

**Supplementary Table 1:** List of the WHO African countries that were assessed, including their income status and sub-region.

<b>S/N</b>	<b>Countries</b>	<b>Level of income</b>	<b>Sub-region</b>
1	Benin	Low-Income Economy	Western Africa
2	Guinea	Low-Income Economy	Western Africa
3	Togo	Low-Income Economy	Western Africa
4	Mali	Low-Income Economy	Western Africa
5	Liberia	Low-Income Economy	Western Africa
6	Sierra Leone	Low-Income Economy	Western Africa
7	Burkina Faso	Low-Income Economy	Western Africa
8	Mauritania	Lower-Middle-Income Economy	Western Africa
9	Côte d'Ivoire	Lower-Middle-Income Economy	Western Africa
10	Nigeria	Lower-Middle-Income Economy	Western Africa
11	Ghana	Lower-Middle-Income Economy	Western Africa
12	Comoros (the)	Low-Income Economy	Eastern Africa
13	Rwanda	Low-Income Economy	Eastern Africa
14	Ethiopia	Low-Income Economy	Eastern Africa
15	United Republic of Tanzania	Low-Income Economy	Eastern Africa
16	Uganda	Low-Income Economy	Eastern Africa
17	Kenya	Lower-Middle-Income Economy	Eastern Africa
18	Mauritius	Upper-Middle-Income Economy	Eastern Africa
19	Seychelles	High-Income Economy	Eastern Africa
20	Chad	Low-Income Economy	Central Africa
21	Central African Republic	Low-Income Economy	Central Africa
22	Democratic Republic of the Congo	Low-Income Economy	Central Africa
24	Gabon	Upper-Middle-Income Economy	Central Africa
23	Zimbabwe	Low-Income Economy	Southern Africa
25	Mozambique	Low-Income Economy	Southern Africa
26	Malawi	Low-Income Economy	Southern Africa
27	Zambia	Lower-Middle-Income Economy	Southern Africa

28	Lesotho	Lower-Middle-Income Economy	Southern Africa
29	Angola	Lower-Middle-Income Economy	Southern Africa
30	South Africa	Upper-Middle-Income Economy	Southern Africa
31	Namibia	Upper-Middle-Income Economy	Southern Africa

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S/N = study number

**Supplementary Table 2:** The GAP implementation on AMR indicators [1].

<b>A. Multi-sectoral approach to addressing AMR: Rationale: To check for progress with multi-sectoral working on AMR and completing a multi-sectoral national action plan on AMR.</b>
1. Multi-sector and One Health collaboration/coordination
A - No formal multi-sectoral governance or coordination mechanism on AMR exists.
B - Multi-sectoral working group(s) or coordination committee on AMR established with Government leadership.
C - Multi-sectoral working group(s) is (are) functional, with clear terms of reference; regular meetings, and funding for working group(s). Activities and reporting/accountability arrangements are defined.
D - Joint working on issues including agreement on common objectives.
E - Integrated approaches used to implement the national AMR action plan with relevant data and lessons learned from all sectors used to adapt implementation of the action plan.
2. Which sectors are actively involved in developing and implementing the AMR National Action Plan- [Human Health]
3. Which sectors are actively involved in developing and implementing the AMR National Action Plan- [Animal Health (terrestrial and aquatic)]
4. Which sectors are actively involved in developing and implementing the AMR National Action Plan- [Plant Health]
5. Which sectors are actively involved in developing and implementing the AMR National Action Plan- [Food Production]
6. Which sectors are actively involved in developing and implementing the AMR National Action Plan- [Food Safety]
7. Which sectors are actively involved in developing and implementing the AMR National Action Plan- [Environment including WASH*]
<b>B. DEVELOPING NATIONAL AMR ACTION PLANS AT THE COUNTRY LEVEL: RATIONALE: To optimize the use of antimicrobial medicines in human and animal health</b>
8. Country progress with development of a national action plan on AMR
A - No national AMR action plan.
B - National AMR action plan under development.
C - National AMR action plan developed.
D - National AMR action plan approved by government that reflects Global Action Plan objectives, with an operational plan and monitoring arrangements.
E - National AMR action plan has funding sources identified, is being implemented and has relevant sectors involved with a defined monitoring and evaluation process in place.
9. Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases- [HIV]

10. Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases- [Tuberculosis]
11. Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases- [Malaria]
12. Is your country's national action plan on AMR linked to any other existing action plans, strategies or targets related to HIV, tuberculosis, malaria or neglected tropical diseases- [Neglected tropical diseases]
13. Has the country published your AMR national action plan?
14. Country policies and regulation on antimicrobial use [Country has laws or regulations on prescription and sale of antimicrobials, for human use.]
15. Country policies and regulation on antimicrobial use [Country has laws or regulations on prescription and sale of antimicrobials for animal use.]
16. Country policies and regulation on antimicrobial use [Country has laws or regulations that prohibits the use of antibiotics for growth promotion in the absence of risk analysis.]
<b>C. AWARENESS AND TRAINING - RATIONALE: (Country progress on strategic objective 1) to improve awareness and understanding of antimicrobial resistance; through effective communication, education and training</b>
17. Raising awareness and understanding of AMR risks and response
A - No significant awareness-raising activities on relevant aspects of risks of antimicrobial resistance.
B - Some activities in parts of the country to raise awareness about risks of antimicrobial resistance and actions that can be taken to address it.
C - Limited or small-scale antimicrobial resistance awareness campaign targeting some but not all relevant stakeholders.
D - Nationwide, government-supported antimicrobial resistance awareness campaign targeting all or the majority of relevant stakeholders, based on stakeholder analysis, utilizing targeted messaging accordingly within sectors.
E - Targeted, nationwide government-supported activities implemented to change behavior of key stakeholders within sectors, with monitoring undertaken over the last 2-5 years.
18. For the level selected above, please indicate the extent of involvement of the sectors below. [Human Health]
A This sector not involved
B. Some activities done in this sector
C. This sector is a main focus for activities
19. For the level selected above, please indicate the extent of involvement of the sectors below. [Animal Health (terrestrial and aquatic)]
A. This sector not involved
B. Some activities done in this sector
C. This sector is a main focus for activities

20. For the level selected above, please indicate the extent of involvement of the sectors below. [Plant Health]
A. This sector not involved
B. Some activities done in this sector
C. This sector is a main focus for activities
21. For the level selected above, please indicate the extent of involvement of the sectors below. [Food Production]
A. This sector not involved
B. Some activities done in this sector
C. This sector is a main focus for activities
22. For the level selected above, please indicate the extent of involvement of the sectors below. [Food Safety]
A. This sector not involved
B. Some activities done in this sector
C. This sector is a main focus for activities
23. For the level selected above, please indicate the extent of involvement of the sectors below. [Environment including WASH]
A. This sector not involved
B. Some activities done in this sector
C. This sector is a main focus for activities
24. Training and professional education on AMR in the human health sector
A - No training for human health workers on AMR.
B - Ad hoc AMR training courses in some human health related disciplines.
C - AMR is covered in 1) some pre-service training and in 2) some in-service training or other continuing professional development (CPD) for human health workers.
D - AMR is covered in pre-service training for all relevant cadres. In-service training or other CPD covering AMR is available for all types of human health workers nationwide.
E - AMR is systematically and formally incorporated in pre-service training curricula for all relevant human health cadres. In-service training or other CPD on AMR is taken up by relevant groups for human health nationwide, in public and private sectors.
25. Training and professional education on AMR in the veterinary sector
A - No training of veterinary related professionals (veterinarians and veterinary paraprofessionals) related to AMR.
B - Ad hoc AMR training courses available for veterinary related professionals.
C - AMR and appropriate use is covered in core curricula for graduating veterinarians and for veterinary paraprofessionals when relevant.
D - Continuing professional training on antimicrobial resistance and antimicrobial use is available nationwide for veterinary related professionals.
E - AMR is systematically and formally incorporated in curricula for graduating veterinarians and veterinary paraprofessionals when relevant and continuing professional training is a formal requirement.

26. Training and professional education on AMR in farming sector (animal and plant), food production, food safety and the environment
A - No training provision on AMR for key stakeholders, e.g. farmers and farm workers, extension workers, food and feed processors and retailers, environmental specialists.
B - Tailored ad hoc AMR training courses available for at least two groups of key stakeholders.
C - Tailored ad hoc AMR training courses are available for all or the majority of key stakeholders.
D - Tailored AMR training courses are routinely available nationwide for all key stakeholders and completion of training is a formal requirement for at least two groups of key stakeholders.
E - Tailored AMR training courses are routinely available nationwide and completion of training is a formal requirement for all key stakeholders.
27. Progress with strengthening veterinary services
A - No systematic approach at national level to strengthening Veterinary Services.
B - Veterinary services assessed and plans developed to improve capacity, through a structured approach such as OIE Performance of Veterinary Services (PVS) Evaluation and PVS Gap Analysis missions.
C - Implementation of plan to strengthen capacity gaps in Veterinary Services underway.
D - Monitoring of Veterinary Services performance carried out regularly, e.g. through PVS Evaluation Follow Up missions.
E - Documented evidence of strong capacity in compliance with OIE standards on the quality of Veterinary Services.+
<b>D. SURVEILLANCE - RATIONALE: (Country progress on strategic objective 2) To strengthen the knowledge and evidence base through surveillance and research</b>
28. National monitoring system for consumption and rational use of antimicrobials in human health
A - No national plan or system for monitoring use of antimicrobials.
B - System designed for surveillance of antimicrobial use, that includes monitoring national level sales or consumption of antibiotics in health services.
C - Total sales of antimicrobials are monitored at national level and/or some monitoring of antibiotic use at sub-national level.
D - Prescribing practices and appropriate antibiotic use are monitored in a national sample of healthcare settings.
E - On a regular basis (every year/two years) data is collected and reported on: a) Antimicrobial sales or consumption at national level for human use; and b) Antibiotic prescribing and appropriate/rational use, in a representative sample of health facilities, public and private.
29. National monitoring system for antimicrobials intended to be used in animals (sales/use)
A - No national plan or system for monitoring sales/use of antimicrobials in animals.
B - Plan agreed for monitoring quantities of antimicrobials sold for/used in animals, based on OIE standards.+
C - Data collected and reported on total quantity of antimicrobials sold for/used in animals and their intended type of use (therapeutic or growth promotion).

D - On a regular basis, data is collected and reported to the OIE on the total quantity of antimicrobials sold for/used in animals nationally, by antimicrobial class, by species (aquatic or terrestrial), method of administration, and by type of use (therapeutic or growth promotion).
E - Data on antimicrobials used under veterinary supervision in animals are available at farm level, for individual animal species.
30. National monitoring system for pesticide use in plant production
A - No national plan or system for monitoring use of pesticides used for the purpose of controlling bacteria or fungal diseases.+
B - Plan agreed for monitoring quantities of pesticides used for the purpose of controlling bacteria or fungal diseases.
C - Data collected and reported on total quantity of pesticides sold/ used nationally for the purpose of controlling bacteria or fungal diseases.
D - On a regular basis, data is collected and reported on quantity of pesticides sold/used in plant production for the purpose of controlling bacteria or fungal diseases, disaggregated by class of active ingredient
31. National surveillance system for antimicrobial resistance (AMR) in humans
A - No capacity for generating data (antibiotic susceptibility testing and accompanying clinical and epidemiological data) and reporting on antibiotic resistance.
B - AMR data is collated locally for common bacteria, but data collection may not use a standardized approach and lacks national coordination and/or quality management.
C - National AMR surveillance activities for common bacterial infections follow national standards, and a national reference laboratory that participates in external quality assurance.
D - There is a functioning national AMR surveillance system covering common bacterial infections in hospitalized and community patients+, with external quality assurance, and a national coordinating centre producing reports on AMR.
E - The national AMR surveillance system integrates surveillance of AMR across sectors, and generates regular reports covering at least one common indicator.
32. National surveillance system for antimicrobial resistance (AMR) in animals (terrestrial and aquatic)
A - No national plan for a system of surveillance of AMR.
B - National plan for surveillance of AMR but capacity (including laboratory and for reporting data on AMR) is lacking.
C - Some AMR data is collected locally but may not use a standardised approach and lacks national coordination and/or quality management.
D - Priority pathogenic/ commensal bacterial species have been identified for surveillance. Data systematically collected and reported on levels of resistance in at least 1 of those bacterial species, involving a laboratory that follows quality management processes, e.g. proficiency testing.
E - National system of surveillance of AMR established for priority animal pathogens, zoonotic and commensal bacterial isolates which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.

33. AMR surveillance is routinely undertaken in animals for the following categories: [Animal (terrestrial and/or aquatic) isolates linked to animal disease.] - N/A, Yes, NO
34. AMR surveillance is routinely undertaken in animals for the following categories: [Zoonotic pathogenic bacteria] - N/A, Yes, NO
35. AMR surveillance is routinely undertaken in animals for the following categories: [Commensal isolates] - N/A, Yes, NO
36. AMR surveillance is routinely undertaken in animals for the following categories: [ESBL producing indicator E. coli obtained from healthy animals in key food producing species] - N/A, Yes, NO
37. National surveillance system for antimicrobial resistance (AMR) in food (animal and plant origin)
A - No national plan for a system of surveillance of AMR is available.
B - National plan for surveillance of AMR but capacity (including laboratory and for reporting data on AMR) is lacking.
C - Some AMR data is collected locally but may not use a standardised approach and lacks national coordination and/or quality management.
D - Priority food borne pathogenic/ indicator bacterial species have been identified for surveillance. Data systematically collected and reported on levels of resistance in at least 1 of those bacterial species, involving a laboratory that follows quality management processes, e.g. proficiency testing.
E - National system of surveillance of AMR established for priority foodborne pathogens and/or relevant indicator bacteria which follows quality assurance processes in line with intergovernmental standards. Laboratories that report for AMR surveillance follow quality assurance processes.
38. AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [A - Food borne pathogenic bacteria][Scale 1] - Yes, NO
39. AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [A - Food borne pathogenic bacteria][Scale 2] - Yes, NO
40. AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [B - Indicator bacteria][Scale 1] - Yes, NO
41. AMR surveillance is systematically undertaken in food (animal and plant origin) in the following categories: [B - Indicator bacteria][Scale 2] - Yes, NO
42. Multi-sectoral working group or coordination committee in charge of national AMR strategy reviews data on antimicrobial consumption and resistance in human and animal sectors at least annually, considers implications for and amends national strategy accordingly [For human health] - Yes, NO
43. Multi-sectoral working group or coordination committee in charge of national AMR strategy reviews data on antimicrobial consumption and resistance in human and animal sectors at least annually, considers implications for and amends national strategy accordingly [For animal health] - Yes, NO
44. National AMR Laboratory network in animal health and food safety sectors+ - no response
45. Effective integration of laboratories in the AMR surveillance



A - Information not available
B - Laboratories perform antimicrobial susceptibility testing (AST) for own purposes and are not included in the national AMR surveillance system
C - Some laboratories performing AST are integrated in the national AMR surveillance system
D - All laboratories performing AST are integrated in the AMR surveillance system but the role should be better formalized and the network better and developed
E - All laboratories performing AST are integrated in the national AMR surveillance system, have a clear position, and are linked to a national network coordinated by a National Reference Laboratory
46. Level of the standardization and harmonization of procedures among laboratories included in the AMR surveillance system
A - Information not available
B - No standardized national AST guidelines are in place or Less than 30% laboratories follow the same AST guidelines
C - Between 30% to 79% of laboratories follow the same AST guidelines
D - Over 80% of laboratories use the same AST guidelines
E - 100% of laboratories use the same AST guidelines
47. Relevance of diagnostic techniques used by laboratories included in the AMR surveillance system
A - Information not available
B - AST, bacterial isolation and identification protocols are not relevant or specific to the national AMR surveillance objectives
C - Major modifications in the AST, bacterial isolation and identification protocols used are required to improve their adaptation to national AMR surveillance objectives
D - Minor modifications in the AST, bacterial isolation and identification protocols used would improve their adaptation to the national AMR surveillance objectives
E - AST, bacterial isolation and identification protocols are perfectly suited to the national AMR surveillance objectives
48. Technical level of data management of the laboratory network in the AMR surveillance system
A - Information not available
B - AST data are handled manually, or AST data management is not computerized in all laboratories of the network and/or there are problems in the recording of the samples and their traceability along the analysis chain
C - Most laboratories of the network use computers to manage part of their data but major improvements in the system are required
D - Some minor improvements may be made in some laboratories of the network for the computerized management of laboratory data (computerized transmission of data, input procedures, sample storage information, etc...)

E - All laboratories use optimal data management (e.g. samples and test results are identified using a complete computerized management system covering each step in the analysis chain, including the storage of epidemiological information, data validation protocol and the computerized transmission of results, conforming perfectly to the requirements of the national AMR surveillance system).
<b>E. INFECTION PREVENTION AND CONTROL (Country progress on strategic objective 3) - RATIONALE: (Country progress on strategic objective)- To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures</b>
49. Infection Prevention and Control (IPC) in human health care
A - No national IPC programme or operational plan is available.
B - A national IPC programme or operational plan is available. National IPC and water, sanitation and hygiene (WASH) and environmental health standards exist but are not fully implemented.
C - A national IPC programme and operational plan are available and national guidelines for health care IPC are available and disseminated. Selected health facilities are implementing the guidelines, with monitoring and feedback in place.
D - National IPC programme available according to the WHO IPC core components guidelines+ and IPC plans and guidelines implemented nationwide. All health care facilities have a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, per national standards.
E - IPC programmes are in place and functioning at national and health facility levels according to the WHO IPC core components guidelines#. Compliance and effectiveness are regularly evaluated and published. Plans and guidance are updated in response to monitoring.
50. Good health, management and hygiene practices to reduce the use of antimicrobials and minimize development and transmission of AMR in animal production (terrestrial and aquatic)
A - No systematic efforts to improve good production practices.
B - Some activities in place to develop and promote good production practices.
C - National plan agreed to ensure good production practices in line with international standards (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius). Nationally agreed guidance for good production practices developed, adapted for implementation at local farm and food production level.
D - Nationwide implementation of plan to ensure good production practices and national guidance published and disseminated.
E - Nationwide implementation of plan to ensure good production practices and monitoring of impact on level of AMR, on animal health and welfare, and on production, with updating of plans and guidance in response to findings.
51. Good management and hygiene practices to reduce the development and transmission of AMR in food processing
A - No systematic efforts to improve good management and hygiene practices.
B - Some activities in place to develop and promote good management and hygiene practices.

C - National plan agreed to ensure good management and hygiene practices in line with international standards (e.g. Codex Alimentarius). Nationally agreed guidance for good practices developed, and adapted for implementation according to local food processing approaches
D - Nationwide implementation of plan to ensure good management and hygiene practices and national guidance published and disseminated.
<b>F. Optimize the use of antimicrobial medicines in human, animal and plant health. (Country progress on strategic objective 4:) - RATIONALE: Country progress on strategic objective 4</b>
52. Optimizing antimicrobial use in human health
A - No/weak national policies for appropriate use.
B - National policies for antimicrobial governance developed for the community and health care settings.
C - Practices to assure appropriate antimicrobial use being implemented in some healthcare facilities and guidelines for appropriate use of antimicrobials available.
D - Guidelines and other practices to enable appropriate use are implemented in most health facilities nationwide. Monitoring and surveillance results are used to inform action and to update treatment guidelines and essential medicines lists.
E - Guidelines on optimizing antibiotic use are implemented for all major syndromes and data on use is systematically fed back to prescribers.
53. Optimizing antimicrobial use in animal health (terrestrial and aquatic)
A - No national policy or legislation regarding the quality, safety and efficacy of antimicrobial products, and their distribution, sale or use.
B - National legislation covers some aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
C - National legislation covers all aspects of national manufacture, import, marketing authorization, control of safety, quality and efficacy and distribution of antimicrobial products.
D - The national regulatory framework <sup>13</sup> for AM products incorporates all the elements included in the related international standards on responsible and prudent use of antimicrobials (e.g. OIE Terrestrial and Aquatic Codes, Codex Alimentarius) according to animal species and/or production sector.
E - Enforcement processes and control are in place to ensure compliance with legislation

## References

1. WHO World Health Organization. Global Database for the Tripartite Antimicrobial Resistance (AMR) Country Self-assessment Survey (TrACSS) Available online: <https://amrcountryprogress.org/> (accessed on Jun 4, 2021).