</td>
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<tr>
<td>PPS</td>
<td>Point Prevalence Study</td>
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<tr>
<td>PVS</td>
<td>Performance of Veterinary Services</td>
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<tr>
<td>QALY</td>
<td>Quality-Adjusted Life Year</td>
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<tr>
<td>ReAct</td>
<td>Action on Antibiotic Resistance</td>
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<tr>
<td>SCC</td>
<td>Site Coordinating Centre</td>
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<tr>
<td>SPINE</td>
<td>Surveillance Programme of In-patients and Epidemiology</td>
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<tr>
<td>SSI</td>
<td>Surgical Site Infection</td>
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<tr>
<td>TB</td>
<td>Tuberculosis</td>
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<tr>
<td>THET</td>
<td>Tropical Health Education Trust</td>
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<tr>
<td>TrACSS</td>
<td>Tripartite AMR Country Self-Assessment Survey</td>
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<tr>
<td>TWG</td>
<td>Technical Working Group</td>
</tr>
<tr>
<td>UK</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>UofSC</td>
<td>University of South Carolina</td>
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<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>UTI</td>
<td>Urinary Tract Infection</td>
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<tr>
<td>WASH</td>
<td>Water, Sanitation and Hygiene</td>
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<tr>
<td>WASH-FIT</td>
<td>Water and Sanitation for Health Facility Improvement Tool</td>
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<td>WHO</td>
<td>World Health Organization</td>
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1. Introduction
1.1. Introduction

Antimicrobial Resistance (AMR) is a global health problem threatening the delivery of safe, effective healthcare in all settings and all countries. The ability of microorganisms to become resistant to the effect of antimicrobials is an inevitable evolutionary process, however misuse and over use of antimicrobial agents exacerbates this. This has led to an increasing focus globally on Antimicrobial Stewardship (AMS).

The Review on Antimicrobial Resistance commissioned by the UK Prime Minister and published in 2016 estimated that, by 2050, antimicrobial resistant infections could be responsible for 10 million deaths globally each year, more than cancer, road traffic accidents, diabetes and diarrhoeal disease, with developing countries and large emerging nations bearing the brunt of this problem. The impact of this will be felt in all healthcare provision with routine surgeries and minor infections becoming life-threatening once again.

Commonwealth Partnerships for Antimicrobial Stewardship (CwPAMS) is managed by the Commonwealth Pharmacists Association (CPA) and the Tropical Health Education Trust (THET). CwPAMS is a global health partnership programme funded by the Department of Health and Social Care (DHSC) using UK aid funding, managed by the Fleming Fund. The Fleming Fund is a £265 million UK aid investment to tackle AMR by supporting low- and middle-income countries to generate, use and share data on AMR and is managed by the UK Department of Health and Social Care.

The CPA’s vision is to “Be the umbrella professional organization for pharmacists in the Commonwealth”. Its mission is “Empowering pharmacists to improve health and wellbeing throughout the Commonwealth” and its strategic goals are to: develop the pharmacy workforce and build capacity by advancing education for the benefit of the public, support pharmacists to strengthen healthcare systems through the safe and effective use of medicines and promotion of healthier lifestyles, and to advocate for the advancement of the pharmacy profession in order to improve access to medicines and reduce health inequalities. THET is an international NGO with expertise in delivering global health partnerships.

As of December 2020, CwPAMS had supported partnerships between the UK NHS and academic institutions and institutions in Ghana, Tanzania, Uganda and Zambia to work together on AMS initiatives. The aim of these partnerships was to enhance the implementation of protocols and evidenced based decision making to support antimicrobial prescribing and support capacity for antimicrobial surveillance, supporting objectives 1, 2, 3 and 4 of the Global AMR action plan. The funding for these projects was limited to 12 health partnerships (involving at least 24 institutions across 5 countries), however the learning from these projects has been, and continues to be, applicable to many healthcare institutes worldwide.

As part of an extension to the CwPAMS programme, scoping previously undertaken in Ghana, Tanzania, Uganda and Zambia has been updated, and now also includes elements of One Health. Kenya, Malawi, Nigeria and Sierra Leone are new participants in the CwPAMS programme and scoping reports have been developed with a refreshed framework and with the benefit of lessons learned from the existing countries.

These eight reports are available as standalone documents.
1.2. Aims

The aims of the scoping study:

- To map the current AMS landscape and recognise key gaps where technical support would be valuable;
- To identify current actors and initiatives related to AMS projects and their potential for synergy;
- To enable the development of workstreams with local stakeholders that can be sustained after the project.

Rapid systematic evidence synthesis was undertaken to:

- Update and consolidate four prior scoping reports (Ghana, Tanzania, Uganda, Zambia);
- Develop four new scoping reports (Kenya, Malawi, Nigeria, Sierra Leone);
- Combine findings in a summary report with recommendations;
- Develop an International Resources Toolkit.
1.3. Methodology

This summary report includes an evidence synthesis drawn from the scoping reports of the eight countries: Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda and Zambia. The scoping reports underwent an extensive review and editing process with input sought from key stakeholders within and across countries, local experts and programmatic leads. Further analysis of these reports resulted in the identification of core themes within each reporting subtopic which were further refined through a workshop.

Applying a rapid evidence synthesis approach to scoping

A literature search using topics and free text relating to antimicrobial stewardship was conducted on the Medline database via PubMed for each country. 2197 articles were identified and screened for relevance to the scoping review objectives. 267 articles were selected and reviewed in full. 49 additional articles were found from reference and citation searches of the selected articles. An additional search was conducted for One Health literature for each country resulting in 204 articles identified and screened for relevance and 91 articles cited.
Additionally, purposive searches of key organisational websites for report and policy documents were conducted. This was supported by local expert correspondence to identify relevant reports and acting bodies in each country. This identified 342 relevant articles for the scoping review.

For each country, data was extracted, thematically analysed, and applied to a report framework built from the previous scoping study. To ensure suitability to the practical aims of the scoping review, a best fit approach was taken to the reporting framework, which was refined throughout the evidence synthesis.

The study findings informed the discussion guide for a series of online focus group discussions with participants and stakeholders in each country.

The focus group discussions were conducted with a total of 55 experts with representation from the National AMR Committees, Antimicrobial Stewardship, One Health, Infection Prevention and Control, Medicine, Nursing and Pharmacy. Prior to the focus group discussion, the findings so far were shared for information and to gain targeted feedback. Additional insights were incorporated and used to refine the findings so far. A peer review approach was taken by the research team to ensure research rigour and trustworthiness.

The eight draft scoping reports were then shared with over 56 reviewers with representation from each country and the UK to ensure they accurately reflect the situation experienced and subsequently refined to incorporate this valuable feedback.
2. Results

The combined findings from the literature review, focus groups and consultation were separated into overarching thematic areas. The key findings relating to each area are summarised within the following sections:

2.1. The current status (Review of Literature)
2.2. WHO assessments
2.3. National AMR strategies and their status of implementation
2.4. Antimicrobial resistance surveillance
2.5. Status of antimicrobial stewardship, surveillance and infection prevention and control activities
2.6. One Health initiatives in relation to antimicrobial stewardship
2.7. Stakeholder and AMR Coordinating Committee engagement
2.8. Digital health
2.9. The coverage of AMR and AMS in pharmacy training (both pre-service and in-service)
2.10. Access to antimicrobials, supply of medicines
2.11. Impact of COVID-19
2.12. Insights and evaluation of CwPAMS so far
2.13. Case studies on practice
2.14. AMS assessment tool
2.1. The current status (Review of Literature)

The rise of antimicrobial resistance (AMR) is increasingly becoming a public health threat globally. However, in sub-Saharan Africa, inadequate surveillance and regulation make it even more challenging to define the status of AMR and implement effective and sustainable programmes(1). Worsening AMR trends have been identified in all of the eight assessed countries according to country-specific situational analyses, joint external evaluation reports and among other studies from hospital to national level. Coupled with the burden of infectious diseases such as tuberculosis (TB), respiratory infections, and diarrhoeal diseases, emerging resistance to treatments for these diseases have potentially enormous impacts in the assessed countries(2,3). Antimicrobials have been valuable in fighting organisms causing infections and infectious diseases for decades, but, due to the increased and often inappropriate use of these medicines, an increasing number of these organisms have developed resistance which calls for an imperative inter-sectoral collaboration to proffer solutions that will address this looming threat. In all assessed countries, national guidelines have identified the need to address inadequate AMR surveillance and to enable legislation to monitor the rise in AMR(4,5).

Several studies have shown resistance to the most commonly used antimicrobials such as penicillin, tetracyclines, ciprofloxacin and cotrimoxazole(16). These results highlighted the importance of upscaling AMR surveillance while monitoring treatment protocols for patients with common illnesses that require antimicrobials. For example, the recommended treatment for urinary tract and bloodstream infections is ciprofloxacin, to which there is high rate of resistance, leading to the use of ineffective treatment.

Resistance to common antimicrobials has been identified in multiple common microbial organisms including Staphylococcus aureus and other Staphylococci (including Methicillin-resistant Streptococcus pneumoniae, Salmonella typhi, Shigella spp, Escherichia coli and Vibrio Cholerae(6–8). Several studies suggest the following as drivers of AMR due to gaps in health systems capacity as well as supply and regulation of antimicrobials in all multiple sectors, these are detailed in Box 1(5, 9,10):

**Box 1. AMR Drivers**

- Inadequate Infection Prevention and Control (IPC)/Water Sanitation and Hygiene (WASH) infrastructure in Healthcare Facilities (HCFs) i.e., soap and handwashing;
- Self-medication (patients access the hospital after self-prescribing and there are strong public opinions on antibiotics; patients have prior knowledge of previous infection treatments, which may lead to the wrong choice of medication, for example, the prevalent use of antibiotics for viral infections);
- Use of antibiotics as a preventative measure;
- Failure for patients to complete their courses of prescribed antibiotics;
- Poor immunisation strategies;
- Low availability of healthcare workers against the patient ratios results in ineffective prescribing;
• Poor knowledge and education amongst antibiotic prescribers;
• Ineffective medicine regulation (over the counter supply and ineffective regulation of supply chains);
• Availability of antibiotics over the counter (clients request for antibiotics);
• Availability of poor quality and or counterfeit antimicrobial agents;
• Misuse of antimicrobial agents in humans, animals, and agriculture;
• Absence/lack of capacity in laboratories to accurately identify and detect resistance. There are few health facilities with lab capacity to do culture and sensitivities across all countries and they face several challenges including lack of reagents, lack of patience by clinicians to wait for lab results before prescribing, long turnaround times for results to come, poor relationships between laboratory staff and the clinicians and poor teamwork;
• The difficulties in differentiating a viral infection with a bacterial one leads to prescribers making unnecessary antibiotic prescriptions for even viral infections;
• Lack of proper surveillance programmes for Multidrug-Resistant Organisms at the local and national level;
• Subsidising the cost of medicines through health insurance has been shown to increase the consumption of medicines especially antibiotics, which in turn may contribute to irrational use;
• Poor documentation and poor compliance with treatment guidelines are common problems encountered in antimicrobial prescribing.

All the eight assessed countries participated in the WHO Joint External Evaluations (JEE); a voluntary multisectoral process to assess a country’s capacity to prevent, detect and respond to public health risk while informing the development of national action plans to implement International Health Regulations (IHR). Box 2 is a summary of recommended priority actions for AMR from the JEE, which are currently under implementation(7,11–15).

**Box 2. Recommended Priority Actions**

• Developing national action plans to address AMR. This should align with the Global Action Plan on AMR, incorporating action by all relevant sectors, particularly from health, veterinary and agriculture sectors;
• Increasing political engagement, awareness within the health system and actions on AMR;
• Improving systems for surveillance and reporting AMR, including the animal health sector;
• Strengthening laboratory capacity through the involvement in WHO/National Institute for Communicable Diseases (NICD) External Quality Assessment (EQA) programme;
• Developing and implementing AMS programmes in health care settings and pharmacovigilance systems in public and animal health sectors;
• Developing and implementing an antimicrobial policy to guide the appropriate prescription and use of antimicrobials in human and animal health;
• Developing Standard Operating Procedures and tools for effective coordination and communication, including AMR data sharing and reporting for human and animal health;
• Harmonising the country’s different programmes with different IPC policies and providing information on availability and implementation of IPC at hospitals and the number of trained IPC professionals;
• Improving human resources and infrastructure to boost laboratory capacity for AMR testing for both human and animal health;
• Strengthening quality management systems in the laboratories performing antibacterial susceptibility testing in the human and animal health sectors;
• Improving awareness of the importance of appropriate use of antimicrobials among health care workers, the veterinary workforce, and the public.

a. Antimicrobial monitoring, stewardship and use

Optimisation of antimicrobial use through stewardship is an increasingly fundamental priority given the extent of increasing AMR. Evidence has shown inappropriate use of antimicrobials in hospitals, community settings and veterinary treatment(11–15,17,18). As a result, AMR prevention has targeted healthcare facilities, communities and the animal health sector. There are variations in the status of AMS programme implementation. However, despite recent strides, in many countries there are significant challenges with leadership commitment, pharmacy expertise, reporting, education and accountability.

More than half of the antimicrobial medicines registered in the national drug registers in Kenya, Uganda and the United Republic of Tanzania are non-essential(19). Antimicrobial medicines that are not included in essential medicines lists do not appear in standard treatment guidelines, which is likely to lead to the inappropriate use of these non-essential antimicrobials. Data shows that particularly high proportions of non-essential second- and fourth generation cephalosporins are registered. Therefore, the high rate of registration of non-essential second- and fourth generation cephalosporins is a cause for concern(19).

A 2011 situational assessment of treatment of children in Uganda and Zambia found high prescription of antibiotics, and higher dosing for most conditions(20). Additionally, there is evidence of(2,3,6):
• suboptimal compliance to treatment guidelines
• lack of clarity in documentation
• prolonged surgical antibiotic prophylaxis
• extensive misuse of the first-line drug of choice in treating uncomplicated infections
• lack of awareness among health workers.

b. Infection prevention control

Infection prevention and control (IPC) is significant in reducing the need for antimicrobials. The scoping research found that all countries have a national IPC plan, policy and documents to cater to the IPC and WASH in HCFs. However, in most countries, IPC has been a neglected area in many HCFs, and it is evident that there is a need for strengthening activities in this area. For example, in Sierra Leone, high rates of Ebola virus disease transmission in healthcare facilities prompted the need for IPC improvement in the healthcare system.
There is little data available on the incidence of HCAIs, but it has been widely recognised as an issue to address. The actual burden of HCAIs in most countries is unknown due to microbiological data scarcity, inaccurate patient records, lack of electronic medical records and inadequate surveillance systems to track HCAIs. However, studies indicate Urinary Tract Infections (UTIs), Surgical Site Infections (SSI) and healthcare-associated pneumonia as some of the most common HCAIs in Africa(21).

SSI rates in low- and middle-income countries (LMICs) range from 8% to 30% of procedures, making them the most frequent HCAI with substantial morbidity, mortality, and economic impacts(22). The risk for patients developing an SSI in developing countries is significantly higher than in developed countries(23).

Approximately 10% of hospital procedures in LMICs result in a HCAI. Containing those infections is an integral component of a quality health care system and is particularly critical as the world grapples with the COVID-19 pandemic. It is also key to tackling AMR. One such approach is the USAID MTaPS Program that has been supporting Kenya and Uganda to implement a continuous quality improvement (CQI) process in IPC procedures(24).

Effective IPC practices require training and monitoring of the health workforce. However, there is a challenge in adherence to training. Several studies were conducted on knowledge, awareness and practice of IPC by health care workers in most countries with results showing poor hygiene compliance due to inadequate training, poor infrastructure and lack of PPE(25–27). Studies have also shown wide gaps in IPC compliance across different health professional groups with non-clinical staff, cleaners, pharmacists, those with secondary level qualification and healthcare workers who report insufficient PPEs at risk of non-compliance with IPC protocols(28).
2.2. World Health Organization assessments

Several World Health Organization (WHO) documents are available to help inform policy and decision-makers by providing data and guidelines on the burden of AMR, IPC, WASH, among other critical areas. The table below highlights some of the key areas each country has been involved in. The different WHO tools and guidelines used have been represented below:

<table>
<thead>
<tr>
<th>Country</th>
<th>Enrolment to GLASS-AMR</th>
<th>WHO JEE</th>
<th>WHO Methodology for PPS</th>
<th>NAP</th>
<th>WHO WASH FIT</th>
<th>WHO Global Plan on AMR</th>
<th>Global TrACSS</th>
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</thead>
<tbody>
<tr>
<td>Kenya</td>
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<td>Malawi</td>
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<td>Uganda</td>
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<td>Tanzania</td>
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<td>Zambia</td>
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<td>Nigeria</td>
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<tr>
<td>Sierra Leone</td>
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</tbody>
</table>

There has not been any AMR burden share and reporting to GLASS across all the 8 countries. All the countries except Sierra Leone have enrolled into GLASS. No notable evidence of AMR activities have been reported to the GLASS data cell. There is no literature evidence supporting implementation or data collection across the 8 countries.
2.3. National antimicrobial resistance strategies and their status of implementation

In all countries a national AMR action plan or strategy was available which included some or all of the elements deemed necessary for AMS. This is a promising advance which represents increased policy awareness and commitment to tackle AMR. This was led by an AMR coordinating committee (AMRCC) or platform of multi sector stakeholders, who coordinate implementation activities. (Further insights into AMRCC approaches are provided in Annex 1). However, there were various degrees to which these plans have been implemented, with notable barriers remaining including:

- Gaps in operationalising One Health interventions;
- Lack of monitoring processes for NAP-AMR implementation;
- The focus group discussions indicated that there is a lack of/insufficient dedicated financial resources to support the implementation of the plan as well as a lack of/insufficient means to measure cost-efficiency, for example, Quality-Adjusted Life Year (QALYs), Disability-Adjusted Life Year (DALYs), mortality rates, costs associated with infectious disease/bed spaces/drugs and treatment to assess the impact of AMR.

a. Notable themes in NAP status

All countries adopted a multi-stakeholder approach to developing their National Action Plans. The stakeholders included WHO, FAO, Fleming Fund, respective government line ministries, among others. Out of the eight assessed countries, the Malawi NAP is not readily available to stakeholders. Based on the focus group discussion, the current NAP is under review to improve implementation strategies, reflect indicators achieved and move to the next level of local context implementation to achieve desired outcomes.

The individual country NAPs were developed based on the recommendations of the GARP situation analysis on AMR in the respective countries.

Some priority gaps during the NAP drafting period identified were(3):

- Insufficient public awareness and weak coordination of AMR awareness activities by government and partners like vertical disease control programmes;
- Poor ‘One Health’ coordination of animal and human national disease surveillance systems, non-existence of a national AMR laboratory surveillance system and no dedicated funding for AMR control activities;
- Non-existence of a federal IPC coordinating body or guidelines, and poor budgetary support for IPC activities in health facilities;
- Lack of AMS in both private and public sectors;
- A complete absence of studies on AMR's health and economic impact in Nigeria and poor coordination of research on antibiotic use.

Across all countries, there were representatives from the various pharmaceutical bodies during the drafting of the NAP. One of the NAP principles in all eight countries is the use of a One Health
approach. There is a common understanding that AMR needs collective actions, including human and animal production, crop agriculture and environmental activities. The One Health plan highlights the strategic objective to strengthen responses to AMR and the capacities of the One Health platform and stakeholders to address AMR effectively.

Most of the countries’ NAPs have clear implementation plans with Monitoring and Evaluation (M&E) indicators. However, there is limited documented evidence on the status of implementation of the NAPs. Despite the lack of information on monitoring processes for NAP-AMR implementation, Fleming Fund country grant activities are implemented to support the NAP with an M&E plan to track progress.

Some of the NAP implementation challenges identified during the focus group discussions include:

- Lack of adequate funding sources, compounded by poor data availability and monitoring, and weak diagnostic and regulatory capacities throughout the health system;
- There is still limited functionality of sector-specific technical working committees, mainly due to the time needed to nominate members officially;
- The committees are also heavily reliant on development partners’ support to perform their core functions, a threat to sustainability.

Other noted challenges were around monitoring and reporting against the action plan indicators. It will therefore be vital that the CwPAMS programme is developed in line with the National Action Plan and its ongoing initiatives support its implementation. Within this, there is a need to consider the approach to measure progress robustly and support capacity building in this area.
2.4. Antimicrobial resistance surveillance

Although most hospitals across all eight countries still lack surveillance capacity, AMR surveillance is increasing with the Fleming Fund availing funds for country-specific interventions.

Ghana
During the previous scoping study, there was no national coordinating centre for AMR surveillance but independent activities to promote AMR surveillance were carried out by some hospitals and public health laboratories. IQVIA conducted The Fleming Fund AMR/AMU national surveillance (MAAP) in Ghana between December 2020 and March 2021. With support from the Fleming Fund, seven sentinel sites were identified nationwide. Sentinel site coordinating committees (SCC) were formed in the first quarter of the year 2020. Ghana has a Fleming Fund Country Grant of £993,293 from December 2020-July 2021 to oversee the refurbishment of all laboratory sites, work with the Ghana Health Service to ensure appropriate transport, asset management and installation processes are followed, as well as building capacity of the Ghana Health Service to manage equipment maintenance effectively, procure consumables and reagents on behalf of the Fleming Fund for sites, and ensure the Ghana Health Service is engaged and capacitated to take over this function, work with other service providers to ensure sites are ready for equipment installation and training by equipment providers, work with service providers and Ghana Health Service to support maintenance planning for laboratory equipment, as well as ensuring adequate service maintenance plans are in place with equipment providers.

Kenya
The MoH and the National Microbiology Reference Laboratory (NMRL) have published a national antimicrobial surveillance strategy. The MoH is currently piloting surveillance at four sites: Thika, Kitale, Malindi, and Machakos. Kenya has also launched a national AMR surveillance strategy, a communication strategy on containment and prevention of AMR, an infection prevention and control strategy and a health database for 19 sites. Kenya has a Fleming Fund Country Grant of £6,000,000 from September 2019-March 2021 to strengthen One Health governance structure for AMR, AMU and AMC surveillance, strengthen AMR and AMU/AMC surveillance system in the human and animal health sectors.
### Malawi

Five sentinel sites have been established for AMR. The NMRL performs antimicrobial susceptibility testing on isolates sent from surveillance sites (32). The criteria for referral to the NMRL is resistance to three or more antibiotics. Most sites are in urban areas. NMRL also provides annual training in AMR for sentinel sites. Malawi has a Fleming Fund Country Grant of £3,395,845 from January 2020-August 2021 to strengthen One Health governance structure for AMR, AMU and AMC surveillance and strengthen AMR surveillance systems in the human and animal health sectors.

### Nigeria

In a 2016 Fleming Fund report on the overview of AMR surveillance systems, Nigeria had a well-developed structure for collecting information on resistance to anti-tuberculosis drugs. However, the country lacked a system for checking the quality of antimicrobials, but there were no policies relating to AMR surveillance at the federal level (60). Nigeria has a Fleming Fund Country Grant of £9,438,377 from May 2019-September 2021 to strengthen One Health governance structure for AMR and AMU surveillance, strengthen AMR and AMU surveillance system in the human health sector, strengthen AMR and AMU surveillance in food animals and establish a foundation for AMR surveillance in aquaculture species and in the environment.

### Sierra Leone

IQVIA conducted The Fleming Fund AMR/AMU national surveillance (MAAP) between September 2020 to January 2021. There is country level agreement on data storage and privacy (publishing) between the ministry of health and the MAAP consortium. In 2018, TDR/WHO funded surveillance on AMR in patients with clinical features of HCAIs in an urban tertiary hospital in Sierra Leone (6). There are individual projects on AMR and there are public health laboratories that do some AMR work, but this is mainly focused on TB and HIV. There is no record of engagement with global PPS. Sierra Leone has a Fleming Fund Country Grants of £444,827 from November 2020-December 2021 and £1,500,000 from October 2020-February 2022 to strengthen the One Health governance structure for AMR and AMU surveillance and strengthen the AMR and AMU surveillance system in the human health sector.
### Tanzania
A network of regional and national laboratories working with the National Health Laboratory Quality Assurance and Training Centre can diagnose resistant infections. Tanzania scored relatively well on laboratory capacity, but standard procedures, staff, and equipment availability are still challenging (61). Tanzania has a Fleming Fund Country Grant of £1,500,000 from March 2021-January 2022 to strengthen governance of AMR Surveillance with a One Health approach, sustain existing support to AMR and AMU surveillance in human health and expand to additional sites and to sustain existing support to AMR/U/C surveillance in terrestrial animals and expand to additional sites.

### Uganda
A Technical Working Group on AMR Surveillance has produced a National Antimicrobial Resistance Surveillance Plan, awaiting approval for implementation. Uganda’s AMR-NCC has collaborated extensively with stakeholders such as CDC, GHSP and Fleming Fund to implement surveillance. Uganda has a Fleming Fund Country Grant of £4,100,000 from November 2020-February 2022 to strengthen governance of AMR surveillance with a One Health approach, sustain existing support to AMR and AMU surveillance in human health and expand to additional sites, sustain existing support to AMR and AMU/C surveillance in terrestrial animals, and expand to additional sites and expand AMR surveillance to include the environment sector.

### Zambia
Several programmes aim to strengthen AMR surveillance capacity. These include the Fleming Fund Country Grant in collaboration with the Centre for Infectious Disease Research in Zambia and the University of Zambia School of Veterinary Medicine, PATH. The grant availed £2,750,680 from August 2019 - February 2021 with the objectives of developing a costed operational workplan for sustained and expanded AMR and AMU surveillance, strengthen One Health governance structure to oversee and monitor AMR and AMU surveillance at the national level, improve microbiology laboratory capacity and capability for quality assured AMR and AMU surveillance in the human health and animal health sectors.
2.5. Status of antimicrobial stewardship, antimicrobial use surveillance and infection prevention control activities

a. Surveillance of antimicrobial use (including Point Prevalence Survey)

Infections are a leading cause of death in LMICs and the burden of AMR is difficult to estimate. Most data that support treatment guidelines comes from studies and surveillance systems from developed countries. However, even in developed countries, the gaps still exist in surveillance of bacterial pathogens that cause animal and human infections(31). Reports have shown that most countries' capacity for laboratory testing for AMR is centralised, with minimal capacity in districts. Several country-specific examples are outlined below:

According to information from colleagues in Uganda, at all AMR designated surveillance sites, there has been rejuvenation of Medicine and Therapeutics Committees (MTCs), boosting IPC capacity, Point Prevalence Surveys (PPS) and application of WHO AWARE tool to address antimicrobial consumption (AMC) challenges. There are also ongoing efforts to set up the Pharmacy AMR National Coordination Centre (NCC) at the Ministry of Health (MoH) pharmacy dept and start sharing data with GLASS. In Malawi, sentinel sites are used for AMR surveillance monitoring for TB, paediatric meningitis, rotavirus and HIV.

The focus group discussions showed that WHO PPS Survey has been done in local hospitals in Sierra Leone. Data has been collected but has not yet been published. A PPS was performed in the Kilimanjaro Christian Medical Centre (KCMC) (tertiary hospital), Mawenzi (regional) and St. Joseph (district) hospital in Tanzania from November and December 2016. Antibiotic use in all patients admitted for more than 24 hours and those undergoing surgery was recorded. The results of the PPS in these three hospitals from different levels of healthcare in Tanzania showed a prevalence of antibiotic use in hospital inpatients of 44%. This is comparable to results from African countries which have participated in the Global PPS (50%) as well as surveys from individual sub-Saharan African countries such as Botswana 70.6% and Kenya 67.7%(30).

In Kenya, a retrospective review of antimicrobial consumption has been conducted with the support of the Fleming Fund through IQVIA, data analysis and report writing are in progress. PPS in 6 hospitals have been finalised and data analysis and report writing are ongoing.

Malawi has approximately 40% of hospital laboratories detecting, isolating and identifying antimicrobial-resistant organisms. Reports, however, show insufficient action on several antibiotic sensitivity results(31). Currently, sentinel sites are used for AMR surveillance monitoring for TB(31–33). According to the focus group, the surveillance programme is not done at a national level but is more efficient at the institutional level through partnerships and collaboration. A national microbiology reference laboratory (NMRL) for AMR monitors nine priority pathogens from human and veterinary diagnostic laboratories. Standard treatment guidelines are under review using NAP and GLASS routine data. Based on the focus group discussions, PPS is underway in 7 Fleming Fund health facilities out of a total of 34. Albeit being delayed due to COVID-19 and ethical issues, there are plans to expand. As per requirement, there was a need for ethical approval from the National Ethics Committee if findings are to be published. The data will be used to inform AMR
guidelines. However, PPS is needed in other facilities, which is currently a challenge due to a lack of funds.

Nigeria was part of the African countries trained on the WHO methodology for PPS with Botswana, Burkina Faso, Burundi, Cameroon, Côte d’Ivoire, Kenya, Madagascar, Mozambique, United Republic of Tanzania, and Zimbabwe. The training allowed for the development of operational plans for conducting national surveys by 2019(34). As a result, the country has adopted the WHO PPS tool, which provides for reporting stockouts.

b. Antimicrobial guidelines

Prescription and dispensing of antimicrobials are guided by the various national clinical guidelines across all the eight countries. Kenya is the only country out of the eight with national AMS guidelines for the healthcare settings while the rest of the countries have several guidelines such as Standard Treatment Guidelines and Essential Medicines Lists.

According to direct communications (conducted during the previous scoping study) with the AMR focal persons, most countries are updating their guidelines with evidence from the GARP, situational analyses etc. All countries have a broad legal framework for medicines control, including antimicrobials. However, there is evidence of poor adherence. There is currently limited literature on the status of the implementation of these guidelines. While monitoring and regulation capacity has been challenging in hospitals due to a lack of AMS tools and initiatives, there is anecdotal evidence of implementation.

c. Behavioural barriers to AMS

Despite awareness of the need to act on AMR at a ministerial level and policies in place, these are not implemented in practice due to resource limitations. AMS activities are affected by the behaviour of health workers, individuals and service providers.

Several behavioural barriers in the AMR fight include(10,20,35–37):

- Prescribers continue to permit access to antimicrobial drugs without prescription due to limited enforcement of legislation;
- Individuals take antimicrobials as a way of infection prevention instead of treatment;
- Unaffordability of antimicrobials results in purchasing less than prescribed and patients tend not to finish their prescribed courses;
- Self-medication is common with medicines from market vendors, pharmacies, drugs shared with friends and family;
- There is a lack of medical supplies, long distances to health facilities and poor attitudes of medical professionals towards patients. The misuse of antibiotics in hospitals, while not well documented, is evident, and there are no national guidelines for the use of antibiotics in ICUs;
- Guidelines are not adhered to and hardly used, which may be due to a lack of faith in the advice.
- Updated information on AMR is limited and not circulated or collated to be available from one source, so it does not influence clinical practice. This has led to the prescription of antibiotics being a matter of trial and error. The Pharmaceutical Society of Uganda has been involved in the recent updates to the clinical
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**guidelines. One key outcome from a CwPAMS programme could be the generation of evidence that can contribute to the guidelines and inform clinical practice.**

- Financial incentives by privately selling antibiotics in hospitals (including poly pharmacy). For example, the national referral hospitals and private not for profit hospitals have a private arm where you can buy medicines;
- Failure to adhere to legislative measures. In May 2015 the Uganda National Drug Authority (NDA) was sued for failing to crack down on illegal drug shops and clinics. Several drug shops and private clinics do not conform to the required standards and remain operational in many districts;
- Lack of diagnostic tests in medical decision-making, increasing or decreasing the probability of infection in a patient based on the result;
- Poor education on IPC and AMR;
- Characteristics of the facility and the health-care worker, such as the health-care worker’s knowledge and the availability of supplies suggests that improvements will require a broader focus on behavioural change. Findings also emphasise the need to create hospital leadership buy-in in order to overcome challenges in AMS programmes in the response to AMR.

### d. Initiatives to improve AMS

During the focus groups, discussions showed that there is still considerable progress to be made in AMS implementation. Some of the reasons include several barriers, such as finances, and AMS work being side-lined for other top national indicators.

Initiatives within current AMS activities across the eight countries are summarised below:

- The African Institute for Development Policy (AFIDEP) has developed awareness material such as comic strips, fact and information sheets in the local Chichewa language in Malawi.
- The Drivers of Resistance in Uganda and Malawi (DRUM) consortium is a multi-stakeholder project working in Malawi and Uganda. They have been researching AMR in humans, animals and the environment.
- Nigeria is utilising social media for AMS awareness and has an AMR Awareness Facebook page where information is shared to support the implementation of the Global Action Plan on Antimicrobial Resistance to minimise the impact of AMR on Human, Animal and Environment(38). A project was conducted to increase the awareness of AMR from February 2nd to May 13th, 2019, in Nigeria. The awareness-based project used community outreaches and social media to raise awareness on AMR and address issues such as misconceptions and knowledge gaps. The student-led project had over 200,000 hits on Facebook indicating how social media can be a powerful tool to reach the masses(39).
- Nigeria’s Centre for Disease Control in collaboration with relevant ministries, departments and agencies in the animal and human health sectors, participates in the World Antibiotic Awareness Week commemorations every year. In 2020, under the theme “Antimicrobials: Handle with care”, several activities were conducted. These included a webinar on operationalising One Health interventions on AMS, engagement with livestock farmers and training with Fleming Fund Fellows on AMR and AMU surveillance(40).
- Zambia is one of the countries supported by ReAct Africa in developing their National Action Plan. ReAct Africa assists countries by bringing together experts
and key stakeholders to form technical working groups on AMR. They ensure a multi-sectoral, holistic approach and target the general public and the health, veterinarian, agricultural and environmental sectors about AMR. Their role is to also increase collaboration with other relevant networks and organisations (41).

- In Kenya, both public and private hospitals like the Kenyatta National Hospital, Aga Khan University Hospital and The Nairobi Hospital have developed and implemented AMS programmes. They have observed significant adherence to AMU guidelines in surgical prophylaxis and restricted carbapenem, and other reserve antibiotic use, with a resultant decline in multi-drug resistant infections and candidemia. Other hospitals are in the process of establishing AMS teams with mentorship from the teams from hospitals that have implemented stewardship programmes. Insights from the focus group discussions showed that there are initiatives and unpublished documentation on AMS in the country. There is on-going work with USAID-MTaPS, Fleming Fund, ReAct, CDC, WHO, FAO, OIE.

- The Ghana National Policy was created in 2011 by the Ministry of Health, with support from ReAct to drive the AMR agenda including to support surveillance of use and stewardship. (Reference to react website: https://www.reactgroup.org/toolbox/policy/examples-from-the-field/ghanas-national-antibiotic-policy/). This involved a cross-sectional study of antibiotic beliefs which informed a policy bulletin issued by the Ministry of Health in partnership with ReAct. This highlighted the need for diagnostic tools, regular bulletins/situational updates, and increased accountability on AMU.

- In 2017, Mbeya Zonal Referral Hospital (MZRH) and the University of South Carolina (UofSC) agreed to collaboratively strengthen antimicrobial prescribing in the southern highlands of Tanzania and train a new generation of clinicians in responsible AMU to note how empirical treatment infrequently fully aligned with national guidelines. While nearly two-thirds of patients were initiated on the recommended agents, only 15% were able to complete the required therapy (42).

d. Infection prevention and control measures

Multiple partners such as CDC implementing partners, USAID-MTaPS, WHO, ReAct are supporting the country to improve IPC, optimise the use of antimicrobial medicines, and strengthen multisectoral coordination for containing AMR. At the national level, they have provided technical assistance to the National Infection Prevention and Control Advisory Committee and the MoH Patient and Health Worker Safety Division to review the existing policy for health care workers.

Several documents have been developed and implemented to facilitate IPC procedures and policies at the national and hospital level.

They include but not limited to:

- IPC plan;
- Infection Control and Waste Management plan;
- Standard Treatment guidelines;
- National Communication Strategy for IPC;
- National IPC Guidelines & Pocket Guides;
- Quality Improvement – IPC Orientation Guide for Participants;
- National IPC Standards;
- National Health Care Waste Management Policy Guidelines;
• HCWM Standards and Procedures;
• HCWM Monitoring Plan;
• National Catalogue for National Health Care Waste Management Equipment and Facility Options;
• Essential Medicine List.

In addition to the several policy documents, there are National IPC Advisory and Coordination Committees that support and improve adherence to hand hygiene and waste management practices.
2.6. One Health initiatives in relation to antimicrobial stewardship

One Health Approach

One Health is a collaborative, multisectoral, and transdisciplinary approach — working at the local, regional, national, and global levels — with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment (CDC, 2020).

Currently in Ghana, Kenya, Nigeria, Tanzania and Zambia, One Health (OH) collaboration/coordination are established with multi-sectoral working groups being operational within the country, engaged with clear terms of reference and defined activities and reporting/accountability arrangements(43). In Sierra Leone, OH coordination is established but without clear terms of reference and defined activities. In Uganda there is an ongoing review of the National Strategic plans for all key stakeholders in each of the affected ministries (Ministries of Health, Agriculture and Environment), to include the AMS/AMR agenda as part of their deliverables for further implementation, as this will help to push AMS activities to the sub-national, districts and to the farmers. In Malawi, there is a concept note on OH approach.

At the country level, FAO, WHO and OIE have played a strong role in promoting intersectoral coordination and collaboration, especially in Sierra Leone, Tanzania and Ghana through OH intersectoral groups and committees(44).

The Fleming Fund has also signed MoU with the MDAs involved to implement One Health in the country to respond to public health threats through health promotion, early detection, timely response and post-outbreak management(45). In some of these countries (Tanzania), the OH strategic plan is currently in the implementation stage, and a number of NGOs are taking part as stakeholders supporting implementation of the activities recommended in the NAP.

a. Raising awareness of AMR in the animal health sector

The FAO’s awareness-raising activities have targeted a range of stakeholders from food producers and medicine sellers to veterinarians and para-veterinarians in some of the countries(44). Despite the evidence of nationwide, government-supported AMR awareness campaigns in some of the countries(43), the levels of awareness targeting the animal, food and environmental health sectors are relatively low in all the eight countries.

b. Antimicrobial use and stewardship in farms

Antibiotics are used in the animal health sector for treatment and prophylaxis against infections. It is also used in sub-therapeutic doses in livestock feeds to enhance growth and improve feed efficiency in intensive livestock farming(46).
The situation on AMU/AMS in the eight countries is as follows:

<table>
<thead>
<tr>
<th>Country</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Ghana</td>
<td>In research conducted in urban Ghana, farmers use antibiotics for disease prevention (56,57). Laws that prohibit the use of antibiotics for growth promotion are under development as well as guidelines on prescribing antimicrobials (44).</td>
</tr>
<tr>
<td>Kenya</td>
<td>Managers or farmers are the key decision makers with about 70% of the farms using antibiotics (58). Recently, a plan has been agreed upon for monitoring quantities of antimicrobials sold for/used in animals, based on OIE standard (43). Tailored ad hoc AMR training courses are available for at least two groups of OH key stakeholders (43).</td>
</tr>
<tr>
<td>Malawi</td>
<td>In this country, farmers are reportedly facing a lack of regular and coordinated drug supply (50). There are also national treatment guidelines, but no mechanisms to ensure or enforce appropriate prescription and use of antimicrobials in animal health and food production.</td>
</tr>
<tr>
<td>Nigeria</td>
<td>There is no legislation on sales and prescription of antimicrobial medicines for animal use, nor are there laws that prohibit the use of antibiotics for growth promotion in the absence of risk analysis despite the issued ban by the NAFDAC (43,51). Tetracyclines are the most commonly misused antibiotics in Nigerian farms (17,52,53). Meanwhile, data is collected and reported on AMU/AMC in the animal sector (43).</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>There is lack of regulation on AMS in the animal and environmental sectors, which may be due to the absence of national policy or legislation in optimising AMU regarding the quality, safety and efficacy of antimicrobial products, and their distribution in animal health sector (43,54). There are no training provisions on AMR/AMS for key stakeholders such as farmers (though ad hoc AMR courses are available for veterinary related professionals, see below) (43).</td>
</tr>
<tr>
<td>Tanzania</td>
<td>About 100% of the farms are using antimicrobials in animal production. On a regular basis, data is collected and reported to the OIE on the total quantity of antimicrobials sold for/used in animals (43). There are no training provisions on AMR/AMS for OH key stakeholders (43).</td>
</tr>
<tr>
<td>Uganda</td>
<td>The NDA keeps records of all antimicrobials imported into the country and periodically collates them, but they are not currently widely shared (49). The AMR/AMS guidelines for the animal, food processing and safety, agriculture, fisheries and environment sectors are still under review by the Ministry of Agriculture, Animal Industries and Fisheries (MAAIF).</td>
</tr>
<tr>
<td>Zambia</td>
<td>In Zambia, almost all the farms use antimicrobial agents based on farmers’ knowledge and experiences (55). The country now has laws on the prescription and sale of antimicrobials for animal use, while regulations that prohibit the use of antibiotics for growth promotion in the absence of risk analysis are yet to be developed (43).</td>
</tr>
</tbody>
</table>
c. Veterinarians and AMS

In Ghana, there are agencies responsible for monitoring the use of antibiotics and surveillance of resistance in animals. Meanwhile, in Ghana, Nigeria and Sierra Leone(43), ad hoc AMR training courses are available for veterinary related professionals and the implementation of the plan to strengthen the capacity gaps in veterinary services are currently underway(43).

In Malawi, Nigeria, Sierra Leone, Tanzania, Uganda and Zambia, there is no regular training provided to farmers as they are difficult to engage with easily(59). In Tanzania and Zambia, there is continuing professional training on AMR/AMU for veterinary-related professionals(43). Also, in some of the countries, the monitoring of veterinary services performance is carried out regularly, e.g., through Performance of Veterinary Services (PVS) Evaluation follow up missions(43). In Malawi, the development of AMS guidelines in the animal sector is still underway.

d. Antimicrobial surveillance in animal and environmental sectors

In Kenya, all laboratories performing Antimicrobial Sensitivity Test (AST) are integrated in the AMR surveillance system(43). In feeding the national surveillance system for AMR in livestock and aquaculture, some AMR data is collected locally.

In some of the countries, there are national surveillance systems for AMR in animal, food and environment sectors. With approved surveillance plans for AMR in animal health, while the surveillance plan for AMC/AMU in animal health and environmental health sectors are under review. In a few countries, the animal health and food safety sectors are not integrated in the national AMR laboratory network, and the AST done in those labs are not included in the national AMR surveillance system(43). Meanwhile, there is no defined national surveillance system for antimicrobial resistance (AMR) in livestock and aquaculture, plant and animal food in some countries(50).

e. Infection prevention and control

In Ghana and Tanzania, there are IPC programmes in the animal and plant health services while in other countries, there are no national IPC guidelines covering the animal, food, environment and agriculture sectors(43).
2.7. Stakeholder and AMR Coordinating Committee engagement

To facilitate the implementation of AMR-NAP, the eight assessed countries established AMRCC committees which may have a different name based on the country. In Kenya it is the National Antimicrobial Stewardship Interagency Committee (NASIC), while in Sierra Leone it is the National Multi-Sectoral Coordinating Group (NMCG). The AMRCC oversees and provides overall coordination of the implementation of the AMR National Action Plan (AMR-NAP). The activities of the AMRCC are supported by national technical working groups (TWGs) supporting and overseeing the implementation of each of the strategic objectives. These TWGs are composed of technical experts from key members representing animal health, food and animal production, human health, the environment, public, private institutions and civil society with expertise in those areas. In most countries, AMRCC work has been limited. This is due to several factors including poor funding of activities despite the clear role of AMRCC committees towards AMR efforts. With the advent of the Fleming Fund country grant, meetings are held every quarter and there has been an increase in interventions and meetings undertaken by the committee. Annex 1 has highlighted more on AMRCC across the eight countries.

In Uganda, the committee is chaired by an independent expert conversant with AMR both nationally and globally. The chair of the One Health platform rotates every three months between the MoH, Ministry of Agriculture, Animal Industry and Fisheries, and the Ministry of Water and Environment. This strengthens leadership, incentivises ownership and collaboration among the ministries, and helps motivate the Uganda National Antimicrobial Resistance Committee (UNAMRC) members appointed by their respective ministries. According to the in-country consultants in Zambia, AMRCC priority activities for implementing AMR Control programmes are in motion, but the Awareness and Education pillar seems to be taking centre stage.

Currently, the AMRCC has been conducting:

- Assessment of various curricula to determine current extent of AMR inclusion;
- Situation analysis of sanitary and phytosanitary measures, infection prevention and control, and biosecurity;
- Periodic studies on efficacy of antimicrobials.
2.8. Digital health

The penetration of mobile phones and other digital technologies has provided an opportunity for digital health initiatives. There has been an increased use of digital health, mirroring global trends fuelled by the COVID-19 pandemic. Additionally, there has been an increased development and implementation of mobile health applications. Countries such as Kenya, Ghana, Zambia and Malawi have adopted National e-Health strategies whilst Tanzania, Nigeria, Uganda and Sierra Leone have not yet adopted this strategy.

District Health Information Software-2 (DHIS-2), a digital interface designed initially for collecting and using district health information, has been implemented in seven countries. Sierra Leone has not yet implemented the use of DHIS-2. This provides an interface to communicate between facilities at different levels in order to improve medicines supply.

The DHIS-2 serves as:

- National repository for health data;
- Data collection tool e.g., Ghana collects more accurate morbidity and mortality statistics;
- Management, aggregation and analysis tool especially for HIV/AIDS management and other health programmes in Nigeria;
- Supportive tool for effective logistics planning in Malawi;
- Mobile reporting tool by the Zambia Malaria control Program;
- Module for tracking patients at remote facilities e.g., Uganda tracks women for antenatal care, delivery and postnatal care;
- Mobile reminder tool for patient scheduled appointments;
- Disease surveillance tools e.g., this has increased as a use in Tanzania;
- Monitoring tool for performance and payments from health service providers;
- Platform for use of collaborative tools which has encouraged more feedback from users in Kenya.

However, some challenges and barriers, including network problems and difficulty in data integration, have been identified to have affected the use of DHIS-2.

a. Advances in use of e-prescribing

Medical apps for healthcare professions have been developed to support adverse event monitoring, prescribing, and quality assurance. These applications are used for various purposes including point-of-care reference tools, physician consultation, monitoring adherence to therapy, inter-professional interaction etc.

The Commonwealth Pharmacists Association, as part of the CwPAMS programme, developed an app, ‘MicroGuide’, to support antimicrobial prescribing and stewardship activities conducted by health partnerships through the programme in Ghana, Tanzania, Uganda, and Zambia by providing guidance, resources, and training documents.

Use of apps to aid AMS and inform practice has been well implemented in hospitals. UK led telemedicine initiatives, such as Virtual Doctors have also supported healthcare workers in rural areas. However, several barriers to use digital health exist including unavailability of digital tools and connectivity issues.
b. Use of prescribing apps

Electronic health services such as for prescribing are increasingly becoming popular in developing countries.

Some examples of such apps include:

The Pharmacy and Poisons Board (PPB) has granted, in Kenya, which operates the MyDawa brand the first ever retail license for an e-retailing pharmacy in Kenya. Issuance of the license marks a major milestone for MyDawa which has other licenses that allows the organisation to operate as an online retail pharmacy. The move now provides the firm a full suite of retail services directly to the patient from mydawa.com website and mobile app(77).

Malawi implemented the Surveillance Programme of In-patients and Epidemiology (SPINE), which records information through touch-screen terminals located in the hospital medical wards. SPINE is connected to the ARV clinic system, enabling patients registered in either system to be recognised by both. Clinical teams can record relevant information about a patient upon discharge. This allows for easy diagnosis and prescription formulation. The system also provides access to a patient’s medical history, including previous diagnoses and treatment received(78). In order to regulate prescribing practices, the MicroGuide app is used by the team of clinicians at The Queen Elizabeth Central Hospital in Malawi. The app was designed to allow for accessible information on medicines which has improved antimicrobial stewardship at the hospital. The ability to tailor-make the MicroGuide app for local use has made it easy to adapt with local guidelines(79).

In Uganda, the electronic health records system, ‘Stre@mline’, was co-developed with a team of physicians from the Kisiizi Hospital and provides an interface for clinicians from different departments to communicate with one another. This includes a pharmacy interface that can be seen by prescribers, and it continuously updates stock, expiry date, and price of all drugs in real time. The app also inputs patient information such as age and contact details. The platform does not require internet access to operate, making it easy to use in remote areas(80).

c. Use of medicines supply apps or software

Mobile applications have eased service provision to local hospitals enabling a more efficient and effective distribution of essential medical supplies across the country(77). However, in some cases there was no evidence on whether the apps had been widely implemented. For example, the Kenya Medical Supplies Authority (KEMSA) is a national project that aims to support public health facilities to enable them to communicate with KEMSA electronically in a seamless manner. The application uses the KEMSA Logistic Management Information System (LMIS) which is integrated in the Enterprise Resource Planning (ERP) platform that gives visibility to the customer once an order has been made through LMIS. KEMSA e-mobile includes a module designed to provide critical information to stakeholders about a health facility. This includes key decision makers in the health facilities who ordinarily do not need access to the ordering system, but need important data such as order status, order fill rate, order turnaround time, county/facility statements/balances and facilities’ programmes reporting rates(81).

Significant work is required to ensure interoperability of systems within hospitals and with other government services. Additional studies on clinical usability and the workflow fit of digital health systems are required to ensure efficient system implementation. However, this requires support from key stakeholders including the government, international donors and regional health informatics organisations(82).

The CwPAMS app includes national guidelines on antimicrobial prescribing and has been developed with Microguide, which provides an easy-to-use interface for clinical use. The use of the
CwPAMS app had been piloted in the four existing countries and preliminary results highlighted. A study titled ‘Improving Access to Antimicrobial Prescribing Guidelines in 4 African Countries: Development and Pilot Implementation of an App and Cross-Sectional Assessment of Attitudes and Behaviour Survey of Healthcare Workers and Patients’ noted initial barriers to uptake that were approached using a behaviour change approach. For example, there was a need to ensure patients were made aware that health professionals would be using the phone app as part of their duty of care.

Considering this, digital technology will be powerful in providing tools for antimicrobial prescribing, however, use of digital technology should reflect the local setting and be built to address potential barriers to ensure sustainability. There will also be a need to consider the technology already in existence and how to build and strengthen these advances. Monitoring and assessment of uptake will be key to ensure fit for purpose. Another area where digital health was noted was online training and CPD.
2.9. The coverage of AMR and AMS in pharmacy training (both pre-service and in-service)

a. State of training and education

There is a critical shortage of pharmacy personnel, especially in government health centres in all assessed countries. This shortage leads to unqualified personnel managing medicines and supply chain and dispensing to patients, impacting patient care and medicine availability. Countries like Kenya, Malawi, Nigeria, Tanzania and Zambia train pharmacy assistants/technicians for 2-3 years. The aim is to bridge the health workforce gap, increase medicine availability and improve the rational use of medicines in rural health centres(62). Pharmacists take a 5-year bachelor’s degree. Both the pharmacy technician qualification and degree require a pre-registration placement.

Most countries have some form of Continuing Professional Development (CPD), designed to update the knowledge of pharmacists and enable them to keep abreast of advancements in pharmaceutical development and modern trends in pharmacy. This is to enhance their skills in the process of providing pharmaceutical care(63). Uptake of CPD is currently low in countries where it is not mandated, and so it requires personal drive(64). In Tanzania, CPD attendance is high for pharmacists. There is now a prerequisite for all pharmacists to attend at least one continuing education course per year in order to retain their names in the registry as active pharmacists(65).

b. State of antimicrobial stewardship education

There have been variations in the training of pharmacists on AMS among countries. In Ghana, there is currently not a single fully trained pharmacist in any of the Teaching Hospitals or the Regional Hospitals in this area of practice. Recently (in February 2021), the collaboration between Korle-Bu Teaching Hospital (KBTH) and North Middlesex University Hospital (from UK) used part of the grant awarded by THET to train 19 pharmacists from the four referral hospitals in the Greater Accra Region. Nigeria has made available an AMR training curriculum in universities (undergraduate and postgraduate). According to the focus group discussions, there are plans to develop a curriculum for AMS. The aim is to target pharmacists and reinforce learning on prescribing. Similarly, a key outcome of the Brighton-Lusaka Health Link partnership in Zambia has been the inclusion of AMS in undergraduate courses. They also provided support in techniques to monitor AMU. AMS was not an integral part of the pharmacy curriculum but based on the focus group discussions, some progress has been made to that end.

The work on AMS extends to pre-service pharmaceutical management in Kenya, and MTaPS is working with the University of Nairobi School of Pharmacy to reform the pre-service curriculum to integrate AMS-related topics. The programme also provides ongoing technical assistance to the Pharmaceutical Society of Kenya to develop an AMS training course linked to CPD and licensure for delivery through the professional association(66). AMS CPD continues to be offered on various platforms countrywide in collaboration with professional associations, including from the CPA.
c. The number and role of pharmacists in the eight CwPAMS countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Estimated number of pharmacists</th>
<th>Estimated number of pharmacy technicians</th>
<th>Main sectors of pharmacists</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>5098</td>
<td>2298</td>
<td>Clinical, community, education, industry, pharmaceutical marketing, public health, social and administrative pharmacy</td>
</tr>
<tr>
<td>Kenya</td>
<td>4,000</td>
<td>11,000</td>
<td>Public sector – government hospitals, community pharmacists, industry, manufacturing, importation, distribution and wholesale, academia</td>
</tr>
<tr>
<td>Malawi</td>
<td>200*</td>
<td>Not available</td>
<td>Information not available</td>
</tr>
<tr>
<td>Nigeria</td>
<td>29,589</td>
<td>9,172</td>
<td>Dispensing, counselling, clinical ward rounds, members of medicines/therapeutic committees, supply chain management, AMS, traditional medicines (herbal), administration</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>203</td>
<td>364</td>
<td>Supply chain activities (district and central level), Clinical (in some hospitals) as part of the clinical team, as part of drug and therapeutics committees, regulatory affairs, community pharmacies</td>
</tr>
<tr>
<td>Tanzania</td>
<td>2599</td>
<td>3525 and 746 pharmaceutical assistants enlisted</td>
<td>Hospital settings: Hospital formulary development, Ethical dispensing, Inventory management, Medication reconciliation, Adherence counselling, Compounding of Extemporaneous preparations, Adjustment of Prescriptions, Antimicrobial Stewardship lead person, documentation and record keeping in dispensing, Dispensing, counselling, clinical ward rounds, Secretary and members of medicines/therapeutic committees, Supply chain activities in procurement and store management, medicines distribution</td>
</tr>
<tr>
<td>Country</td>
<td>Learners</td>
<td>Exams</td>
<td>Assessment Methods</td>
</tr>
<tr>
<td>-----------</td>
<td>----------</td>
<td>-------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Uganda</td>
<td>1445</td>
<td>Not available</td>
<td>Information not available</td>
</tr>
<tr>
<td>Zambia</td>
<td>1513</td>
<td>2067</td>
<td>Dispensing medicines, attending clinical rounds, procurement and store management, medicines distribution. Non-hospital settings - Academia, regulatory institutions, community pharmacies and medical stores</td>
</tr>
</tbody>
</table>

Information obtained through In Country Consultants.

2.10. Access to antimicrobials, supply of medicines

The CwPAMS programme running from 2019 to 2021 highlighted that, in some cases, medicines supply issues led to challenges to achieving AMS. Most African countries have been further affected by shortages and supply issues due to COVID-19 and heavy import dependency, especially in the pharmaceutical sector. All African countries are net importers of medical and pharmaceutical products and Malawi is among the countries which abolished or reduced tariffs to facilitate trade in pharmaceuticals. COVID-19 has shown how important it is to move from global suppliers to a more regionalised approach (83).

a. Access to medicines via community pharmacy

Several studies have documented over-the-counter supply of antibiotics in community pharmacies and commercial drug outlets, and self-medication in all assessed countries. Often the wrong treatment or dose are provided or self-administered. Moreover, there is little advice given on the use of antimicrobials by shopkeepers or pharmacists, and public knowledge on infection and antimicrobials is low.

Further findings highlight the key drivers of antimicrobial misuse in community pharmacies include (17, 67–70, 70–72):

- Ease of access to and overuse of over-the-counter antibiotics;
- High levels of self-medication;
- Over-reliance on community pharmacists;
- Lack of policies nor strict enforcement;
- Sale of antibiotics without prescriptions;
- Dispensing of antimicrobials on partial doses;
- Sub-optimal AMR knowledge and attitudes among pharmacy personnel;
- High drug resistance levels;
- Excessive use and failure to adhere to treatment guidelines;
- Over-prescribing of antimicrobials;
- Lack of antimicrobial sensitivity to patients and clients.
The overview of the medicine supply chains across the 8 countries has been depicted and categorized below by procurement agency, supply chain system in place and organizational structure (centralized / decentralized).

<table>
<thead>
<tr>
<th>Country</th>
<th>Government Procurement Agency</th>
<th>NGO Procurement Agency</th>
<th>Private Sector Procurement Agency</th>
<th>Supply Chain System in place</th>
<th>Centralized system</th>
<th>Decentralized system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ghana</td>
<td>x</td>
<td></td>
<td>x</td>
<td>3 tier system</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Kenya</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>3 supply chain systems</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Malawi</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Single agency</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Nigeria</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Devolved to states</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Single agency</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Tanzania</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Single agency</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Uganda</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>Single agency</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Zambia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>3 tier system</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
2.11. Impact of COVID-19

COVID-19 has radically shifted public health, societies, and economies. However, it is important to explore how COVID-19 might be impacting the emergence and spread of drug-resistant pathogens through overuse of medication used to treat secondary infections. Additionally, COVID-19 has affected strides that the assessed countries have taken in tackling AMR. The countries have several COVID-19 documents including IPC guidelines. IPC measures are included as an integral part of clinical management of patients. The guidelines put emphasis on ensuring standard precautions in all areas of healthcare facilities including hand hygiene and use of PPE to avoid direct contact with patients. None of the guidelines however mention AMR.

Based on discussions with in-country consultants, the pandemic has significantly affected AMR and AMS activities including:

- Physical or face-to-face meetings and subsequent actions to implement AMR/AMS activities have reduced due fear of increasing the spread of infection among healthcare workers. Most of the activities are being conducted remotely with a limited number of participants on the ground.
- There has been overuse of certain prescription only drugs that are perceived to prevent or treat COVID-19 infection. For example, pharmacies are receiving an increased number of Azithromycin prescriptions and individual requests for self-medication. This may contribute to resistance to such drugs in the near future.
- Much government attention has been paid to enforcement of preventive health guidelines and administration of COVID-19 vaccine than procurement of antimicrobials disrupting the supply chain of medications. This has an effect on adhering to AMS principles.

Vaccines are key to reducing the effects of infections and all the countries (as of June 2021) except Tanzania have made strides in vaccine rollout, albeit slow. Tanzania recently requested to join the COVAX global vaccine sharing facility. Several vaccines are being administered including Oxford AstraZeneca, Johnson & Johnson, Sinopharm and Sputnik. COVID-19 resulted in diverted personnel and resources away from priority diseases such as HIV/AIDS, TB and malaria. Considering most countries' existing healthcare system challenges, including inadequate human resources, financial, infrastructural, supply chain and logistical challenges, the pandemic has had an effect on AMR programmes. The focus group discussions revealed that the pharmacy workforce in all the eight countries were affected by COVID-19 in the different professional cadres, i.e. industry, clinical, retail.
2.12. Insights and evaluation of CwPAMS so far

An independent evaluation of the CwPAMS Programme took place between March and May 2021(84).

The CwPAMS programme comprised twelve Health Partnerships (HPs) between UK health institutions and their counterparts in four Commonwealth countries: Ghana, Tanzania, Uganda and Zambia, which had been funded in support of the Fleming Fund objectives. The HPs consisted of health workers and experts from UK and LMIC institutions who volunteered their time to co-develop strategies and share skills and knowledge to address priority health system issues relating to AMR and AMS.

The strategy for evaluating the CwPAMS Programme and individual HPs is based on three Overarching Evaluation Questions (OAQs), and the Organisation for Economic Co-operation and
Development Assistance Committee (OECD-DAC) Evaluation Criteria. Indicators were developed internally which correlate with the individual OAQs. All the information obtained was assessed and evaluated using an objective numerical scorecard.

**Overarching Evaluation Questions:**

1. “Proof of concept”
   a. To what extent has the CwPAMS Programme improved antimicrobial stewardship in LMIC partner healthcare institutions?
   b. Does the health partnership approach improve antimicrobial stewardship in LMIC partner healthcare institutions and staff?

2. What is the value to the NHS of its volunteers participating in the CwPAMS project, in particular how are skills and experiences absorbed within the UK healthcare institution, and is there evidence of a “skills exchange” between UK volunteers and their counterparts in the LMIC?

3. What is the potential for scaling up AMS in National AMR Action Plans?

Findings demonstrated that the CwPAMS Programme largely achieved its programme-level outcomes attaining an overall average rating during quarter 4-5 of VERY GOOD (Score: 83) and an aggregate score for quarter 1-5 of VERY GOOD (Score: 82) reflecting:

- Relevance - 73 (Very Good)
- Impact - 85 (Very Good)
- Effectiveness - 96 (Excellent)
- Efficiency - 58 (Good)
- Sustainability - 85 (Very Good)
How well did the CwPAMS programme score?

CwPAMS Scores

- **RELEVANCE**: 73% very good
- **EFFICIENCY**: 58% good
- **IMPACT**: 85% very good
- **SUSTAINABILITY**: 85% very good
- **EFFECTIVENESS**: 96% excellent

Overall programme score: 82%

A few key metrics:

1. **To what extent has the CwPAMS programme improved antimicrobial stewardship in LMIC healthcare institutions?**
   - Score: 74%

2. **What is the potential for scaling up AMS in National AMR Action Plans?**
   - Score: 92%

3. **Does the health partnership approach improve antimicrobial stewardship in LMIC partner healthcare institutions and staff?**
   - Score: 81%

4. **What is the value to the NHS of its volunteers participating in the CwPAMS project?**
   - In particular, how are skills and experiences absorbed within the UK healthcare institutions, and is there evidence of a ‘skills exchange’ between UK and LMIC volunteers?
   - Score: 73%

**Scores and ratings**

- 31%–50% Minimally satisfactory
- 51%–70% Good
- 71%–90% Very good
- 91%–100% Excellent

**OECD-DAC* Evaluation Criteria**

- Is the intervention doing the right thing?
- What difference does the intervention make?
- How well are the resources used?
- Will the benefits last?
- Is the intervention achieving its objectives?

* Organisation for Economic Co-operation and Development-Development Assistance Committee

**Minimally satisfactory**

- Generally poor achievement with few positive elements. An area where improvement is required.

**Good**

- Satisfactory achievement reported in most relevant areas, but partial reporting and/or achievement in others.

**Very good**

- Strong achievement reported in most areas with very little improvement to be done in order to maximise impact and positive contribution.

**Excellent**

- Excellent level of achievement reported, including (where relevant) in areas which were not anticipated or prioritised. Significant positive contribution achieved.
This section summarises the findings of the CwPAMS Programme according to OECD-DAC Evaluation Criteria:

**Relevance:** The Programme adequately demonstrated knowledge exchange and its relevance during a global health pandemic. The success of various online conferences and webinars showcasing CwPAMS held at the Programme level demonstrated that the principles of AMS and the HP approach are transferable and tools such as the CwPAMS Toolkit will enable this in the future.

**Impact:** The HPs created activities and interventions that have benefited the skills exchange between UK and LMIC partners, produced a wide range of dissemination materials for different audiences and target groups, successfully trained fellow healthcare workers, such as pharmacists, who have gone on to positively influence their hospitals and engage local and international policymakers in the areas of AMR.

**Effectiveness:** Good working relationships, project management, flexibility and target-driven work styles were the most significant factors that positively influenced the effectiveness of the projects throughout the entire programme.

**Efficiency:** THET, CPA and the Change Exchange all sought to optimise allocational efficiency in different ways. For example, Change Exchange used their underspend to create a behavioural toolkit for the Programme. Understanding that the pandemic undermined their ability to provide professional development to LMIC healthcare workers, CPA reallocated a portion of their budget to fund the CPD platform which provides online training and educational material to pharmacists across the Commonwealth.

**Sustainability:** All HPs set objectives and outcomes that could be sustained within the LMIC health systems. Development of guidelines, protocols, processes, and the formation of MTCs and accompanying AMS and IPC committees (as well as the appointment of AMS champions) in LMIC institutions will aid in the long-term sustainability of the projects. CwPAMS has also created a wide range of tools that can be used on multiple platforms by different groups. Additionally, some HPs have continued to maintain and build strong relationships between UK and LMIC team members, and plan to continue to support shared learning and peer support.

The Evaluation Report is available on request.
CwPAMS Tools and Resources can be found at Annex 2.
2.13. AMS country case studies

The case studies are focused on nine countries to showcase the good practices that are in place for AMS practices that can be emulated. The countries are: Ghana, Kenya, Malawi, Nigeria, Sierra Leone, Tanzania, Uganda, United Kingdom and Zambia.

Key case studies can be found in Annex 3.
2.14. AMS assessment tool

The AMS Assessment Tool sent to in-country consultants for completion was derived from the draft WHO Periodic National Assessment tool. The original tool is based on 5 pillars:

**Pillar 1:** National Coordination Mechanisms for antimicrobial stewardship, developed Treatment Guidelines and implementation tools for antimicrobial stewardship activities.

**Pillar 2:** Access to and Regulation of Antimicrobials

**Pillar 3:** Improved Awareness, Education and Training.

**Pillar 4:** Water, Sanitation and Hygiene and Infection Prevention and Control.

**Pillar 5:** Surveillance, Monitoring and Evaluation.

**Five pillars of integrated AMS activities**

WHO Policy Guidance on Integrated Antimicrobial Stewardship Activities

![Illustration of 5 pillars of WHO AMS Assessment](image)

- Establish and develop national coordination mechanisms for antimicrobial stewardship and develop guidelines
- Ensure access to and regulation of antimicrobials
- Improve awareness, education and training
- Strengthen water, sanitation and hygiene and infection prevention and control
- Surveillance, monitoring and evaluation

The findings of this tool are summarised and analysed based on feedback from in-country consultants from the eight countries and can be found at Annex 4.
3. Reflections and recommendations
3.1. Reflections

Highlights

- All countries have developed a NAP document. This reflects prominence of the issues surrounding AMR and political will to tackle it.
- There are a notable number IPC and WASH activities being implemented in the eight countries.
- There is a notable increase in digital health across all the eight countries.
- There is potentially notable inclusion of pharmacists into the development of the NAP and other national policy/strategy documents.

Gaps

- There is paucity in documented evidence on AMR and antimicrobial use surveillance, antimicrobial stewardship and monitoring and evaluation of the NAP implementation. Increased political motivation to tackle AMR should be matched with technical workforce capacity and expertise to do so.
3.2. Recommendations

The following recommendations are based on the above findings from the scoping review and would be supportive in promoting AMS interventions across the eight countries.

- Development of national AMS guideline document/strategy. (Currently only Kenya has an AMS strategy).
- Increasing the number of health facilities with AMS programmes. Most countries have piloted AMS programmes in specific health facilities and have not expanded nationally.
- Incorporation of AMS in the pharmacy curriculum for pre-service and in-service training. This should involve an increase in education and training for all healthcare professionals on AMS. In the literature review and focus group discussions, there was evidence of insufficient training such as through online platforms with a standardised curriculum.
- Prioritisation of AMS programmes in the national health budget. Most countries mentioned there is not enough funding for programmes as well as human resources for in-country implementation of programmes.
- Identification of national action plan indicators which need to be improved or upgraded.
- Increased capacity of technical working groups on AMS. The focus group discussions indicated that sometimes they are side-lined for other health interventions.
- Provision of technical support to increase workforce and streamline processes to improve Monitoring and Evaluation (M&E) for the national action plan on AMR. Most countries did not have enough literature on the status of implementation on AMS.
- Updating hospital/healthcare clinical guidelines to include antimicrobial stewardship principles and integrate the AWaRe classification of antibiotics. Generation of evidence that can contribute to the guidelines and inform clinical practice would be a key outcome from a CwPAMS programme. These customisable guidelines can also be incorporated into existing digital and eHealth applications such as DHIS-2 to optimise prescriptions. The shift towards digitisation can potentially improve antimicrobial prescribing through ease of access to information and records.
- Improvement of regulations on sales of prescription-only antibiotics. There were notable gaps in the policies that govern sale of antibiotics especially in community pharmacies. It is important to harness advances in digital technology where possible.
- Streamlining and strengthening of national medicine supply chain systems to ensure consistent availability of quality-assured antimicrobials.
- Encouraging more policies and government regulatory frameworks on distribution and manufacturing of quality-assured health products at the national level.
- Incorporating bottleneck analysis of national supply chains to identify root causes and human behaviour influencing them.
• Establishment of antimicrobial stewardship programs that incorporate medical supply chain management to ensure rational antimicrobial selection, procurement, use, monitoring, storage, distribution, and supply.
• Improvement of national quality control and assurance systems of pharmaceuticals, which will reduce the prevalence of substandard and falsified antimicrobials within the country distribution systems and channels.
• Provision of incentives to support AMS programmes and further inclusion/collaboration of these programmes into/with IPC, WASH, TB, and other health programmes in all healthcare facilities.
• Prioritisation of institutionalising and subsequent decentralisation of One Health activities to the sub-national level for implementation as this would foster operation and capacity building.
• Increasing the national AMU and AMR surveillance programmes as well as AMR/AMS awareness campaigns targeted at the stakeholders and MDAs in the animal, food processing, agriculture, and environmental health sectors to enhance coverage.
• Involving pharmacists and pharmacy associations further in the implementation of national AMS activities.
• Strengthening and fostering of partnerships and opportunities that ensure inclusion of all the relevant stakeholders/actors (nationally and internationally) in the implementation of AMS activities.
• Encouraging more AMR and/or One Health-driven research collaborations between government and non-government stakeholders, which would enhance the implementation of the NAP.
• Conducting a comprehensive ethnographic study on the use and misuse of antimicrobial drugs in human and animal health, agriculture, and the environment to adequately inform programming.
• In the new countries scoped, it was noted that there is a need for easy access to prescribing information through an app and this was highlighted as an area which will be key to supporting antimicrobial stewardship.
References


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84. THET Addendum Report Client Final 16.06.2021