PRIORITIZED ACTIVITIES OF

ZAMBIA'S MULTI-SECTORAL NATIONAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE

August 2019

PRIORITIZED ACTIVITIES OF

ZAMBIA'S MULTI-SECTORAL NATIONAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE

August 2019

CSE is grateful to the Swedish International Development Cooperation Agency (SIDA) for institutional support

The report presents prioritized activities of Zambia's multi-sectoral national action plan on antimicrobial resistance. The report is an outcome of a workshop organized jointly by the Zambia National Public Health Institute (ZNPHI) and the Centre for Science and Environment (CSE), India. The ZNPHI and the CSE would like to thank all experts from Zambia and other countries who contributed to the development of this report. The list of experts is provided at the end of report.

About ZNPHI

ZNPHI (http://znphi.co.zm/) under the Ministry of Health, Republic of Zambia is a public health centre of excellence that addresses all major public health concerns in Zambia. It serves as the Secretariat to the National Antimicrobial Resistance Coordinating Committee and is responsible for coordinating the implementation of Zambia's multi-sectoral national action plan on antimicrobial resistance.

About CSE

CSE (www.cseindia.org), India is a non-profit public interest research and advocacy organization working on issues of public health, environment and development in India and the global South. The food safety and toxins programme team at CSE has been working to address the problem of antimicrobial resistance.

Published by
Centre for Science and Environment
41, Tughlakabad Institutional Area
New Delhi 110 062
Phone: + 91-11-40616000
Fax: + 91-11-29955879
E-mail: cse@cseindia.org
Website: www.cseindia.org

Contents

Foreword

Antimicrobial Resistance (AMR) has emerged as a major threat to global public health and the very existence of humankind. Among the various initiatives that have been launched to address and stem the spread of AMR is the Global Action Plan (GAP) on AMR, developed by the World Health Organization (WHO) and endorsed by the World Organisation for Animal Health (OIE), and the Food and Agriculture Organization of the United Nations (FAO).The GAP sets the guiding principles and broad base on which coordinated multisectoral actions can be premised to effectively tackle AMR and monitor progress at national and local levels.

Based on the AMR GAP, Zambia developed her multi-sectoral national action plan (NAP) on AMR in 2017 and has set ambitious targets to address the various facets and factors influencing development and spread of AMR in the local context. The activities are set out in line with the five core objectives outlined in the GAP. Among the priorities set in Zambia's AMR NAP is the development and enhancement of partnerships. To this end, the Zambian Ministry of Health through the Zambia National Public Health Institute (ZNPHI), which serves as secretariat to the national antimicrobial resistance coordinating committee, established collaboration with the India-based Centre for Science and Environment (CSE). The partnership brings on board the expertise and vast experience of the CSE to assist Zambia in refining and focusing actions set out in the NAP.

The ZNPHI and CSE have taken several action steps including the joint hosting of a workshop in Lusaka in March 2019, whose objectives were threefold: (i) to facilitate understanding on policies, tools and technical aspects that enable AMR surveillance (ii) to share best practices in different countries, and (iii) to facilitate strengthening and prioritisation of Zambia's Multi-sectoral AMR NAP and draft Integrated AMR Surveillance Strategy. The workshop incorporated expert participants from key sectors including human health, animal health, environment, food, drug, and agriculture sectors. Workshop participants were drawn from several Zambian government departments, international AMR experts, and AMR focal points from selected African countries. This report sets out some key outputs from the workshop, particularly with respect to the strengthening and prioritisation of Zambia's Multi-sectoral AMR NAP. This exercise was vital as it will enable the optimisation of the limited available resources for maximum impact and realisation of the best value for money. Among other virtues, this report demonstrates the value of collaborative multisectoral partnerships in the AMR fight.

Dr Victor Mukonka
Director - Zambia National Public Health Institute
Chairperson - National Antimicrobial Resistance Coordinating Committee
Ministry of Health

Foreword

Antibiotics are increasingly becoming ineffective in treating bacterial infections. The ill impact of antimicrobial resistance (AMR) is not limited to human health and lives but is also recognized on food security and safety, livelihood, economics and development. The world is in dire need of a solution to contain this crisis of AMR, which is led by growing resistance in bacteria against antibiotics. The good part is that global action to contain AMR is gaining momentum. The world has begun to preserve antibiotics in a concerted way. Rightly so— there is no time.

In a favourable response to the call made through the global action plan on AMR, most countries have developed their national action plans. In line with the need of the hour, these are ambitious, comprehensive and multi-sectoral. But effective implementation of such plans will determine how successfully a country is able to contain the problem of resistance. This is a mammoth task and would be a big challenge. More so for low- and middle-income countries, which often have limited financial and technical resources and are caught up with competing priorities. Such countries are less prepared to address all aspects of the problem in one go and may have to start afresh in many areas. Therefore, it is important to prioritize actions, which not only have maximum impact but are also feasible in view of the available resources and ground realities across different sectors.

My colleagues at the Centre for Science and Environment have been collaborating with the Ministry of Health in Zambia to help implement Zambia's Multi-sectoral National Action Plan on Antimicrobial Resistance. This report outlines the prioritized activities of Zambia's plan and is an outcome of a jointly organized workshop conducted in March 2019 at Lusaka, Zambia. The workshop involved key stakeholders from Zambia and relevant experts from several parts of the world, including Africa, Europe, India and the US. This report gives a clear sense of activities that should be initiated and completed across human, animal, agriculture and environment sectors along with timelines over the next five years. But the need of the hour is to move step by step. It is therefore important that work on priorities emerged for first year gets initiated. Five focus areas for year one are as follows:

- **Collection, analysis and integration of the baseline information such as on consumption of antibiotics, status and capacity of laboratories and trends of AMR**
- **Development and operationalization of policies on use of antibiotic growth promoters in food animals as well as the use of critically important antibiotics, particularly of highest priority**
- **Integration of the AMR perspective in relevant policies**
- **Monitoring the progress of national action plan implementation across different sectors**
- **Publishing annual reports on status and progress**

We at the Centre for Science and Environment are happy to have worked together with the Zambia National Public Health Institute, which is responsible for implementation of Zambia's action plan. We believe that this report will be useful in Zambia's efforts to contain antimicrobial resistance. I wish them the best. We also hope that this report provides a framework for other countries to prioritize their national action plans.

Chandra Bhushan
Deputy Director General
Centre for Science and Environment

Abbreviations

AMR—Antimicrobial Resistance
AMRCC—Antimicrobial Resistance Coordinating Committee
CDC— Centers for Disease Control and Prevention
CPD—Continuing Professional Development
CSE—Centre for Science and Environment
DALY—Disability Adjusted Life Year
EPR—Extended Producer Responsibility
FAO—Food and Agriculture Organization of the United Nations
GAP—Global Action Plan
HAI—Hospital Acquired Infection
IPC—Infection Prevention and Control
KAP—Knowledge Attitude and Practice
LMIC—Low- and Middle-Income Country
MoU—Memorandum of Understanding
NAP—National Action Plan
NRL—National Reference Laboratory
OIE—World Organisation for Animal Health
QALY—Quality Adjusted Life Year
QMS—Quality Management System
SDG—Sustainable Development Goal
SOP—Standard Operating Procedure
STG—Standard Treatment Guideline
STP—Sewage Treatment Plant
ToR—Terms of Reference
UNEP—United Nations Environment Programme
WHO—World Health Organization
ZAMRA—Zambia Medicines Regulatory Authority
ZEMA—Zambia Environmental Management Agency
ZNPHI—Zambia National Public Health Institute

1. Introduction

Antimicrobial resistance (AMR) is recognized as a global public health threat. With rising AMR—particularly antibiotic resistance in bacteria—common infections are becoming difficult to treat.[1] Limited options of effective antimicrobials are putting the success of modern medical and surgical interventions at risk resulting in prolonged hospital stays, expensive treatments and higher economic burden to individuals and nations. It is estimated that worldwide, AMR will be responsible for more than 10 million deaths per year by 2050 and will result in lost outputs worth US $100 trillion, if not contained in a timely manner.[2] AMR can also influence food safety, nutrition security, health security, livelihood and attainment of the following Sustainable Development Goals (SDGs):[3]

- End poverty in all its forms everywhere (SDG 1)
- End hunger, achieve food security and improved nutrition and promote sustainable agriculture (SDG 2)
- Ensure healthy lives and promote well-being for all at all ages (SDG 3)
- Ensure availability and sustainable management of water and sanitation for all (SDG 6)
- Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all (SDG 8)
- Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (SDG 9)
- Reduce inequality within and among countries (SDG 10)
- Ensure sustainable consumption and production patterns (SDG 12)
- Strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development (SDG 17).

AMR has been recognized as a One Health issue owing to its significant linkages with the health of humans, animals and environment.[4] The key reasons contributing to AMR include misuse and overuse of antibiotics in human health, food-animal production and agriculture, along with poor management of waste emanating from households, farms, factories and human and veterinary healthcare settings. While efforts aimed at addressing AMR from the human health aspects have received most attention, followed by the animal part of the problem, those related to the environmental dimensions of AMR have received limited focus in comparison.

In order to respond to this global crisis, the World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE) endorsed the Global Action Plan (GAP) on AMR in 2015.[5] The GAP outlined five strategic objectives emphasizing the need for multi-sectoral involvement to address the issue. It called for Member States to develop their National Action Plans (NAPs) on AMR. As of January 2019, 117 countries had finalized their NAPs and another 62 were in the process of developing theirs.[6] Later in 2016, the FAO came up with its action plan and OIE developed its strategy to address AMR.[7,8] The United Nations Environment Programme (UNEP) has been a recent addition to the WHO-FAO-OIE tripartite to bring focus on the environment sector.

Many countries have responsibly come forward and developed their comprehensive and ambitious NAPs. However, their implementation would be a challenge and more so for resource-constrained low- and middle-income countries (LMICs), which are often limited by competing priorities, inadequate policies and enforcement capacities, and required resources in general. Further, in comparison to human

health sector, greater challenges in NAP implementation will be faced by animal, agriculture and environment sectors due to limited understanding, guidance, and lack of preparedness to address AMR in these sectors.

In order to effectively move forward and achieve multi-sectoral NAP implementation, there is a strong need for prioritization of NAP activities based on ground level realities, available resources and capacity, and feasibility of implementation at the country level. For example, a country with high levels of food-animal production should focus on judicious antibiotic use in food animals and waste management in farms. Similarly, a country which is a large-scale pharmaceutical manufacturer should also focus on appropriate waste management at manufacturing units to prevent environmental spread of AMR or its determinants. The Interagency Coordination Group on AMR, set up by the United Nations to give practical recommendations to contain AMR, also highlights the need for prioritized actions and interventions that are specific to the national context, capacity and infrastructure.[9]

Since 2018, the Ministry of Health, Republic of Zambia and the Centre for Science and Environment (CSE), India are collaborating to support the implementation of Zambia's multi-sectoral NAP on AMR.[10] As part of this collaboration, the Zambia National Public Health Institute (ZNPHI) and CSE jointly organized a three-day workshop in March 2019. One of the objectives of this workshop was to enable prioritization of NAP activities. This was achieved with the help of experts and stakeholders from Zambia and experts from select African and European countries as well as India and the United States across human health, animal, environment, food, drug, and agriculture sectors.

Among the many outputs of the workshop, this report presents the output of one of the group exercises wherein the activities outlined in Zambia's multi-sectoral NAP on AMR were prioritized, segregated into policy and implementation level activities, and new activities were incorporated. It is believed that the report will be useful for effective implementation of Zambia's NAP on AMR.

The challenges of AMR development and spread have to be urgently addressed using a coordinated multi-sectoral approach for containment. Zambia has set high on its health agenda with the highest level of political and technical leadership support, the responsibility to manage AMR in Zambia and the region as it has a solid foundation of ministerial support from all sectors, regulatory bodies that have the mandate to monitor the sectors, and ZNPHI and various governmental, non-governmental and civil society organizations to partner in implementation of the NAP. Furthermore, Zambia advantaged by its position as a host country to the Africa CDC Southern Africa Regional Collaborating Centre places it in a leadership position to influence this process in the region. Prioritization of resource mobilization and the policy framework should enable a rapid response and minimize the spread of AMR.

2. Approach adopted to prioritize activities of Zambia's Multi-sectoral National Action Plan on Antimicrobial Resistance

As part of the workshop, experts deliberated on the prioritization of activities mentioned in Zambia's NAP on AMR over a five-year time period. The experts agreed upon a sector-specific prioritization of activities, addition of new activities, as well as policy and implementation level segregation of the activities.

Prioritization has been done for human health (represented as H), animal (represented as A), and environment (represented as E) sectors across all objectives and strategic interventions mentioned in Zambia's NAP on AMR (see *Table 1: Objectives and strategic interventions in Zambia's Multi-sectoral National Action Plan on Antimicrobial Resistance*). Activities related to plant sector are prioritized as part of environment. Additional activities are marked (*). Policy-related activities include development of laws, policies, standards or regulations and activities related to guidelines, SOPs, training, capacity building etc. are categorized under implementation.

The prioritized timelines for NAP activities indicate the timing of activity completion based on the Zambian sector-specific capacities and resources. The criteria adopted for prioritization are as follows:

- A time frame of one year is allocated for an activity that should be completed in short-term
- Two to three years are allocated for an activity that should be completed in medium-term
- Four to five years are allocated for an activity that should be completed in long-term
- One to three years are allocated for an activity that should begin in short-term and complete by medium-term
- Two to five years are allocated for an activity that should begin in medium-term and complete by long-term
- One to five years are allocated for an activity that should continue throughout

In addition, for effective NAP implementation, experts highlighted the importance of strengthening governance and leadership along with significance of ensuring the functionality of AMRCC in view of the required One Health approach. Experts also emphasized the periodic review and monitoring of implementation of the NAP on AMR.

Table 1: Objectives and strategic interventions in Zambia's Multi-sectoral National Action Plan on Antimicrobial Resistance

Objectives	Strategic interventions
Objective 1: To improve awareness and understanding of AMR through good governance, effective communication, education and training	1.1 Establish an evidence-based public communications programme targeting audiences in human, animal, plant health, and environment practices 1.2 Promote the inclusion of AMR and related topics into the education curricula at all levels (general education, pre- and in-service) 1.3 Develop accredited continuing professional development (CPD) and in-service training programmes on AMR, including alternative learning methods 1.4 Establish a trace-back system in livestock and foods of animal origin
Objective 2: To strengthen knowledge and evidence-base through surveillance and research	2.1 Establish a national coordination structure for surveillance of AMR 2.2 Establish a food safety surveillance system including AMR 2.3 Strengthen legal provisions to address AMR and related factors 2.4 Designate national reference laboratories for AMR surveillance 2.5 Establish an AMR laboratory network 2.6 Develop and implement a national AMR research plan
Objective 3: To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures, and biosecurity	3.1 Establish a national coordinating structure for sanitary and phytosanitary measures; infection prevention and control, and biosecurity 3.2 Strengthen biosecurity and sanitary measures in animal/plant health
Objective 4: To optimize the use of antimicrobial medicines in human, animal, and plant health	4.1 Strengthen the pharmaceutical manufacturing and supply chain 4.2 Establish/strengthen antimicrobial stewardship programmes in human, animal, and plant health practice
Objective 5: To develop the economic case for sustainable investment that takes account of the national needs and to increase investment in new medicines, diagnostic tools, vaccines, and other interventions	5.1 Measure the burden of AMR in various sector 5.2 Promote access to incentives for industry to invest in research and development of novel antimicrobials and therapeutics 5.3 Promote national and international collaboration among industry, government, academia, and other institutions in the search for novel drugs, vaccines and diagnostic tools 5.4 Establish database of potential research funding agencies with an interest in AMR

3. Prioritized activities of Zambia's Multi-sectoral National Action Plan on Antimicrobial Resistance

Objective 1: To improve awareness and understanding of AMR through good governance, effective communication, education and training

Table 2: Prioritized activities under NAP Objective 1

		Activity		Timeline (years) 1	2	3	4	5
Strategic intervention 1.1: Establish an evidence-based public communications programme targeting audiences in human, animal, plant health, and environment practices								
1	IMPLEMENTATION	Estimate awareness and knowledge through knowledge, attitude and practices (KAP) and behavioural studies in different professional groups, farmers and the general public	H					
			A					
			E					
2		Design communication programmes based on KAP studies targeting different audiences in human, animal, plant and environmental health practices, and the general public	H					
			A					
			E					
3		Awareness of consumers on antibiotic residues in food, AMR and labelling of food from animals raised with/without routine use of antibiotics*	H					
			A					
			E					
4		Awareness campaigns on importance and need for environmental surveillance across stakeholders*	H					
			A					
			E					
5		Develop public–private partnerships for increased awareness*	H					
			A					
			E					
6		Engage farmer association for farmer awareness on aspects such as judicious antibiotic use and antibiotic-laden feed and feed additives*	H					
			A					
			E					
7		Use of social media and mobile-based technologies for awareness creation and spread*	H					
			A					
			E					
8		Publication of annual AMR status report*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years) 1	2	3	4	5
Strategic intervention 1.2: Promote the inclusion of AMR and related topics into the education curricula at all levels (general education, pre- and in-service)								
1	IMPLEMENTATION	Conduct assessment of various curricula to determine current extent of AMR inclusion	H					
			A					
			E					
2		Advocate for the inclusion of AMR and related topics in various curricula at all levels in the formal education sector	H					
			A					
			E					
3		Incorporate IPC/hygiene/sanitary/biosecurity in curricula for education and training of professionals*	H					
			A					
			E					
4		Develop AMR refresher courses in environmental sector*	H					
			A					
			E					
Strategic intervention 1.3: Develop accredited continuing professional development (CPD) and in-service training programmes on AMR, including alternative learning methods								
1	POLICY	Regulation to make CPD on AMR as a requirement for practicing*	H					
			A					
			E					
2	IMPLEMENTATION	Engage professional bodies in developing capacity of all professionals for AMR containment in various sectors	H					
			A					
			E					
3		Develop and implement an AMR CPD training strategy and resources	H					
			A					
			E					
4		Make available and conduct CPD on AMR for in-service professionals	H					
			A					
			E					
5		Conduct annual antimicrobial stewardship training programmes	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years) 1	2	3	4	5
6	IMPLEMENTATION	Awareness and training of regulators, custom officials, distributors, sellers for approved drug sale*	H					
			A					
			E					
7		Conduct regular in-service training for plant health inspectors, animal health inspectors, environmental health inspectors and extension workers at provincial and/or district level on biosecurity/hygiene/good farm and waste management practices*	H					
			A					
			E					
8		Awareness and training of doctors, registered practitioners, farmers, veterinarians and other stakeholders on need for biosecurity, judicious antibiotic use, importance of alternatives, self-regulation and record keeping*	H					
			A					
			E					
9		Development of training material/strategy for AMR and residue testing in food animals/products (protocols, standard methods, data collection, analysis, and reporting etc.)*	H					
			A					
			E					
10		Conduct field epidemiology training programmes*	H					
			A					
			E					
11		Enhance linkages between agricultural extension services and environment with respect to AMR*	H					
			A					
			E					
Strategic intervention 1.4: Establish a trace-back system in livestock and foods of animal origin								
1	IMPLEMENTATION	Conduct community mobilization to raise awareness and capacity building	H					
			A					
			E					
2		Include AMR and related topics in community based training programmes on human health, animal health, plant health and environment	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

Objective 2: To strengthen knowledge and evidence-base through surveillance and research

Table 3: Prioritized activities under NAP Objective 2

		Activity		Timeline (years) 1	2	3	4	5
Strategic intervention 2.1: Establish a national coordination structure for surveillance of AMR								
1	IMPLEMENTATION	Integrate AMR surveillance into the existing surveillance system within each sector–human, animal, plant, food and environment	H					
			A					
			E					
2		Interlink and integrate the sector-specific surveillance systems into the national and international AMR surveillance systems	H					
			A					
			E					
3		Establish a surveillance system for zoonotic food-borne pathogens	H					
			A					
			E					
4		Establish surveillance of HAI*	H					
			A					
			E					
5		Establish/integrate a laboratory-based early warning system to report suspected AMR issues for the public	H					
			A					
			E					
6		Promote stakeholder collaboration on AMR surveillance in environment*	H					
			A					
			E					
7		Establish surveillance systems for antibiotic use at national, regional, provincial and district levels*	H					
			A					
			E					
8		Data collection, recording and disclosure to develop harmonized systems for AMR, antimicrobial use and residue testing*	H					
			A					
			E					
9		Develop online platform for sharing data on AMR, antibiotic use and antibiotic residue surveillance*	H					
			A					
			E					
10		Set achievable reduction targets on antibiotic use*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years) 1	2	3	4	5
Strategic intervention 2.2: Establish a food safety surveillance system including AMR								
1	IMPLEMENTATION	Develop a traceability strategy for food safety surveillance	H					
			A					
			E					
2		Conduct training on traceability of AMR in food production	H					
			A					
			E					
Strategic intervention 2.3: Strengthen legal provisions to address AMR and related factors								
1	POLICY	Review existing laws/policies related to AMR containment prior to formulation of new laws/ policies*	H					
			A					
			E					
2		Conduct regulatory impact assessment of all relevant Zambian legal provisions on antimicrobials	H					
			A					
			E					
3		Develop national monitoring policy/framework for antibiotic residues in food from animals*	H					
			A					
			E					
4		Develop standards for antibiotic residues in food from animals and animal tissues*	H					
			A					
			E					
5		Develop/update regulation (non-mandatory) on antibiotic residues and AMR in effluents and waste from pharmaceutical factories, abattoirs, STPs, farms, and human and animal healthcare settings*	H					
			A					
			E					
6		Develop/update regulation on antibiotic residues and AMR in effluent and waste from pharmaceutical factories, abattoirs, STPs, farms, and human and animal healthcare settings*	H					
			A					
			E					
7		Standards (non-mandatory) for using animal farm wastes in plants and other animal and aquaculture farms*	H					
			A					
			E					
8		Standards for using animal farm wastes in plants and other animal and aquaculture farms	H					
			A					
			E					
9		Regulation on use of animal tissue waste in animal feed*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years)				
				1	2	3	4	5
10	IMPLEMENTATION	Evidence-based development/strengthening of antimicrobial policies and STGs for human, terrestrial and aquatic animals, plants, and environment	H					
			A					
			E					
11		Assess and generate baseline data of antimicrobials used on plants*	H					
			A					
			E					
Strategic intervention 2.4: Designate national reference laboratories for AMR surveillance								
1	IMPLEMENTATION	Identify, designate and strengthen NRL with capacity to assay specific pathogens	H					
			A					
			E					
2		Develop and approve TOR and MoUs for national reference laboratories	H					
			A					
			E					
3		Procure equipment and supplies for conducting AMR testing	H					
			A					
			E					
4		Develop a biorepository facility	H					
			A					
			E					
Strategic intervention 2.5: Establish an AMR laboratory network								
1	IMPLEMENTATION	Conduct a countrywide needs assessment for laboratories	H					
			A					
			E					
2		Establish a safe and appropriate specimen collection and transport system	H					
			A					
			E					
3		Build microbiological capacity in laboratories to detect AMR in environment*	H					
			A					
			E					
4		Build capacity (human, material, and infrastructure) in network laboratories to conduct AMR activities	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years)				
				1	2	3	4	5
5	IMPLEMENTATION	Strengthening diagnostic and residue monitoring capacities in laboratories*	H					
			A					
			E					
6	IMPLEMENTATION	Strengthen QMS in laboratories	H					
			A					
			E					
Strategic intervention 2.6: Develop and implement a national AMR research plan								
1	IMPLEMENTATION	Prepare and operationalize a national AMR research agenda through engagement of research community	H					
			A					
			E					
2	IMPLEMENTATION	Advocate to research authorities to consider all aspects of AMR, including environment and plant health*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

Objective 3: To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures, and biosecurity

Table 4: Prioritized activities under NAP Objective 3

		Activity		Timeline (years) 1	2	3	4	5
Strategic intervention 3.1: Establish a national coordinating structure for sanitary and phytosanitary measures; infection prevention and control (IPC), and biosecurity								
1	POLICY	Develop policy on registration/licensing of farms, factories (pharmaceutical manufacturers, feed manufacturing units, big slaughter houses, fish/meat/dairy processing units), healthcare and veterinary facilities*	H					
			A					
			E					
2		Develop policy on registration/licensing of farmers*	H					
			A					
			E					
3		Policy on environment risk assessment in view of AMR*	H					
			A					
			E					
4	IMPLEMENTATION	Conduct situation analysis of sanitary and phytosanitary measures, IPC, and biosecurity	H					
			A					
			E					
5		Develop/revise national guidelines and protocols identified through situation analysis	H					
			A					
			E					
6		National coordination structure to spearhead effective sanitation, hygiene, IPC and biosecurity*	H					
			A					
			E					
7		Develop a national IPC/hygiene/sanitary/biosecurity implementation plan*	H					
			A					
			E					
8		Develop national sanitation, IPC, hygiene, biosafety, and phytosanitary guidelines for relevant stakeholders such as farms, factories and healthcare settings*	H					
			A					
			E					
9		Advocate for the implementation of the national sanitation, IPC, hygiene, biosafety, and phytosanitary guidelines	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years) 1	2	3	4	5
10	IMPLEMENTATION	Development of SOPs on management of waste from above settings in view of AMR*	H					
			A					
			E					
11		Promote hand hygiene to prevent infections in human healthcare facilities and community*	H					
			A					
			E					
12		Review and strengthen national immunization program to expand the vaccine coverage in human and animal health sectors*	H					
			A					
			E					
13		Development of SOPs targeted at agricultural extension services*	H					
			A					
			E					
Strategic intervention 3.2: Strengthen biosecurity and sanitary measures in animal/plant health								
1	IMPLEMENTATION	Mapping of livestock/plant populations and biosecurity points	H					
			A					
			E					
2		Develop/strengthen livestock/plant census and national database	H					
			A					
			E					
3		Develop new and strengthen existing biosecurity checkpoints and barriers	H					
			A					
			E					
4		Exploit new technologies to aid process of livestock census*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

Objective 4: To optimize the use of antimicrobial medicines in human, animal, and plant health

Table 5: Prioritized activities under NAP Objective 4

		Activity		Timeline (years)				
				1	2	3	4	5
Strategic intervention 4.1: Strengthen the pharmaceutical manufacturing and supply chain								
1	POLICY	Laws for licensing of manufacturer/distributor/ seller of antibiotic laden feed/feed premix*	H					
			A					
			E					
2		Regulation on import of antibiotics*	H					
			A					
			E					
3		Regulation/policy on appropriate labelling of antibiotics*	H					
			A					
			E					
4		Regulation on online sale of antibiotics*	H					
			A					
			E					
5		Development of a policy on EPR applicable across the supply chain*	H					
			A					
			E					
6		Harmonization of laws related to AMR containment between ZAMRA, Ministry of Agriculture and ZEMA*	H					
			A					
			E					
7		Strengthen the regulatory mechanisms (ZAMRA and professional bodies) for access to antimicrobials in human, animal and plant health	H					
			A					
			E					
8	IMPLEMENTATION	Review and strengthen the existing QMS for the supply of medicines, covering manufacturing, production, storage, transport, etc.	H					
			A					
			E					
9		Implement policies for ensuring prescription sale and limiting over the counter availability of antibiotics*	H					
			A					
			E					
10		Develop/review guidelines for disposal of antimicrobials, human, animal, plant and pharmaceutical industry waste	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years)				
				1	2	3	4	5
11	IMPLEMENTATION	Implement regulation on EPR for drug manufacturers and its enforcement and launch of drug take-back programmes*	H					
			A					
			E					
12		Create incentives and disincentives for compliance of regulations developed to contain AMR such as performance benchmarks and rating systems*	H					
			A					
			E					
Strategic intervention 4.2: Establish/strengthen antimicrobial stewardship programmes in human, animal, and plant health practice								
1	POLICY	Policy for antimicrobial stewardship*	H					
			A					
			E					
2		National policy to restrict critically important antimicrobials in animals particularly for growth promotion and disease prevention*	H					
			A					
			E					
3		National policy to gradually phase off non-therapeutic use of antibiotics such as growth promoters and disease prevention in food animals*	H					
			A					
			E					
4		Regulation on import of antibiotic-laden feed/ feed-premixes*	H					
			A					
			E					
5		Regulation/policy on appropriate labelling of antibiotic-laden feed/feed premixes and food products sourced from animals raised with/ without antibiotic use*	H					
			A					
			E					
6		Revise the 'Plant Pest and Disease Act' in view of AMR*	H					
			A					
			E					
7		Develop statutory provision to include antimicrobials used in plants as drugs*	H					
			A					
			E					
8		Policy and regulations on the use of antimicrobials in plants*	H					
			A					
			E					
9		Policy on development and promotion of alternatives to antibiotics (especially in animal and plant sector)*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

		Activity		Timeline (years) 1	2	3	4	5
10	IMPLEMENTATION	Develop ToR for sector-specific antimicrobial stewardship teams	H					
			A					
			E					
11		Develop antimicrobial stewardship programmes at the hospital level*	H					
			A					
			E					
12		Develop guidelines specific to AMR in plant health	H					
			A					
			E					
13		Promote search for new drugs, vaccines and diagnostic tools in human, animal and plant health sectors*	H					
			A					
			E					
14		Conduct targeted research on prebiotics and probiotics*	H					
			A					
			E					
15		Encourage research on alternatives to antibiotics in traditional medicine*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

Objective 5: To develop the economic case for sustainable investment that takes account of the national needs and to increase investment in new medicines, diagnostic tools, vaccines, and other interventions

Table 6: Prioritized activities under NAP Objective 5

Activity				Timeline (years)				
				1	2	3	4	5
Strategic intervention 5.1: Measure the burden of AMR in various sector								
1	IMPLEMENTATION	Measure QALYs, DALYs, mortality rates, and costs associated with infectious diseases/ hospitalization/treatment to establish the impact of AMR#	H					
			A					
			E					
2		Quantification of the cost of infectious disease and its impact on animal health and related economics*	H					
			A					
			E					
3		Conduct periodic studies on efficacy of antimicrobials	H					
			A					
			E					
Strategic intervention 5.2: Promote access to incentives for industry to invest in research and development of novel antimicrobials and therapeutics								
1	IMPLEMENTATION	Enhance awareness among industry players of existing incentives for research and development of novel antimicrobials and therapeutics	H					
			A					
			E					
Strategic intervention 5.3: Promote national and international collaboration among industry, government, academia, and other institutions in the search for novel drugs, vaccines and diagnostic tools								
1	IMPLEMENTATION	Create database of all stakeholders in implementation of the NAP on AMR*	H					
			A					
			E					
2		Promote linkages among stakeholders to search for new drugs, vaccines and diagnostic tools	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

Using existing hospital records and laboratory data

		Activity		Timeline (years)				
				1	2	3	4	5
Strategic intervention 5.4: Establish database of potential research funding agencies with an interest in AMR								
1	IMPLEMENTATION	Map available sources of funding for NAP implementation*	H					
			A					
			E					
2		Develop an investment plan for implementing NAP*	H					
			A					
			E					
3		Map available sources of funding for research in AMR	H					
			A					
			E					
4		Create database of available and potential research funding agencies with an interest in AMR and develop resource mobilization strategies	H					
			A					
			E					
5		Create database of researchers and institutions interested in conducting AMR research	H					
			A					
			E					
6		Harmonize activities and resources with up-coming funding opportunities (e.g. Fleming Fund)*	H					
			A					
			E					

* Additional activities Human (H) Animal (A) Environment (E) Not applicable to sector

List of expert contributors

Experts from Zambia

- Amon Siame, Biomedical Scientist, Chilonga Mission General Hospital
- Chanda Chikwanda, Epidemiologist, Zambia National Public Health Institute
- Chewe Orbrie, Field Epidemiology Training Resident, Zambia National Public Health Institute
- Chileshe Lukwesa-Musyani, AMR Focal Point (Human health), Lusaka District Health Office
- Christopher P. Siame, Regional Laboratory, Ministry of Fisheries and Livestock
- Daniel Ndambasia, Registration Officer-Veterinary Medicines, Zambia Medicines Regulatory Authority
- Danny Sinyinza, Department of Fisheries, Ministry of Fisheries and Livestock
- Doreen M. Chomba, Principal Agricultural Research Officer/Plant Health Inspector, Plant Quarantine and Phytosanitary Service, Zambia Agriculture Research Institute
- Elebert Mtonga, Senior Analyst, Food and Drugs Control Laboratory
- Francis Chimpangu, AMR Focal Point, Food and Agriculture Organization of the United Nations, Zambia Country Office
- Joseph Kasongo, Head, Ndola Teaching Hospital Laboratory
- Kaunda Yamba, University Teaching Hospital, Ministry of Health
- Kellyson Mache, Ministry of Fisheries and Livestock
- Kenny Chisha, Regional Laboratory, Ministry of Fisheries and Livestock
- Kunda Musonda, Head-Laboratory Systems and Networks, Zambia National Public Health Institute
- Mabvuto Phiri, Operations Manager, Central Laboratory, Centre for Infectious Disease Research in Zambia
- Maxwell Nkoya, Director-Planning, Information and Research, Zambia Environmental Management Agency
- Mazyanga L. Mazaba Liwewe, Head-Communication, Information and Research, Zambia National Public Health Institute
- Munkombwe Zuma, Director, Medicines Control, Zambia Medicines Regulatory Authority
- Mwiche Chiluba, Head, Emergency Unit, Ndola Teaching Hospital
- Ntombi Mudenda, President, Veterinary Association of Zambia
- Otridah Kapona, Laboratory Scientist and National AMR Focal Point and Coordinator, Laboratory Systems and Networks, Zambia National Public Health Institute
- Paul Fandamu, Deputy Director, Department of Veterinary Services, Ministry of Fisheries and Livestock
- Ranjit Warrier, Director, Biomedical Research, Centre for Infectious Disease Research in Zambia
- Ricky Chazya, National Livestock Epidemiology and Information Centre, Department of Veterinary Services, Ministry of Fisheries and Livestock
- Rodwell Chandipo, Principal Environmental Inspector, Natural Resources Management Unit, Zambia Environmental Management Agency

- Samuel Yingst, Chief, Laboratory Infrastructure and Support, Centers for Disease Control and Prevention
- Sly M. Phiri, Research Officer, Department of Fisheries, Ministry of Fisheries and Livestock
- Victor Mukonka, Director, Zambia National Public Health Institute; Chair, Antimicrobial Resistance Coordinating Committee
- Victor Chishimba, Zambia Community Health Initiative

International experts

- Amit Khurana, Programme Director, Food Safety and Toxins, Centre for Science and Environment, India
- Anuj Sharma, Technical Officer-Antimicrobial Resistance; Health Laboratories, World Health Organization Country Office for India
- Bashiru Boi Kikimoto, Head, Public Health and Food Safety Division Veterinary Services Directorate, Ministry of Food and Agriculture, Ghana
- Chandra Bhushan, Deputy Director General, Centre for Science and Environment, India
- Dennis Byarugaba, Professor of Microbiology, Faculty of Veterinary Medicine, Makerere University, Uganda
- Divya Khatter, Programme Officer, Food Safety and Toxins, Centre for Science and Environment, India
- Emmanuel Kabali, Regional AMR Project Coordinator, Food and Agriculture Organization of the United Nations, Southern Africa Sub-regional Office, Zimbabwe
- Flemming Bager, Head, Department of Risk Assessment and Nutrition, National Food Institute, Technical University of Denmark, Denmark
- John Stelling, Co-Director, World Health Organization Collaborating Centre for Surveillance of Antimicrobial Resistance; Brigham and Women's Hospital, Microbiology Laboratory, Boston, Massachusetts, United States of America
- Joshua Obasanya, Head, Prevention and Programmes Coordination Department, Nigeria Centre for Disease Control, Federal Ministry of Health, Nigeria
- Karl Pedersen, Head of Section, Department of Animal Health and Antimicrobial Strategies, National Veterinary Institute, Sweden
- Mirfin Mpundu, Executive Director EPN and Head ReAct Africa-Kenya
- Rajeshwari Sinha, Deputy Programme Manager, Food Safety and Toxins, Centre for Science and Environment, India
- Samuel Kariuki, Deputy Director, Research and Development, Kenya Medical Research Institute, Kenya

High-level leadership

- Chitalu Chilufya, Honorable Minister, Ministry of Health, Zambia, MP, MCC
- Kennedy Malama, Permanent Secretary, Technical Services, Ministry of Health, Zambia

ZNPHI cooperating partners

- Nathan Bakyaita, World Health Organization Country Representative, Zambia Country Office
- George Okechi, Food and Agriculture Organization of the United Nations Country Representative, Zambia Country Office

Workshop coordination

ZNPHI

- Otridah Kapona, Laboratory Scientist and National AMR Focal Point and Coordinator, Laboratory Systems and Networks, Zambia National Public Health Institute
- Kunda Musonda, Head-Lab Systems and Networks, Zambia National Public Health Institute
- Mpanga Kasonde, Antimicrobial Resistance Coordinating Committee Secretariat, Zambia National Public Health Institute

CSE

- Amit Khurana, Programme Director, Food Safety and Toxins, Centre for Science and Environment, India
- Rajeshwari Sinha, Deputy Programme Manager, Food Safety and Toxins, Centre for Science and Environment, India
- Divya Khatter, Programme Officer, Food Safety and Toxins, Centre for Science and Environment, India

Report writing (with inputs from experts and ZNPHI)

- Amit Khurana, Programme Director, Food Safety and Toxins, Centre for Science and Environment, India
- Rajeshwari Sinha, Deputy Programme Manager, Food Safety and Toxins, Centre for Science and Environment, India
- Divya Khatter, Programme Officer, Food Safety and Toxins, Centre for Science and Environment, India

References

1. WHO Factsheet on Antimicrobial Resistance
   https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance
2. Tackling drug-resistant infections globally: Final report and recommendations
   https://amrreview.org/sites/default/files/160518_Final%20paper_with%20cover.pdf
3. No time to wait: Securing the future from drug-resistant infections
   https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_report_EN.pdf
4. Global Action Plan on Antimicrobial Resistance
   http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf
5. Global Action Plan on Antimicrobial Resistance
   http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf
6. Follow-up to the high-level meetings of the United Nations General Assembly on health-related issues: Antimicrobial Resistance
   http://apps.who.int/gb/ebwha/pdf_files/WHA72/A72_18-en.pdf
7. The FAO Action Plan on Antimicrobial Resistance (2016- 2020)
   http://www.fao.org/3/a-i5996e.pdf
8. The OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials
   http://www.oie.int/fileadmin/Home/eng/Media_Center/docs/pdf/PortailAMR/EN_OIE-AMRstrategy.pdf
9. No time to wait: Securing the future from drug-resistant infections
   https://www.who.int/antimicrobial-resistance/interagency-coordination-group/IACG_final_report_EN.pdf
10. Multi-sectoral National Action Plan on Antimicrobial Resistance (2017 - 2027)
    https://www.afro.who.int/sites/default/files/2018-08/ZNPHI%20Document.pdf

This report is an outcome of a collaborative workshop organized jointly in March 2019 by the Zambia National Public Health Institute (ZNPHI) and Centre for Science and Environment (CSE), India. It presents prioritized activities of Zambia's Multi-sectoral National Action Plan on Antimicrobial Resistance. It aims to help in the effective implementation of Zambia's action plan to contain antimicrobial resistance.

Centre for Science and Environment
41, Tughlakabad Institutional Area
New Delhi 110 062 Phone: + 91-11-40616000
Fax: + 91-11-29955879 E-mail: cse@cseindia.org
Website: www.cseindia.org