



ZIMBABWE
ONE HEALTH ANTIMICROBIAL RESISTANCE
NATIONAL ACTION PLAN
2017-2021

Strategic Framework, Operational Plan, and Monitoring
and Evaluation Plan

September, 2017

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ABBREVIATIONS AND ACRONYMS

AMR	Antimicrobial resistance	ICAZ	Infection Control Association of Zimbabwe
AMU	Antimicrobial use	IDSR	Integrated Disease Surveillance and Response
CDC	Centers for Disease Control and Prevention	IPC	Infection Prevention and Control
CDDEP	Center for Disease Dynamics, Economics & Policy	IEC	Information, Education and Communication
CEO	Chief Executive Officer	LMAC	Livestock & Meat Advisory Council
CIA	Critically Important Antimicrobials	MAMID	Ministry of Agriculture, Mechanization and Irrigation Development
CPD	Continuous Professional Development	MCAZ	Medicine Control Authority Zimbabwe
CSO	Civil Society	MDRO	Multi-drug resistant organism
CVL	Central Veterinary Laboratory	MEWC	Ministry of Environment, Water and Climate
DDD	Defined Daily Doses	MLCSCZ	Medical Laboratory and Clinical Scientists Council Zimbabwe
DLS	Directorate Laboratory Services	MoHCC	Ministry of Health and Child Care
DLVS	Department of Livestock and Veterinary Services	MoE	Ministry of Education
DPS	Department of Pharmacy Services	MoF	Ministry of Finance
DR&SS	Department of Research and Specialist Services	MoS&T	Ministry of Science & Technology
DVS	Division of Veterinary Services	NAP	National Action Plan
EMA	Environmental Management Agency	NBA	National Biotechnology Authority
EML	Essential Medicines List	NGO	Non-governmental organisation
FAO	Food Agricultural Organisation of the United Nations	NHIS	National Health Information System
GAL	Government Analyst Laboratory	NIPCC	National Infection and Prevention Control Committee
GARP	Global Antibiotic Resistance Partnership	NMRL	Naitonal Microbiology Reference Laboratory
HAI	Health-care associated infections	NMTPAC	National Medicine & Therapeutics Policy Advisory Committee
HCW	Health-care workers		
HMTC	Hospital medicines therapeutic committees		

OIE	World Organization for Animal Health
PATAM	Health-care workers
RCZ	Hospital medicines therapeutic committees
ReAct	Infection Control Association of Zimbabwe
STG	Standard Treatment Guideline
STI	Sexually Transmitted Infections
TMPC	Traditional Medical Practitioners Council
TMD	Traditional Medicines Department
TWG	Technical Working Group
UZ	University of Zimbabwe
VHW	Village Health Workers
VMDG	Veterinary Medicines General Dealers
WASH	Water Sanitation and Hygiene
WHO	World Health Organization
ZACH	Zimbabwe Association of Church-related Hospitals
ZiMA	Zimbabwe Medical Association
ZIMCHE	Zimbabwe Council for Higher Education
ZIMRA	Zimbabwe Revenue Authority
ZINATHA	Zimbabwe National Traditional Healers Association
ZINQAP	Zimbabwe National Quality Assurance Programme
ZINWA	Zimbabwe National Water Authority
ZRP	Zimbabwe Republic Police
ZVA	Zimbabwe Veterinary Association

Foreward

Antimicrobial resistance (AMR) has become an increasingly serious threat to national and global public health that requires prioritised action across all government sectors and society. Antimicrobials have been hailed as one of the most important discoveries in medical history as they have successfully treated many diseases in both animals and humans promoting the health and well-being of individuals. AMR is threatening the effective prevention and treatment of an ever increasing range of infections caused by bacteria, viruses, parasites and fungi and impacting on the health and productivity of livestock. It is important that we preserve the current antimicrobials that are available as it takes an average of 12 years for new antimicrobials to be available for use.

Following the adoption of the Global Action Plan (GAP) on Antimicrobial Resistance by the 68th World Health Assembly in May 2015, Zimbabwe immediately put in place a framework towards developing the AMR National Action Plan by starting with a situational analysis to help understand the situation around AMR and any efforts to contain it that were in place. The Global Action Plan urges Member States “to have in place, national action plans on antimicrobial resistance and with standards and guidelines established by relevant intergovernmental bodies.”

Findings of the AMR situation analysis that was carried out showed that AMR will grow in Zimbabwe if it is not tackled in a holistic manner. This national action plan is in line with the Global Action Plan and outlines the following 5 strategic objectives:-

- To improve awareness and understanding of AMR through effective communication, education and training;
- To strengthen the knowledge and evidence base through surveillance and research;
- To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures;
- To optimize the use of antimicrobial medicines in human and animal health;
- To develop the economic case for sustainable investment that takes into account the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions.

Therefore, the three governmental departments and other relevant stakeholders whose responsibilities intersect on human, animal and environmental health outcomes, and therefore are responsible for implementing the ‘One Health’ approach in Zimbabwe, have committed themselves to investing resources in designing sound strategies and interventions to preserve the effectiveness of our antimicrobial agents, in order to ensure sustainable dependence on them and to slow down the emergence and spread of AMR in Zimbabwe. This National Action Plan on AMR will be implemented by all sectors in coordinated manner to significantly slow down the development of antimicrobial resistance.

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Acknowledgements

The Ministry of Health and Child Care, the Ministry of Agriculture Mechanisation and Irrigation Development and the Ministry of Environment, Water and Climate would like to thank the World Health Organization (WHO), Food and Agriculture Organization (FAO) of the United Nations for the financial and technical support during the development of this document. Special thanks also go to the Global Antibiotic Resistance Partnership (GARP), under the Centers for Disease Dynamics, Economics & Policy (CDDEP) and Action on Antibiotics Resistance (ReAct) for their support and guidance of both the Situation Analysis and the National Action Plan (NAP).

The three ministries are grateful for the commitment and involvement of the Zimbabwe Antimicrobial Resistance Core Group and the 5 technical working groups who have been working tirelessly in the production of these documents using a 'One Health' approach.

Special thanks also go to the core national action plan writing team who were:-

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1. BACKGROUND AND SITUATION ON AMR

The Government of Zimbabwe through the antimicrobial resistance (AMR) core group conducted an analysis of the AMR situation in Zimbabwe in the human, animal and environmental sectors following the 'One Health' approach advocated by World Health Organization (WHO), World Organisation for Animal Health (OIE), and Food and Agriculture Organization of the United Nations (FAO). This interest is borne out of the fact that AMR is a cross cutting problem affecting human, animal and the environment that calls for coordinated action across these sectors. It develops from changes at genetic levels through mutations or as acquired traits in the microorganism. As a naturally occurring phenomenon, AMR is accelerated by selection pressure in the environment of the microorganism. Because microorganisms are present in the natural environment, when AMR develops, it can also escalate and spread in the environment with implications on the well-being of all forms of life. Events precipitating AMR in microorganisms can therefore have implications on pathogenicity and therefore plant, animal and human health. This puts pressure on the ability of human and animal health systems as well as agricultural production, particularly as the pace of discovery and innovation of more effective antimicrobials has significantly slowed down over the last three decades.

Zimbabwe has faced serious economic challenges over the years, which have affected all aspects of life, not least of which is the health sector's ability to provide health care, and which has resulted in a shortage of health-care workers and stock outs of medicines. The agriculture sector is one of the most important pillars of the Zimbabwean economy, with the majority of the population dependent directly or indirectly on agriculture.

Zimbabwe faces significant and growing resistance in common infections such as TB, malaria, HIV, respiratory infections, sexually transmitted infections (STIs), urinary tract infections (UTIs), meningitis and

diarrheal diseases. One major driver of resistance is increased antimicrobial consumption in both humans and animals. However the data on antimicrobial use and patterns of AMR in humans and animals in Zimbabwe are limited.

Although the country's vaccination coverage rate for children under 1 year is at 89%, more can be done to prevent infections, including improving general hygiene and sanitation and implementing infection prevention and control (IPC) measures in all health institutions. A significant dent has been made in the occurrence of rotavirus diarrhoea through vaccination; however the persistent challenges of poor water, sanitation and hygiene practices have kept diarrhoea cases related to typhoid and other bacteria causes as common occurrences. Whilst oral rehydration with Zinc, is the standard treatment of choice for diarrhoea, antibiotics are often used and resistance is spreading.

In Zimbabwe there is lack of meaningful surveillance data to help understand resistance patterns, prevalent organisms and guide policy development, due to constraints in the laboratory testing systems. Only 25 percent of the human public health laboratories have the necessary staffing, equipment and reagents to perform culture and susceptibility testing on human samples, which limits the diagnostic capabilities of health care professionals treating patients and the availability of antimicrobial resistance data to guide clinical practice and policymaking.

Zimbabwe has an essential medicines list (EML) that was last updated in 2015, but access to antimicrobials is still limited in many areas, and should be expanded alongside efforts to improve supply chains and storage. The primary reason for lack of access to medicines is lack of finances at the national level and fragmented funding from donors. Widespread unregulated availability of antimicrobials over-the-counter (OTC) for use in humans and animals has been reported despite regulations that prohibit sale without a valid prescription and the possibility that

a pharmacist may lose their license or be fined for contravening these laws. More needs to be done to improve incentives for appropriate antibiotic use, create disincentives for the overuse of antibiotics and illegal access to antimicrobials of poor quality through sound legislation and policy.

The use of antimicrobials in crop production is less well acknowledged although there is potential in the food horticulture industry.

Infectious diseases caused by microbiological agents including bacteria, fungi, protozoa and viruses in animals inflict significantly important economic and public health impact in animal production systems. The use of antimicrobial agents is therefore an important aspect of animal healthcare. However, because of the constant infection challenge to animals in the environment, overdependence and abuse of antimicrobials have contributed to the development of AMR, which results from selection pressure at genetic level. This tendency is being exacerbated by the need for repetitive treatment such as occurs in milk producing animals and mass treatments as called for in managing small stock and aquatic animal infections. In other instances, the prophylactic and metaphylactic use of antimicrobial medicines, in order to achieve sustainably high productivity levels, are to blame for the rising occurrence of AMR, which risks affecting the availability of some key antibiotics essential for use in treatment of human disease.

The regulatory oversight on the use of veterinary medicines suffers from the weak distribution of veterinary services particularly in the numbers and distribution of veterinarians and veterinary paraprofessionals. This defeats the intention of the medicines control legislation whose aim is to promote the rational and safe use of medicines. A large range of prescription medicines can therefore be accessed and used by lay personnel and animal keepers without the necessary controls to ensure judicious and prudent use.

Greater reliance on preventive veterinary medicine has however been gaining popularity due to the con-

cern about dangers of residues of veterinary medical agents in food for consumers. For a wide variety of infections especially those caused by viruses, and some bacteria, effective vaccines are available for prevention. Some vaccination programs are offered as a public good depending on their importance to production system economies and to public health. For others, the adoption of good animal husbandry and hygienic practices may go a long way in reducing infection pressure. While these alternatives to antimicrobial use (AMU) are being promoted, some important diseases such as vector-borne rickettsial (*Ehrlichia* of ruminants and dogs) and protozoan (*Babesiasis*, *Trypanosomiasis*, *Theileria* spp) diseases could benefit from development of effective, user-friendly vaccines. Vector-borne diseases therefore still rely on chemical vector control with its environmental implications or the frequent use of antibiotics for some of them. The range of options in the prevention of microbial infections can therefore still be explored through research.

Animal disease surveillance is one of the important tools for intelligence gathering to facilitate early detection of higher impact endemic and trans-boundary animal and zoonotic diseases and pests. General and disease specific surveillance is also a useful tool in the generation of evidence for sanitary safety assurance of traded animal-source products. Disease specific surveillance programs exist for brucellosis in dairy cattle, salmonellosis in breeder poultry flocks and slaughtered cattle and pigs aimed at infection reduction. Surveillance data could be of additional use in the determination of emerging risks due to AMU and resistance. This requires laboratory testing capacity and capability for the determination of resistance as well as monitoring for residues in animal tissues.

Present veterinary laboratory testing capacity is limited by personnel skills and equipment. Culture and sensitivity tests for AMR and a limited range of residue testing can be done, especially in support of animal-source food exports but no monitoring is carried out for the local market on a 'client pays' basis. There are currently limited capacities to support a comprehensive residue monitoring programme in animal slaugh-

ter establishments, and to monitor or regulate residue levels in abattoir waste and their disposal pathways. The confirmatory tests for AMR still take long and could benefit from the development and adaptation of more rapid detection methods to facilitate rapid and precise decisions on the choice of medicines removing the element of “trial and error”.

Widespread unregulated availability of over the counter medicines and informal cross-border importation of antimicrobials for use in humans and animals has been reported despite legislation prohibiting sale without prescription. Policy, legislation and implementation gaps have allowed the routine inclusion of antibiotics in feeds, while weak veterinary capacity has been blamed for the wide access to antimicrobials by animal keepers, without the necessary checks. Enforcement of existing legal provisions and incentives for appropriate antibiotic use, with disincentives for the overuse of antibiotics and illegal access to antimicrobials are required.

Chemicals are used in the crop sector as fungicides or for their bacteriostatic effects. There is need for

more research to be done including surveillance. In order to prevent resistance, cultural methods are employed to control diseases such as crop rotation, use of clean seed and use of resistant varieties.

Environmental monitoring and surveillance for AMR needs to be mainstreamed within a general national strategy to scale down the rate of emergence of AMR. To do this, a clear understanding is required of drivers in each sub-sector in relation to safeguards on the lists of essential veterinary and medical antimicrobials, especially those intended for specific use in human disease.

Access to good water and sanitation facilities is lowest in rural areas, where two thirds of the population resides including a few residential areas in the urban areas. Added to this, hospitals, clinics and manufacturing industries have poor liquid and solid waste disposal methods and the capacity to regulate the disposal and treatment of clinical waste is limited. As a result, antimicrobials and antimicrobial residues are likely entering the environment, including drinking water and soil.

2.0 EXECUTIVE SUMMARY

The AMR situation analysis that was carried out by the multi-sectorial Zimbabwe AMR Core Group indicated that the problem of AMR, caused by a combination of factors, can be addressed through a roadmap towards slowing down the pace of AMR development and enhancing sustainable reliance on AMU in public health promotion. The following 5 strategic objectives were identified in Zimbabwe, which align with the WHO Global Action Plan objectives, in order to ensure preservation of the available antimicrobials so that infectious diseases are treatable:

- Raise awareness and educate the population, professionals and policy makers on AMR.
- Improve understanding of the AMR burden and antimicrobial use patterns through surveillance.
- Reduce the need for antimicrobials by improving infection prevention and control, improved farm practices and biosecurity, water sanitation and hygiene, and immunisation.
- Improve controlled access and optimise the use of antimicrobials in humans and animals
- Sustainable investment into AMR and research into alternatives to antimicrobials.

This National Action Plan (NAP) will help to plan the development and implementation of a comprehensive national communication and awareness plan to educate the public, professionals and policy makers on ways to prevent infections, treat infections appropriately and conserve antimicrobials. It will strengthen the education curriculum in all educational sectors from primary to tertiary education, improving the knowledge of school children and educating human, animal and environmental health care professionals, both as students and postgraduates, to be aware of the threat of AMR and ways to minimize its development and spread in humans, animals and the environment.

The NAP will also prioritise the building of laboratory diagnostic capacity, as this forms the basis for treatment decisions for human and animal health-care professionals and supports informed decisions about AMU. Laboratory capacity is also needed to conduct AMR surveillance, which will be incorporated into the existing integrated disease surveillance and response (IDSR) system for humans and notifiable disease surveillance system for animals. A combined surveillance reporting system will be created to ensure the One Health approach to understanding the magnitude, patterns and dynamics of AMR. A monitoring system for AMU will be established in the public and private sectors to measure and monitor the usage of antimicrobials in humans, animals and crop production, its disposal into the environmental, and determine the impact of AMR interventions on reducing use.

In order to minimize the development of AMR, renewed attention will be brought to current infection prevention and control practices to reduce the spread and transmission of multi-drug resistant organisms (MDROs). Surveillance of hospital-acquired infections (HAIs) will support these efforts. Biosecurity measures, and better hygiene and health management practices for animals will be promoted and strengthened through improved policies, guidelines and practices, training and capacitation of regulatory bodies to improve enforcement and testing mechanisms. The relevant authorities will focus on appropriate environmental controls, the provision of water, sanitation and hygiene (WASH) facilities in communities, health and veterinary facilities, and promotion of improved hygiene behaviours.

Stewardship programs will need to be incorporated into the hospital medicines therapeutic committees (HMTCs) to ensure prudent and appropriate use of antimicrobials. Measures will need to be implemented to ensure consistent and sustained access to quality medicines by strengthening pro-

curement systems, supply chains and storage facilities for antimicrobials and ensuring sustained funding for the antimicrobials on the Essential Medicines List (EML). Control of quality veterinary medicines will need to be increased and simultaneously strengthened without limiting access to animal keepers through enhanced involvement of veterinarians in the provision of guidance on antimicrobial use in the field as well as scope of practice for veterinary paraprofessionals under veterinary oversight. Public access to antimicrobials at the point of the pharmacy and veterinary medicine general dealers (VMGDs) is to be controlled through improvements to regulatory processes. This will ensure prudent use without undermining access to quality antimicrobials and care.

At the same time, the rational use of antimicrobials in health facilities will be improved through functional hospital medicines therapeutic committees, standard treatment guidelines (STG's) and an

updated EML that reflects the current diseases and pathogens in humans to improve treatment.

Both short-term and long-term research needs to be carried out to understand the links, drivers and dynamics of AMR development and spread between the human, animal, and environmental interfaces and to create innovative diagnostic tools, new vaccines, and alternative therapies such as probiotics and traditional remedies. Funding for these types of research activities will be provided by the Government with the support and collaboration of development partners and the private sector.

Implementation of this plan requires sustained commitment into years to come and a monitoring and evaluation plan will be needed to evaluate its impact. The plan will be achieved through the "One Health" approach which embraces an integrated, unified effort across sectors, addressing the cross cutting nature of AMR.

3.0 GOVERNANCE

3.1 Governance Structure

The AMR governance structure was formed and endorsed in August 2016 by the Secretary for Health and Child Care to allow for coordination, management and monitoring of AMR activities in the country (See Figure 1 below). The AMR focal point is the AMR Coordinator who will work under the Department of Epidemiology and Disease Control (EDC), the Directorate Laboratory Services (DLS) in the Ministry of Health and Child Care (MoHCC) and the Division of Livestock and Veterinary Services (DLVS).

The governance structure was formed after a consultative process that involved relevant stakeholders from the relevant ministries, civil society (CSOs), academia and non-governmental organizations (NGOs). Technical working groups that are aligned to the strategic objectives of the Global Action Plan were formed at a multi-sectoral 'One Health' stakeholder's forum that was held in June 2016 (See Figure 1 below).

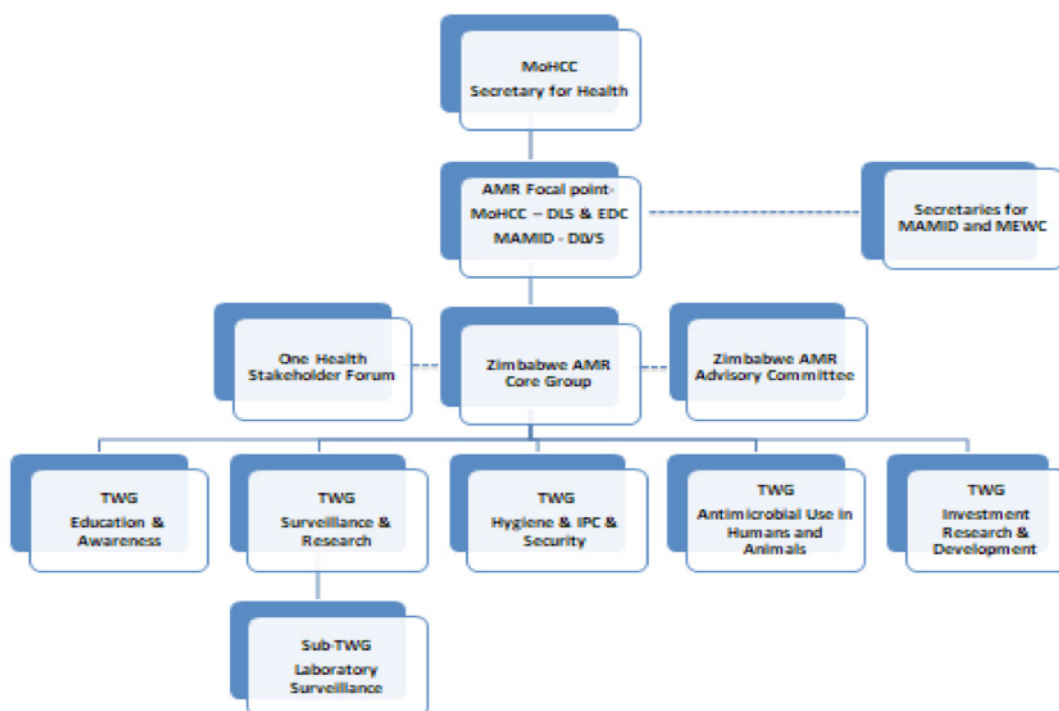


Fig 1: Governance structure of the Zimbabwe AMR activities

3.2 Leadership

The Secretary for Health in the MoHCC is the office that is responsible for leading national AMR activities. The Core Group shall also report to the Permanent Secretaries through the advisory committees in the Ministry of Agriculture, Mechanisation and

Irrigation Development and the Ministry of Environment, Climate & Water. The focal point, the Zimbabwe AMR Core Group and the Advisory Committee were all appointed by the Secretary for Health for a period of 5 years.

3.2.1 Roles of the appointed positions

AMR Focal Point

The functions of the National AMR focal point include:

- i. Building sustained partnerships and working nationally and internationally on containment of AMR;
- ii. Leading and coordinating activities of the AMR National Action Plan;
- iii. Facilitating and overseeing implementation of activities through the AMR Core Group;
- iv. Ensuring regular data collection and information sharing by instituting effective communication and coordination mechanisms among all stakeholders, the members of the Core Group and their constituencies, sectors and disciplines and;
- v. Coordinating national activities as per the National Action Plan for the AMR program.

The Zimbabwe AMR Core Group

The Zimbabwe AMR Core Group is a multi-sectoral group comprising of 18 members, an appointed Chairperson, Deputy, Coordinator, Secretariat and Committee Members. Members of the Core Group are from the following organizations:

- Ministry of Health & Child Care
- Ministry of Agriculture, Mechanisation and Irrigation Development
- Ministry of Environment, Climate & Water
- Department of Livestock and Veterinary Services
- Medicines Control Authority of Zimbabwe
- Food & Agricultural Organization of the United Nations (FAO)
- World Health Organization (WHO)

- The national delegation to the World Organisation of Animal Health (OIE)
- University of Zimbabwe
- Biomedical Research and Training Institute
- Civil society
- National Biotechnology Authority of Zimbabwe
- Ministry of Finance and Economic Development

The roles and responsibilities of the AMR Core Group include:

- i. Mobilising resources for the national response against AMR. Creating correct and relevant messaging on AMR in order to guide education and awareness programmes on AMR to ensure that the public and all other relevant stakeholders are sensitised on AMR issues.
- ii. Facilitating the establishment of surveillance systems to monitor AMR.
- iii. Disseminating active and passive surveillance data on antimicrobial use (AMU) and integrated laboratory surveillance data to policy makers and other relevant partners.
- iv. Enabling research activities on relevant AMR issues.
- v. Encouraging rational use of medicines through the establishment of antimicrobial stewardship programs.
- vi. Supporting the implementation of infection prevention and control (IPC) and biosecurity measures to reduce and control the spread of AMR.
- vii. Monitoring implementation of AMR-related activities by other organisations, institutions and stakeholders.
- viii. The AMR Core Group will be accountable for the process of implementation of this NAP.

The Zimbabwe AMR Advisory Committee

There is a multisectoral 12-member Advisory Committee made up of policy makers within the three core ministries, consultants from the University of Zimbabwe, FAO, WHO, CDC and interested private practitioners from both human and animal health. This committee has strategic governing responsibilities that include the following:

- i. Providing practical advice and guidance to the process of carrying out an AMR situational analysis and the national action plan.
- ii. Providing advice and guidance in the implementation, monitoring and evaluation of the AMR NAP.
- iii. Contributing to improved capacity, including research advice, practical and scientific advice to the Core Group and government on strategies to:
 - minimize the incidence of healthcare associated infections (HAIs)
 - monitor AMR and reduce its development and spread
 - maintain the effectiveness of antimicrobial use (AMU) and optimize antimicrobial prescribing in the treatment and prevention of microbial infections
 - take into account the relevant work of other expert groups, in the human and veterinary fields when making its recommendations
- iv. Assisting the Zimbabwe National AMR Core group on its scientific priorities and work, including horizon-scanning and long-range planning as well as dealing with immediate risks and opportunities.
- v. Reviewing and evaluate the effectiveness of the on-going work of the AMR core group.

- vi. Identifying any gaps in the evidence base, such as those requiring further research or surveillance.

Five technical working groups (TWG) that are aligned with the strategic objectives of the Global Action Plan were formed in June 2016, as follows:

- Education and Awareness
- Surveillance and Research
- Infection Prevention & Control and Biosecurity
- Antimicrobial Use
- Research and Development

The chairperson of each TWG is a member of the Zimbabwe AMR core group. The roles and responsibilities of TWGs include the following:

- Building sustained partnerships and work in their sector on containment of AMR;
- Identifying other relevant stakeholders;
- Facilitating and overseeing implementation, including monitoring and evaluation (M&E) of the NAP through the TWG;
- Ensuring regular data submission and information sharing to the Core Group by instituting effective communication systems, frameworks and coordination among all members of the TWG.

3.3 Guiding Principles

The guiding principles that the Zimbabwe NAP will follow are in line with those articulated in the 68th WHA:

(i) Whole-of-society engagement including a One Health Approach

A knowledge, attitudes and practices survey of the general public and animal and human health pro-

professionals and a point-prevalence survey carried out in 18 hospitals showed widespread irrational antimicrobial use and varied knowledge of AMR. The whole of society should therefore be engaged in curbing AMR in the country as each individual has a role to play, hence education and awareness of AMR will be intensified.

(ii) Prevention first

Water, sanitation and hygiene (WASH), improved practices in individuals, among medical and veterinary professionals, organisations and at the farm levels are low cost interventions areas with immediate impact to prevent the spread of infections. These are basic first steps that can be undertaken, followed by infection prevention control in hospitals, better biosecurity and good farm practices and routine vaccination of humans and animals.

(iii) Access

Access to information on AMR is key to empowering individuals and the nation as a whole. Access to diagnostic services and access to quality anti-

microbials prescribed by qualified professionals and used appropriately by individuals will ensure quality health care provision at low cost.

(iv) Sustainability

Implementation of this NAP will require to be integrated into the work programs of all relevant ministries to ensure activities will be carried out. Therefore, political commitment and international collaboration and support are needed to promote the technical and financial investment necessary for effective running of the NAP interventions. Government institutions and other relevant sectors will need to commence utilising the available resources and build on this to ensure sustainability.

(v) Incremental targets for implementation

This NAP has a phased approach that can be achieved in a stepwise manner, considering short-term priority areas in the five strategic objectives in order to meet both local needs and global priorities.

4.0 STRATEGIC FRAMEWORK

The Zimbabwe NAP is built on a foundation of research and development and the necessary political commitment and investment to ensure the sustainability of the AMR program.

The four key pillars of the strategy are:

- Surveillance of AMR and AMU patterns in animals, humans and crops.
- Prevention, which will reduce the need for antimicrobials through effective IPC, farm biosecurity and good farm practices, WASH and immunisation
- Rational antimicrobial use, which seeks to improve controlled access to antimicrobials and

to optimise responsible use in animals and humans

- Investment in research and development which seeks innovative ideas of alternatives to antimicrobials or quicker diagnostic techniques.

Finally, the implementation of the Zimbabwe NAP depicts a strong inter-sectoral coordinating mechanism as its foundation and has its roof which is overarching and cross-cutting indicating the need to raise awareness and educate the public, professionals and policy makers on AMR and responsible antimicrobial use. The Coordinating mechanism will ensure that all these strategies are implemented.

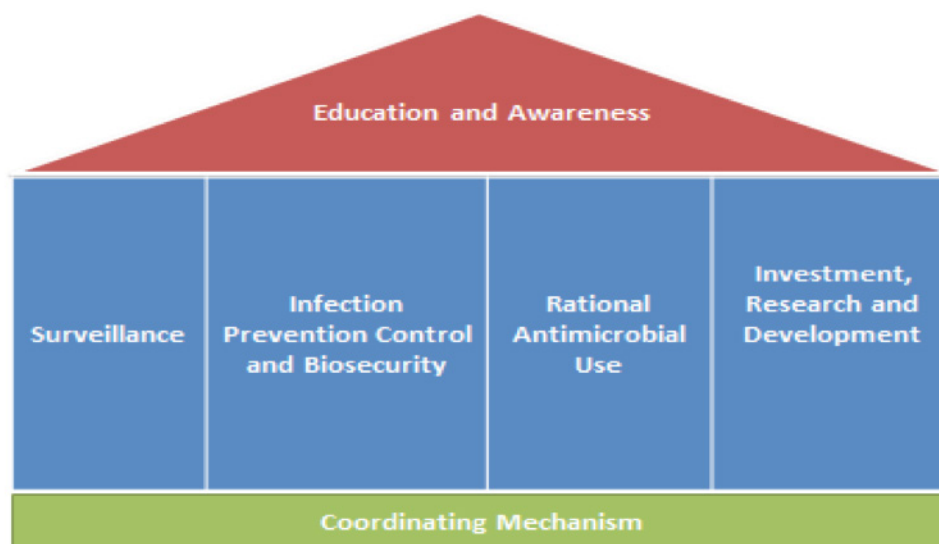


Fig 2: Strategic objectives

4.1 Strategic Plan and Strategic Objectives for AMR in Zimbabwe

4.1.1 Strategic Objective 1 – Education, training and awareness: To raise awareness and educate the population, professionals and policy makers on AMR

Developing and implementing a home-grown training and awareness program is key to ensuring that

key AMR messages reach and resonates with all sectors and corners of the country. In coming up with the training and awareness program for AMR both the formal and informal systems of information dissemination will be utilized. The formal approach will encompass all the national educational and training programs, which are well structured in

terms of content and the way they are delivered, which are aimed at developing specific competencies or skills relevant to AMR. Informal approaches will also be used to relay key messages in simple language that is understandable to all individuals regardless of social, economic or educational status. Zimbabwe is well advanced in terms of having access to modern forms of communication such as print, broadcast, audio and electronic communication media. However, individuals in different parts of the country do not all have equal access to these communication channels. This disparity in access will be considered when developing the AMR training and awareness strategy and plan.

Specific objectives for education and awareness are:

1. To improve awareness and understanding of AMR for the public, professionals and policy makers.
2. To strengthen the knowledge of human, animal and environment health professionals through improved curricula.
3. To educate farmers and animal keepers on AMR to support good antimicrobial use practices.
4. To strengthen the knowledge of school children on AMR at primary, secondary and tertiary level education.

The activities to achieve these strategic objectives are described in more detail in the operational plan in section 3.

4.1.2 Strategic Objective 2 – Surveillance: Improve detection and understanding of the AMR and antimicrobial use patterns and trends through surveillance

Surveillance is important to detect the magnitude of AMR, and help to monitor trends in space and time. Sound survey designs backed by laboratory testing are important tools in detecting AMR. Embracing the ‘One Health’ approach will help to gain efficiencies by reducing duplicative functions on the work of a similar nature for the same end. AMR infor-

mation will be of common importance to human, animal and ecosystem health. This multi-sectoral initiative encompasses laboratories from the Ministry of Health and Child Care (MoHCC), Ministry of Agriculture, Mechanisation and Irrigation Development (MAMID), the Ministry of Environment, Water and Climate (MEWC), National Biotechnology Authority, City Health laboratories and private laboratories. AMU information is also lacking and this new surveillance will include processes for collecting antimicrobial use data.

Specific objectives for surveillance are to:

1. Strengthen diagnostic laboratory capacity to improve healthcare professionals’ ability to make informed AMU decisions.
2. Integrate the surveillance for humans, animals and the environment into a ‘One Health’ integrated surveillance system.
3. Establish an AMU monitoring system for antimicrobials for human and animal use.
4. Analyze and report surveillance data to support clinical and policy decision making in relevant sectors.
5. Strengthen capacities for generating and analysing AMR/AMU data to inform policy development, better targeting of interventions and management decisions and to monitor progress.

The activities to achieve these strategic objectives are described in more detail in the operational plan in section 3.

4.1.3 Strategic Objective 3 – Infection prevention & control, good animal husbandry and biosecurity: Reduce the need for antimicrobials by improving IPC, animal health and management practices including biosecurity, WASH and immunisation

Existing biosecurity measures, good farm management practices and national IPC programs need to be strengthened. Biosecurity is defined by OIE as “The

implementation of practices that create barriers in order to reduce the risk of the introduction and spread of disease agents". The three principles of biosecurity are segregation, cleaning, and disinfection; where segregation is the creation and maintenance of barriers that limit the potential opportunities for infected animals and contaminated materials to enter an uninfected site. Improvement in animal health management practices includes farm facilities and movement controls, documentation of treatment provided to animals, the provision of appropriate care to sick animals and the prevention of illegal cross border movements.

The purpose of IPC in health care as defined by WHO, is "to prevent the occurrence of health-care associated infections (HAIs) in patients, health-care workers (HCWs), visitors and other persons associated with health-care facilities"(WHO 2009). Core components of an IPC program include IPC management structures and human resources such as training, program staffing and occupation health support and IPC guidelines that describe IPC activities such as hand hygiene, standard and transmission based precautions, waste and linen management, environmental cleaning, disinfection processes and surveillance activities. Infections can also be prevented by effective vaccination programs and by improving water, sanitation and hygiene practices, and availability and accessibility at community level.

Specific objectives for Infection, prevention and control, good animal husbandry and biosecurity are:

1. Strengthen the existing biosecurity measures on hatcheries, farms, aquaculture establishments, slaughter houses, and food processing establishments etc., for pathogen risk reduction
2. Improve movement controls of animals and animal products, and border control mechanisms to reduce trans-boundary animal disease occurrence transmission
3. Track and reduce the burden of health-care associated infections (HAIs) through improving IPC practices in all health care facilities in Zimbabwe

4. Strengthen and expand vaccination programs in animals and humans to improve prevention and control of disease, and reduce AMU

5. Reduce the transmission of infectious diseases in communities, health-care centers, veterinary and plant facilities through effective water, sanitation and hygiene practices, and provision of appropriate facilities.

The activities to achieve these strategic objectives are described in more detail in the operational plan in section 3.

4.1.4 Strategic Objective 4 – Rational use of antimicrobials: Improve controlled access and optimise the use of antimicrobials in humans and animals

The availability of antimicrobials according to the National Standard Treatment Guidelines (STGs) and Essential Medicines List, which are based upon the current pathogen resistance patterns, is critical to patient outcomes. Robust regulatory and medicine management systems, including procurement, distribution and dispensing systems, are needed to support access to safe, effective and affordable antimicrobials and remove incentives for illegal dispensing and poor quality medicine sales.

Access and availability of certain key antimicrobials to animal keepers should be maintained and expanded and the necessary control mechanisms implemented to prevent irresponsible use. An important element will be on-going education and awareness of key individuals involved in the distribution and administration of antimicrobials in animals. In addition, a sound regulatory environment that controls and enforces the responsible use of antimicrobials in humans, animals and the environment is essential to the effective control of AMR.

Specific objectives for rational use of antimicrobials are:

1. Improving access to quality assured antimicrobials to animal keepers by increasing ac-

cess points for the sale and provision of antimicrobials.

2. Strengthening control of antimicrobials and their use in animal health by farmers and para veterinarians without limiting access.
3. Implementing sustainable supervision, audit and feedback mechanisms in health facilities by having functional medicines therapeutic committees in health institutions to ensure appropriate antimicrobial use by prescribers.
4. Ensuring that Standard Treatment Guidelines (STG's) and the Essential Medicines List (EML) reflect the current resistance patterns and pathogens in humans and animals.
5. Ensuring adequate supplies of quality assured essential antimicrobials at various levels of human and animal health delivery systems.
6. Controlling public access to prescription only antimicrobials at the point of the pharmacy and veterinary medicine general dealers (VMGDs).
7. Strengthening regulations to ensure appropriate use of antimicrobials in animals.
8. Promoting stewardship and pharmacovigilance in the use of antimicrobials.

The activities to achieve these strategic objectives are described in more detail in the operational plan in section 3.

4.1.5 Strategic Objective 5 – Sustainable Investment into AMR interventions and research into new antimicrobials and alternatives to antimicrobials

There is a need to develop the economic case for sustainable investment that takes into account the need for increased investment in new diagnostic tools, vaccines, medicines and other interventions. The proposed activities are divided into short-term (1-2years), medium-term (2-5 years) and long-term (>5 years) research strategies. This plan outlines the immediate actions,

which are termed as short to medium-term plans to be implemented in the face of the current problem.

The long-term strategies need stronger collaboration from local, regional and international research institutions as they require vast amounts of resources and time.

Short to medium term (1-5 years) investment and research needs

Local collaboration linking human-animal-environment research activities is required in the following areas:

- Support research on the model of transmission between organisms and the transmission of resistant bacteria among different reservoirs (human-animal-environment).
- Conduct research to understand the capacity building needs such as human & financial resources.

Long term investment and research needs

- Innovative diagnostic tools especially AMR rapid diagnostic tools (RDT's)
- User-friendly and affordable vaccines and new vaccines
- New medicines, i.e. antibiotics
- Alternative therapies (complementary medicines, probiotics, etc.)

Specific objectives for Investment, Research & development are:

1. To ensure sustainable investment in counteracting AMR through implementing the NAP.
2. Develop innovate modern diagnostics, vaccine and alternative therapy to AM.

The interventions to achieve these strategic objectives are provided in the tables below and described in more detail in the operational plan in section 3.

5.0 OPERATIONAL PLANS

Below are the detailed operational activities, time frames and indicators for monitoring the achievement of the strategic objectives described above in the strategic plan. Time frames for completion of these activities have been divided into short term (within the next 2 years), medium term (within the next 5 years) and long term (greater than 5 years).

5.1 Strategic objective 1 – Education, training and awareness

The four key pillars of the strategy are:

- Surveillance of AMR and AMU patterns in animals, humans and crops.
- Prevention, which will reduce the need for antimicrobials through effective IPC, farm biosecurity and good farm practices, WASH and immunisation
- Rational antimicrobial use, which seeks to improve controlled access to antimicrobials and to optimise responsible use in animals and humans
- Investment in research and development which seeks innovative ideas of alternatives to antimicrobials or quicker diagnostic techniques.

Finally, the implementation of the Zimbabwe NAP depicts a strong inter-sectoral coordinating mechanism as its foundation and has its roof which is overarching and cross-cutting indicating the need to raise awareness and educate the public, professionals and policy makers on AMR and responsible antimicrobial use. The Coordinating mechanism will ensure that all these strategies are implemented.

STRATEGIC OBJECTIVE: To improve awareness and understanding of AMR for the public, professionals and policy makers			
Intervention	Activities	Responsibility	Timeframe
1.1 Develop a comprehensive national communication and awareness plan	1.1.1 Review existing communication and awareness strategies.	TWG representatives	1st year
	1.1.2 Carry out an assessment on existing KAP (knowledge attitudes and practices) with animal keepers, farmers and veterinary extension workers in rural communities, key-informant interviews.		
	1.1.3 Utilise results from the existing KAP and additional KAP including the national AMR situational analysis to inform on gaps and areas of strengthening.		
	1.1.4 Draft a national communication and awareness plan to cover topics including: AMR, AMU, IPC, biosecurity and animal health management, food security and safety, WASH and hand washing, stewardship, prescribing and treatment guidelines/practices, enforcement, waste disposal, surveillance, residues, and testing methods for humans and animals using various channels.		
	1.1.5 Pilot draft national communication and awareness plan in small cohorts.		
	1.1.6 Adjust national communication and awareness plan based on the results of pilot study.		
	1.1.7 Validation meeting to adopt final national communication and awareness plan.		

1.2. Roll-out of the national AMR communication and awareness plan	<p>1.2.1 Host a stakeholder sensitisation meeting on the approved plan (i.e. ministries of health, agriculture, environment, education, drug authority, media, enforcement, farmer organizations, professional associations, clinicians, nurses, pharmacists), hospital CEOs/associations, university heads, FAO WHO, OIE, NGOs, faith based organizations, provincial reps).</p> <p>1.2.2 Review existing and produce Information, Education and Communication (IEC) materials.</p> <p>1.2.3 Training of trainers (in-service training).</p> <p>1.2.4 Cascading of training to frontline cadres (nurses and extension staff - veterinary).</p> <p>1.2.5 Disseminating AMR information as identified in the communications plan (will include stewardship, IPC, good practices, animal health management, biosecurity, food safety etc) (channels include online, newspaper, radio, television, fliers, road shows, etc.) (target audiences i.e public, students, health professionals, regulators).</p> <p>1.2.6 Engage Civil Society Organisations (CSOs) and development partners to mainstream AMR into programmes.</p> <p>1.2.7 Use of champions in influencing AMR activities and attitudes in all relevant sectors (see champion creation below).</p> <p>1.2.8 Organise activities for World Antimicrobial Resistance Awareness Week.</p> <p>1.2.9 Presentations on AMR during other commemorative days e.g, world TB day, hand hygiene day, World Veterinary Day, etc.</p>	Fluoroquinolone AMR core group, MoHCC, TWG's	1st – 2nd year
1.3. Identify and capacitate opinion leaders to champion the AMR agenda in all sectors.	<p>1.3.1 Establish criteria to select AMR champions and specify role of the champions.</p> <p>1.3.2 Identification of AMR champions/opinion leaders.</p> <p>1.3.3 Capacitation of AMR champions and consensus building.</p>	AMR core group; TWGs	2nd year
1.4. Advocate on IPC in human health, and good animal health management and biosecurity at community level.	<p>1.4.1 Hold field days to promote good hygiene practices and sanitary measures.</p> <p>1.4.2 Hold meetings at the community level e.g. women's groups, church organisations, farmer groups.</p> <p>1.4.3 Train Village Health workers in IPC and AMR; and train para veterinary auxiliaries in biosecurity and AMR.</p>	MoHCC	Ongoing
1.5. Promote behavioural change and practices that instil good hygiene in the community through access to effective water, sanitation and hygiene facilities.	<p>1.5.1 Run education and awareness campaigns.</p> <p>1.5.2 Commemorate hand hygiene days.</p> <p>1.5.3 Mobilise resources for WASH facilities and activities.</p>	MoHCC and relevant authorities	Ongoing

STRATEGIC OBJECTIVE: To strengthen the knowledge of human, animal, environment health professionals and feed manufacturers through improved curricula and educate farmers on AMR to support good prescribing practices

Intervention	Activities	Responsibility	Timeframe
1.6 Strengthen curricula for human health professionals (including doctors, nurses, pharmacists, laboratory scientists, health promotion students, public health students).	1.6.1 Engage stakeholders and advocate for curricula review and update.	TWG/Core group supporting review panels, curricula committees at universities and training institutions in collaboration with MoHCC	1st – 2nd year
	1.6.2 Review and update tertiary educational curricula on AMR, AMU, IPC, biosecurity, biosafety, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance, and lab testing for humans and animals.		1st – 2nd year
	1.6.3 Review and update educational curricula at professional in-service training levels for human health to strengthen AMR, AMU, IPC, biosecurity, biosafety, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance, and lab testing for humans and animals.		
	1.6.4 Develop training modules in IPC requirements to reduce transmission of MDRO to be used for training of health workers at pre- service and in-service level.	MoHCC, NBA, HPA and its Councils, Min of Higher and Tertiary Education, Vocational Training Schools	
	1.6.5 Enforce continuous professional development (CPD) on AMR, AMU, IPC, biosecurity, biosafety, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance, and lab testing for humans and animals		
	1.6.6 Formalize and strengthen mentoring and supervisory program for junior doctors in the public sector		
	1.6.7 Formalize and strengthen mentoring and supervisory program for junior pharmacists in the public sector		
	1.6.8 Formalise a training programme for all nurses at primary health-care (PHC) on selection of antimicrobials for use at the facilities		
	1.6.9 Strengthen mentoring and supervisory program for prescribing nurses in the public sector		
1.7. Strengthen curricula for animal health professionals.	1.7.1 Review and update tertiary educational curricula AMR, AMU, IPC, good animal health management practices and biosecurity, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance and lab testing for humans and animals	TWG/Core group supporting review panels, curricula committees at training institutions in collaboration with MoHCC and MoA, MoHTE and Vocational Training Schools	1st – 2nd year
	1.7.2 Review and update educational curricula at professional in-service training levels for animal health to strengthen AMR, AMU, IPC, good animal health management practices, biosecurity, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance and lab testing for animals		Ongoing
	1.7.3 Formalize and strengthen mentoring program for junior veterinarians in the public sector		
	1.7.4 Design and integrate AMU and AMR into continuous professional development of veterinarians	DVS	
	1.7.5 Enforce continuous professional development (CPD) on AMR, AMU, IPC, good animal health management practices, biosecurity, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance, and lab testing for animals	DVS	

	1.7.6 Conduct a KAP survey on IPC, good animal health management practices, and biosecurity among veterinary personnel in private and government sectors/ environmental officers/ food safety officials/wildlife veterinarians		
	1.7.7 Conduct CPD training in biosecurity issues in relation to AMR for veterinary personnel in private and government sectors/ lab scientists/Agritex officers/ environmental health technicians and officers/meat inspectors/veterinarians/veterinary nurses/ extension workers		
1.8. Enhance the knowledge of animal keepers on appropriate use of antimicrobials	1.8.1 Review training guidelines for shop owners of outlets for veterinarian products	MoHCC	Ongoing
	1.8.2 Provide education for the VMDGs with an AMR focus through train the trainer sessions		
	1.8.3 Reinforce by refresher course, education and awareness for the VM outlets for veterinarian products with an AMR focus through train the trainer sessions		
	1.8.4 Design and execute awareness campaigns to educate (smallholder and commercial) farmers on prudent use of antibiotics in production of food animals and the threat of AMR arising from misuse/overuse		
1.9. Strengthen curricula for environmental health professionals.	1.9.1 Review and update tertiary educational curricula AMR, AMU, IPC, biosecurity, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance and lab testing for humans and animals.	TWG/ CORE group supporting review panels, curricula committees at training institutions in collaboration with MoE	1st – 2nd year
	1.9.2 Review and update educational curricula at professional in-service training levels for human health to strengthen AMR, AMU, IPC, good animal health management practices, biosecurity, WASH, stewardship, prescribing and treatment guidelines, enforcement, surveillance, and lab testing for humans and animals.		
1.10 Enhance knowledge of stock feed manufacturers, farmers and animal keepers on stock feed guidelines	1.10.1 Review regulations of the antibiotics that are used in stock feeds.	Stock feeds Manufacturing Association, SARS.	
	1.10.2 Coordinate and monitor the antimicrobials used in feeds.		
	1.10.3 Train farmers and animal keepers on withdrawal periods for certain stock feeds.		
	1.10.4 Train feed manufacturers on regulations and guidelines concerning antibiotics in stock feeds.		

STRATEGIC OBJECTIVE: To strengthen the knowledge of school children on AMR at primary, secondary and tertiary level education

Intervention	Activities	Responsibility	Timeframe
1.11 Develop curricula to train teachers in college/ university	1.11.1 Meet with stakeholders including MoH and Ministry of Primary and Secondary Education (MoPSE) to emphasize need for curricula.	TWG, Core Group	1st – 2nd year
	1.11.2 Support MoPSE to develop the curricula-information, review with stakeholders, and revise.	MoE; curricula dev unit	
	1.11.3 Disseminate curricula-information to lecturers, teaching training colleges, and train the teachers in schools.	MoHCC, school health masters	
	1.11.4 Update curricula periodically.	TWG, Core group/MoE	

1.12 Review, revise or develop curricula for primary/secondary students (also tie into awareness plan).	1.12.1	Meet with stakeholders including MoH and MoPSE to emphasize need for curricula.	TWG, Core Group of AMR MoPSE; school health masters	1st – 2nd year
	1.12.2	Support MoPSE to develop the curricula-information, review with stakeholders (MPSE and curricula development unit), and revise (TWG/CORE group/MoPSE).		
	1.12.3	Disseminate curricula-changes to lecturers, teaching training colleges train the teachers in school (MoPSE) school health masters – health experts.	MoPSE	Ongoing
	1.12.4	Train teachers in the field on the curricula.		
	1.12.5	Update periodically.		

5.2 Strategic objective 2 – Surveillance

STRATEGIC OBJECTIVE: Strengthen diagnostic laboratory capacity to improve the healthcare professionals' ability to make informed antimicrobial use decisions.

Intervention	Activities	Responsibility	Timeframe	
2.1 Assess laboratory capacity to carry out AMR susceptibility testing in all relevant sectors including residue testing.	2.1.1	Use a laboratory assessment tool (e.g. ATLASS) to assess the human laboratory capacity to carry out AMR susceptibility testing.	Lab surveillance TWG	1st – 2nd year
	2.1.2	Use a laboratory assessment tool (e.g. ATLASS) to assess the veterinary laboratory capacity to carry out AMR susceptibility testing.		
	2.1.3	Use a laboratory assessment tool to assess the environment central laboratory capacity to carry out AMR susceptibility testing.		
	2.1.4	Use a laboratory assessment tool to assess the food safety laboratories' capacity to carry out AMR susceptibility testing.		
	2.1.5	Use a laboratory assessment tool to assess laboratories' capacity to carry out residue testing.		
2.2 Develop budgets and plans for gap filling including equipment, human resources and consumables	2.2.1	List the required equipment.	Lab surveillance TWG	1st – 2nd year
	2.2.2	Ascertain the required HR.		
	2.2.3	List the consumables required.		
	2.2.4	Ascertain the field services required		
2.3 Harmonize SOPs for testing samples for AMR and for organism identification (One Health)	2.3.1	Harmonise SOPs using international standards (e.g. CLSI, EUCAST) for all sectors through meetings and iterative drafts.	Lab Surveillance TWG. MLCSCZ, CVS	1st – 2nd year
	2.3.2	Implement SOPs.		
	2.3.3	Validate methods for antimicrobial residue testing		
2.4 Upgrade laboratories as needed	2.4.1	Site visits to confirm installation of equipment and receipt of supplies	Lab surveillance TWG.	1st – 2nd year
	2.4.2	Train lab personnel on the lab surveillance system.		
	2.4.3	Train lab personnel on residue testing.		

2.5 Collect and test routine samples in all sectors	2.5.1	Design statistically sound surveys for AMR	Government	2nd – 5th year
	2.5.2	Design surveys and test for antimicrobial residues	Hospital	
	2.5.3	Collect biological test samples and test (blood, tissue, urine, stool, cerebral spinal fluid, swabs and aspirates).	Laboratories and some private labs	
	2.5.4	Analyse results and generalise interpretations		
	2.5.5	Collect and test samples in the animal labs and these are clinical and post mortems samples – domestic and wild animals, milk samples, meat samples from abattoirs, imported animal products	DVS labs – MOA	
	2.5.6	Collect and test samples in the food lab and these are meat and meat products, milk and milk products, water, ready to eat food, poultry and poultry products, fish and fish products, cereals and condiments.	Government Analyst Laboratory (GAL)	
	2.5.7	Collect and test samples of potable, raw and wastewater in the environment for AMR and AM residues		
	2.5.8	Survey and test samples of beef, poultry, eggs, pork, dairy, mutton, chevron, and fish for AM residues	EMA and City of Harare lab, DVS	
	2.5.9	Survey and test honey for adulteration and antibiotic residues.	GAL and DVS	

2.6 Progress toward accreditation of all laboratories (ISO)	2.6.1	Develop/Implement quality management systems (QMS) in all laboratories selected for accreditation	All laboratories, coordinated by NMRL, CVL	Ongoing
	2.6.2	All equipment in the bacteriology laboratories to have service contracts.		
	2.6.3	Validate the bacteriology equipment.		
	2.6.4	Validate all bacteriology tests.		
	2.6.5	Subscribe to an external quality assurance (EQA) program.		

STRATEGIC OBJECTIVE: Strengthen diagnostic laboratory capacity to improve the healthcare professionals' ability to make informed antimicrobial use decisions.

Intervention	Activities	Responsibility	Timeframe
2.7 Combine human AMR surveillance into IDSR reporting systems	2.7.1 Identify priority organisms for reporting.	NMRL (MoHCC)	1st – 2nd year
	2.7.2 Identify appropriate antibiotics to be reported on.		
	2.7.3 Add AMR reporting to standard IDSR policy and implement.		
	2.7.4 Monitor AMR reports and add to annual reporting for Core Group.		
	2.7.5 Report AMR trends to the National Health Information System (NHIS), GLASS, CDDEP, Lab surveillance TWG.		
2.8 Animal surveillance: Establish AMR surveillance within existing disease notification system for animals	2.8.1 Identify priority organisms for reporting (including animal species and source)	CVL/DVS	1st – 2nd year
	2.8.2 Identify appropriate antibiotics to be targeted by surveillance system.		
	2.8.3 Communicate reporting needs to all laboratories.		
	2.8.4 Establish reporting systems and standards for analysis.		
	2.8.5 Report AMR trends to the Vet Epidemiology Department, CDDEP, Lab surveillance TWG.		
2.9 Add food and potable water testing for AMR into existing potable water and food safety testing.	2.9.1 Develop organism/antibiotic targets drawing on human and animal targets	GAL (MoHCC) and local authorities, Environmental Health and City Health Department	1st – 2nd year
	2.9.2 Have a national database for foodborne infections.		
	2.9.3 Report to the National Health Information System (NHIS), GLASS, CDDEP and the lab surveillance TWG.		
2.10 Establish an active surveillance system, in selected farming communities (e.g. resettled farming sector, informal urban livestock keepers; feed manufacturers)	2.10.1 Develop a targeted surveillance plan	DVS, Academia	>5 years
	2.10.2 Train veterinary field personnel.		
	2.10.3 Train environmental field technicians		
	2.10.4 Train human health personnel		
	2.10.5 Determine the needed capacity for sample transportation		
	2.10.6 Determine sampling plan		
	2.10.7 Implement sampling process		
2.11 Integrate animal, human, crop and environmental AMR surveillance through a single report	2.11.1 Establish outline of a report for integrated AMR surveillance reporting	AMR core group	1st – 2nd year
	2.11.2 Draw data from all sources (as above) and generate report		
	2.11.3 Publish report annually by AMR Core Group		

STRATEGIC OBJECTIVE: Establish an antimicrobial use (AMU) monitoring system for human and animal use

Intervention	Activities	Responsibility	Timeframe	
2.12 Determine surveillance system for each section on AMU	2.12.1	Develop and adopt appropriate tools to monitor antimicrobial consumption in the human health sector.	AMR Core group	1st – 2nd year
	2.12.2	Determine existing sources of AM consumption		
	2.12.3	Train data collectors on AMU consumption tools.		
	2.12.4	Collect human consumption data		
	2.12.5	Develop and adopt appropriate tools to be used for monitoring antimicrobial consumption in the animal health sector.		
	2.12.6	Determine existing sources of AM consumption		
	2.12.7	Train data collectors on AMU consumption tools.		
	2.12.8	Collect data on food animals.		
	2.12.9	Develop and adopt appropriate tools to be used for monitoring antimicrobial consumption in the crop sector.		
	2.12.10	Determine existing sources of AM consumption.		
	2.12.11	Train data collectors on AMU consumption tools.		
	2.12.12	Collect data on crops.		
	2.12.13	Integrate animal, crop and human AMU data into single report and combine with AMR data report annually.		

STRATEGIC OBJECTIVE: Strengthen diagnostic laboratory capacity to improve the healthcare professionals' ability to make informed antimicrobial use decisions.

Intervention	Activities	Responsibility	Timeframe	
2.13 Modernize, upgrade and maintain central information management systems to handle AMR and AMU data, with interoperability between systems and access for official users.	2.13.1	Conduct a needs assessment of IT system for AMR and antimicrobial use	AMR core group.	2nd – 5th year
	2.13.2	Integrate into the current IT administrative structure of responsible organisations.		
	2.13.3	Determine resources needed to maintain a central information system		
	2.13.4	Expand provincial level (and eventually district level) input into veterinary information management systems on AMR and AMU, as a component of general expansion		
	2.13.5	Expand provincial level (and eventually district level) input into food safety and environmental central information management systems		
2.14 Develop annual One Health report on AMR, AMU (aimed at high-level policymakers, donors and relevant international organization reporting systems: WHO, OIE, FAO, CDDEP.	2.14.1	Extract all data from each data source	MoHCC, DVS, City Health, EMA, NBA	2nd – 5th year
	2.14.2	Analyse data		
	2.14.3	Compile report and send to stakeholders for inputs		
	2.14.4	Publish report annually		
2.15 Present information to policymakers in appropriate formats	2.15.1	Meet with policy makers annually with surveillance reports and proposed EML and STG revisions.	Core AMR group	1st – 2nd year
	2.15.2	Issue a yearly bulletin with significant findings.		

5.3 Strategic objective 3 – Infection prevention and control and biosecurity

STRATEGIC OBJECTIVE: Strengthen the existing biosecurity measures on hatcheries, farms, slaughter houses and food processing establishments to prevent, reduce and contain pathogens to improve livestock productivity, animal welfare, food security and food safety

Intervention	Activities	Responsibility	Timeframe
3.1 Review and update current biosecurity guidelines in relation to AMR and relevance to small scale farmers and review current legislation in relation to biosecurity and AMR	3.1.1 Produce guidelines on good animal health management practices, biosecurity incorporating AMR issues	DVS/MAMID, NBA	1st – 2nd year
	3.1.2 Hold a stakeholder consultation to ensure suitability for different farming scales and systems		
	3.1.3 Adopt, adapt for literacy/translation and dissemination		
	3.1.4 Review current legislation in relation to acts relevant to veterinary/animal production industry to update in relation to biosecurity requirements and AMR		
	3.1.5 Disseminate biosecurity guideline through relevant Ministries, Government Departments and Associations		
3.2 Conduct a risk assessment of meat industries to identify pathogens to inform appropriate food safety and biosecurity measures	3.2.1 Conduct a baseline survey to identify risk factors associated with the transmission of MDR/DR pathogens	MoHCC/Local authorities	1st – 2nd year
	3.2.2 Use baseline survey to adapt biosecurity guidelines as required		
3.3 Measure the extent of MDR/DR bacteria contamination of food and food handlers in food sales outlets to inform biosecurity measures and food safety	3.3.1 Conduct a baseline survey stratified according to outlet types supermarkets, vendors, farmers markets, of MDR/DR bacteria levels in: <ul style="list-style-type: none"> • Dairy products • Meat • Eggs • Vegetables • Fish and fish products • Other animal derived products 	NIHR, BRTI & GAL	1st – 2nd year
	3.3.2 Use baseline survey to adapt biosecurity guidelines as required		
3.4 Ensure that the regulatory body inspects hatcheries, laboratories, farms and slaughter houses, and food processing establishments	3.4.1 Develop a sampling and inspection plan for regular inspections of hatcheries and farms	DVS/MAMID	3rd – 5th year
	3.4.2 Assess staff and transport requirements to carry out regular inspections		
	3.4.3 Implement sampling and inspection plan		

STRATEGIC OBJECTIVE: Improve movement controls of animals and animal products and border control mechanisms to reduce trans boundary animal disease

Intervention	Activities	Responsibility	Timeframe
3.5 Strengthen border post controls in relation to biosecurity	3.5.1 Create and Conduct Awareness campaigns including posters on risks and impact of illegal import of animal derived food products	DVS	1st – 2nd year
	3.5.2 Strengthen the monitoring system for personnel at border posts		
	3.5.3 Increase penalties for offenders	Ministry of Home Affairs, NBA	
	3.5.4 Improve quarantine and testing (POCT) at main border posts and establish incineration and disposal facilities for condemned materials		

STRATEGIC OBJECTIVE: Track and reduce the burden of health care associated infections (HAIs) through improving IPC practices in all health care facilities in Zimbabwe

Intervention	Activities	Responsibility	Timeframe
3.6 Revise IPC guidelines in relation to AMR using evidence-based IPC practice	3.6.1 Review 2013 IPC guidelines in relation to AMR	NIPCC (MoHCC)	1st – 2nd year
	3.6.2 Develop health facility based SOPs and IEC materials from updated guidelines for reduction of transmission of MDRO		
3.7 Improve IPC practices to reduce transmission of MDRO through pre-service, in-service and CPD programmes	3.7.1 Disseminate updated IPC training to all relevant training institutions	NIPCC (MoHCC)	1st – 2nd year
	3.7.2 Continuing in-service training on IPC at health facilities using updated modules		
3.8 Strengthen IPC site support visits in relation to AMR	3.8.1 Update MoHCC IPC site support visit monitoring tools in relation to IPC	NIPCC M&E and surveillance TWG	1st – 2nd year
	3.8.2 Include AMR/IPC issues in IPC site support visits		
3.9 Establish a National HAI	3.9.1 Strengthen health care associated infection (HAI) surveillance and feedback systems at the facility level including collection of data on common HAI pathogens and their susceptibility patterns	NIPCC, TWG for Surveillance and M&E	1st – 2nd year
	3.9.2 Develop a link to the NHIS for collection of data on HAIs, HAI pathogens and susceptibility patterns to inform the National IPC Policy and Strategic Plan		

STRATEGIC OBJECTIVE: Track and reduce the burden of health care associated infections (HAIs) through improving IPC practices in all health care facilities in Zimbabwe

Intervention	Activities	Responsibility	Timeframe
3.10 Increase vaccine coverage in populations/herds	3.10.1 Ensure availability of adequate vaccines and supplies for animals and humans	DVS and MoHCC	Ongoing
	3.10.2 Conduct outreach services for hard to reach communities for animals and humans		
	3.10.3 Conduct mass immunisation/vaccination campaigns for animals and humans		
	3.10.4 Conduct vaccinations for animals at dip-tanks in areas where previously not done		
	3.10.5 Develop IEC materials and health education messages for animal vaccination in local languages to motivate and mobilize participation		
	3.10.6 Advocate and mobilize to increase vaccine uptake in animals using VHWs, agriculture and extension workers, radio and TV and mobile technology, Farmer's Union meetings. "One Health Field Days" field days, and agriculture shows.		
3.11 Improve adherence to scheduled vaccination in humans	3.11.1 Advocate and conduct community mobilisation using VHWs, agriculture extension workers, and health education through radio, TV and mobile technology.	DVS and MoHCC	Ongoing
3.12 Develop user friendly and effective vaccines against protozoa and rickettsial parasites and different populations/farms/species/groups that have shown effectiveness in preventing infectious diseases	3.12.1 Use pathogen surveillance data to inform additional vaccination programmes for improved animal health.	DVS and MoHCC	>5 years
	3.12.2 Conduct continuous reviews of infection surveillance data in humans to expand the immunisation schedule to include new vaccines where required		
	3.12.2 Determine the cost benefit of new vaccines and determine funding sources		

STRATEGIC OBJECTIVE: Reduce the transmission of infectious diseases in communities, health, veterinary and plant facilities through effective water, sanitation and hygiene practices and provision of appropriate facilities

Intervention	Activities	Responsibility	Timeframe
3.13 Strengthen WASH facilities and activities in communities, health facilities, veterinary and plant facilities	3.13.1 Conduct consultative stakeholder meetings to identify areas of focus for WASH	MoHCC and relevant authorities	1st – 2nd year
	3.13.2 Conduct a situation analysis in communities and facilities (human and non-human)		
	3.13.3 Review and update the national WASH plan		
	3.13.4 Implement the updated WASH plan		
	3.13.5 Monitor implementation and address identified gaps accordingly		

5.4 Strategic Objective 4 – Rational use of antimicrobials

STRATEGIC OBJECTIVE: Improve access to antimicrobials by animal keepers by increasing access points for the sale and provision of antimicrobials			
Intervention	Activities	Responsibility	Timeframe
4.1 Increase access points for quality assured over the counter (OTC) antimicrobials by animal keepers	4.1.1 Formalize the registration of veterinary paraprofessionals under the Veterinary Professions legislation	CVSZ	3rd – 5th year
	4.1.2 Make rules flexible for veterinarians to conduct services in ambulatory fashion in communal settings		
	4.1.3 Train Animal Management and Health Centers (AMHC) for greater responsibility for veterinary supervised distribution of antimicrobials in the public sector		
4.2 Formalize the appropriate antimicrobials to be used in animal health against OIE Critically important Antimicrobials (CIA) guidelines	4.2.1 Update current veterinary medicine registration guidelines to include the list of antimicrobials of veterinary importance for use in animals as per OIE recommendations while safeguarding critically important antimicrobials for human use	MCAZ/DVS	2nd – 5th year
	4.2.2 Create a veterinary National Medicine and Therapeutics Policy Advisory Committee to guide the development of STGs and EMLs		Ongoing
	4.2.3 Develop an EML for animal products in Zimbabwe	DVS-MCAZ-AHICZ-CVSZ	
	4.2.4 Conduct a regular review of EML and STGs against AMR and AMU surveillance data		
STRATEGIC OBJECTIVE: Strengthen veterinary control of antimicrobials use by animal keepers and veterinary paraprofessionals without limiting access			
Intervention	Activities	Responsibility	Timeframe
4.3 Improve control of antimicrobial use through increased enforcement of regulations	4.3.1 Strengthen enforcement on the restriction of access to prescription AM preparations	MCAZ	2nd – 5th year
	4.3.2 Develop and implement a tool for monitoring the prescribing patterns/behavior of veterinarians, paravets and farmers.	CVSZ MCAZZ	
	4.3.3 Strengthen post market surveillance on AMs which are on the market for animal use		
	4.3.4 Develop regulations to enable the implementation of OIE standards by veterinarians & veterinary paraprofessionals on the prudent use of antimicrobials		
4.4 Development of One Health Antimicrobial use Guidelines for animal health	4.4.1 Conduct stakeholder engagement in the formulation of guidelines and regulations for promoting optimal antimicrobial use and biosafety in animal food supply system	AMR Core Group, MAMID-DVS, LMAC, DRSS	1st – 2nd year
	4.4.2 Develop guidelines on optimal antimicrobial use for specific livestock production sub sectors (Poultry, pigs, fish, cattle, sheep and goats, etc.) and for the stock feed manufacturing industry (research species specific guidelines (STG's) in other countries and OIE recommendations)		Ongoing

- 4.4.3 Develop simple antimicrobial use decision guidelines and policies for para professionals in the livestock health delivery system, for farmers and over the counter veterinary medicine retailers (veterinary medicine general dealers outlets)
- 4.4.4 Regularly review the guidelines to ensure their appropriateness

STRATEGIC OBJECTIVE: Implement sustainable supervision, audit and feedback mechanisms in health facilities by having functional hospital medicines therapeutic committees in hospitals to ensure appropriate antimicrobial use by prescribers

Intervention	Activities	Responsibility	Timeframe
4.5 Ensure functional Hospital medicine therapeutics committees (HMTC) at all levels of the health system	4.5.1 Improve the governance process and review content of guidance provided by the HMTC's	MoHCC (DPS)	1st – 2nd year
	4.5.2 Expand HMTC's to hospitals without functioning committees		
	4.5.3 Expand the functions of district HMTCs to strengthen support provided to the PHC level		
	4.5.4 Formalize the reporting structure/system for reporting in relation to AMR of the HMTC to the MOHS Director of Pharmacy Services		
4.6 Implement sustainable supervision, audit and feedback mechanisms	4.6.1 Develop guidelines for HMTC's to facilitate the implementation of AMS activities.	MOHCC (DPS)/ HPA and its respective affiliate councils	1st – 2nd year

STRATEGIC OBJECTIVE: Ensure Standard Treatment Guidelines (STG's) and Essential Medicine List (EML) reflect the current diseases and pathogens in humans and animals

Intervention	Activities	Responsibility	Timeframe
4.7 Regularly review the STG's and EML	4.7.1 Regularly review the EML against the WHO list for humans	MoHCC (DPS), NMTPAC)	3rd – 5th year
	4.7.2 Regularly review the STGs taking into account the resistance patterns, disease burden and prevalence of infectious diseases		
	4.7.3 Incorporate AMR surveillance information into the review of the STG's		
	4.7.4 Create an EML for animal health.		
	4.7.5 Create STGs for animal health		
	4.7.6 Review and update animal EML and STGs annually.		
	4.7.7 Develop biosafety guidelines for crops.		

STRATEGIC OBJECTIVE: Ensure adequate supplies of quality assured essential antimicrobials at various levels of human and animal health delivery systems

Intervention	Activities	Responsibility	Timeframe
4.8 Improve the affordability of antimicrobials	4.8.1 Advocate for the sustained funding of antimicrobials in EML to improve access and reduce the financial burden on the patient	MoHCC (DPS)	> 5 years
	4.8.2 Donor coordination to cover more of the EML including antimicrobials		1st – 5th year
	4.8.3 Advocate for implementation of Universal Health Coverage	MCAZ	
	4.8.4 Investigate the presence and extent of poor quality medicines including counterfeits and unregistered medicines and illegal medicine vendors (for animals and humans)		
4.9 Ensure availability of antimicrobials	4.9.1 Strengthen the procurement cycle and supply chain for both human and animal AMs	MoHCC (DPS)	3rd – 5th year
	4.9.2 Strengthen forecasting processes based on improved antimicrobial use surveillance data		
4.10 Ensure appropriate storage of antimicrobials	4.10.1 Establish basic infrastructure for appropriate storage of antimicrobials (esp. at rural clinics) e.g. for cold chains and ambient temperature storage facilities	MoHCC (DPS)	3rd – 5th year
	4.10.2 Establish appropriate storage at animal rehabilitation health centres (cold chain and ambient temp storage facilities)	MAMID-DVS	

STRATEGIC OBJECTIVE: Control public access to antimicrobials at the point of the pharmacy and veterinary medicines general dealers (VMGDs)

Intervention	Activities	Responsibility	Timeframe
4.11 Improve access at pharmacies	4.11.1 Strengthen awareness of pharmacists to comply with the existing regulations on good dispensing practices of antimicrobials	MCAZ and stakeholders (activity coordinated by education and awareness TWG)	1st – 2nd year
	4.11.2 Capacitate the inspectors and strengthen the process of monitoring of compliance of pharmacists to antimicrobial dispensing (MCAZ)		

STRATEGIC OBJECTIVE: Strengthen regulations to ensure appropriate use of antimicrobials in animals

Intervention	Activities	Responsibility	Timeframe
4.12 Harmonise veterinary acts on antimicrobial use and incorporate feeds as per OIE guidelines	4.12.1 Identify the responsible authorities for existing acts on animal health regulation and animal feeds.	MoHCC, MAMID, EMA and ZRP, +MCAZ	3rd – 5th year
	4.12.2 Conduct a participatory stakeholder meeting to review existing regulatory practices and enforcement mechanism	MCAZ/MoHCC, NBA	
	4.12.3 Redraft existing legislation to harmonise regulations, align with OIE guidelines and clarify roles and responsibilities of regulators in monitoring and enforcement of regulations		
	4.12.4 Capacitate regulatory authorities to implement and enforce harmonized regulatory framework	MoHCC, MAMID-DVS, DRSS, NBA	

5.5 Strategic Objective 5 – Investment into research and development

STRATEGIC OBJECTIVE: To ensure sustainable investment in countering antimicrobial resistance through implementing the NAP

Intervention	Activities	Responsibility	Timeframe
Short-term investment			
5.1 Assess the investment required for implementation of the national action plan based on the One Health approach, create a plan to secure and use the required financing	5.1.1 Conduct desk studies to identify the extent & type of resistance in human, animals & environment.	MoHCC (NIHR, TMD), DVS, EMA, NBA, Universities, Research institutions/ AMR Core Group	1st – 2nd year
	5.1.2 Basic study of the problems identified in relation to AMR		
	5.1.3 Establish an AMR Unit under the Research Council of Zimbabwe.		
	5.1.4 Establish a collaborative research committee to approve and regulate research on AMR & AMU in line with the One Health approach under RCZ.		
	5.1.5 Conduct basic studies tracing resistance at the genetic level.		
	5.1.6 Study resistance mechanisms and identify sources and patterns of AMR spread		
	5.1.7 Monitoring and evaluation studies related to data findings		
	5.1.8 Research into alternatives to antimicrobials such as traditional medicine or probiotics		
5.2 Pilot testing of innovative ideas for financing research and development and for new market models to encourage investment and ensure access to new antimicrobial products.	5.2.1 Ensure that 1% of the budget given to the institutions is to be used for research & part of the funding to come from development partners. Charge companies importing antibiotics 0.5% of total cost of (antimicrobials imported) for research.	MoHCC, DVS, EMA + AMR Core Group	1st – 2nd year

STRATEGIC OBJECTIVE: Develop innovative modern diagnostics tools, vaccines and alternative therapies to antimicrobials

Intervention	Activities	Responsibility	Timeframe
5.3 Develop and or utilize innovative diagnostic tools	5.3.1 Develop innovative diagnostic tools.	NIHR, DVS, EMA, academia, DRSS, NBA, BRTI	> 5 years
	5.3.2 Evaluate innovative modern diagnostic tools and methods.		
	5.3.3 Adopt modern technologies in reporting laboratory diagnostic results.		
	5.3.4 Review existing diagnostic capacity of laboratories and identify gaps.		
	5.3.5 Introduce rapid diagnostic tools.		
	5.3.6 Decentralize diagnostic centres to lower levels.		
	5.3.7 Adopt modern diagnostic methods.		

5.4 Develop the ability for local production of zoonotic vaccines	5.4.1	Identify vaccine gaps	NIHR, DVS, EMA, academia, DRSS, BRTI	> 5 years
	5.4.2	Determine local product requirements and business case		
	5.4.3	Source funding for local product		
5.5 Develop new AM therapies and alternatives	5.5.1	Collaborate with R&D institutions and pharmaceutical industry to determine new antimicrobial therapy	NIHR, TMD, DVS, EMA, academia, DRSS, BRTI	> 5 years
	5.5.2	Identify ethno veterinary medicines of potential for all treatments		
	5.5.3	Identify traditional medicines of potential for alternatives		
	5.5.4	Establish funding and business case for the development of these alternatives		
5.6 Establish Central Regulatory platform for Clinical trial approval	5.6.1	Review existing approval process for human and animals clinical trials	NIHR, TMD, DVS, EMA, academia, DRSS, BRTI	Long term
	5.6.2	Determine collaboration potential and business case for a single regulatory platform		
	5.6.3	Support research into mode of transmission between organisms and humans, animals and environment interfaces		

6.0 MONITORING AND EVALUATION

6.1 Approach and components of M&E

Monitoring and evaluation (M&E) is required to assess progress, to identify barriers to achieving results and remedial actions required and for accountability. The approach to M&E of the NAP will be based on the following

- For each pillar of the strategy, the relevant TWG will be responsible for planning the monitoring, including defining indicators in detail, identifying how and how often they are collected, and baselines; they may prioritise the most important indicators. As implementation proceeds, the TWGs will review implementation process (whether planned activities have been done, reasons for lack of progress); monitor outputs and effects, and analyse the results.
- At least once a year, the TWGs will report on progress to the AMR Core Group and Advisory Committee.
- KAP studies will be repeated after 3 years to assess progress in changing knowledge, attitudes and practices (for target groups where there have been interventions to change behaviour).
- An assessment/survey of antimicrobial use in health services and farms, to assess compliance with treatment guidelines and access to appropriate medicines, is planned after 2 to 3 years unless it can be done through supervision/audit.
- Qualitative assessment and analysis will also be required, e.g. to review whether the quality of surveillance reports is improving and how this affects trends in AMR; to review findings from supervision reports.
- After 5 years of implementation, an independent evaluation team will be engaged to evaluate the whole process.
- Costs of M&E will be included in costing and budgeting of the NAP.

Monitoring indicators i.e. outputs, established are there to ensure that the activities of the NAP are implemented whereas the evaluation indicators which are the outcomes will determine the impact of implementation of that strategic objective

Pillar	Strategic objective	Monitoring mechanisms/ indicators (Output)	Evaluation of impact indicators
Overall NAP implementation			
1. Evaluation, training and awareness	To improve awareness and understanding of AMR	<ul style="list-style-type: none"> • Knowledge and awareness activities conducted on AMR for the general public (including farmers) • Knowledge and awareness activities conducted on AMR for the health care and animal health professionals 	<ul style="list-style-type: none"> • Improved understanding and awareness of AMR issues as demonstrated by KAP study results

	Strengthen the knowledge of human, animal and environment health professionals through improved curricula and educate farmers on AMR to support good prescribing practices	<ul style="list-style-type: none"> • # of curricula for human healthcare professionals containing updated AMR components • # of curricula for animal professionals containing updated AMR components • # of curricula for environmental health professionals containing updated AMR components <p><i>(Curricula should contain at least the following AMR, AMU, AMS, IPC, Biosecurity, WASH components)</i></p>	<ul style="list-style-type: none"> • Improved understanding and awareness of AMR issues as demonstrated by the survey tool for professional knowledge study results—human healthcare professionals • Improved understanding and awareness of AMR issues as demonstrated by the survey tool for professional knowledge study results—animal healthcare professionals • Improved understanding and awareness of AMR issues as demonstrated by the survey tool for professional knowledge study results—environmental health professionals • Compliance with treatment guidelines in animals
	Strengthen the knowledge of school children on AMR at primary, secondary and tertiary level education	<ul style="list-style-type: none"> • AMR aspects incorporated into the school curricula for all levels (e.g. AMR, AMU, WASH) 	<ul style="list-style-type: none"> • Improvement in awareness and understanding of AMR issues as measured by a KAP surveys for students and teachers and parents of students, measure change in knowledge on AMR • Reduction in AMU at community level—Defined Daily Doses (DDDs)
	Strengthen the knowledge of stockfeed manufacturing companies concerning antimicrobial use in stockfeeds	<ul style="list-style-type: none"> • DRSS and SARS to carry out level of antibiotic tests in stockfeeds for both local and imported stockfeeds 	<ul style="list-style-type: none"> • Reduced antimicrobial use in stockfeeds. • Compliance of stockfeed guidelines
2. Surveillance and research	Strengthen diagnostic laboratory capacity to improve the healthcare professionals' ability to make informed antimicrobial use decisions.	<ul style="list-style-type: none"> • % of labs reporting susceptibility results out of all labs identified to provide diagnostic services 	<ul style="list-style-type: none"> • % of labs accredited by external quality assurance program out of all labs—Labs are accredited by an accreditation body in a staged process starting with referral hospitals, then district hospitals, and then public and private
	Integrate the surveillance for animals, humans and the environment into a One Health surveillance approach	<ul style="list-style-type: none"> • Human surveillance fully integrated into IDSR system • Animal surveillance fully integrated into existing disease notification system • Water and food safety surveillance includes AMR surveillance • Active surveillance plan implemented • Participation in WHO GLASS yearly 	<ul style="list-style-type: none"> • Annual integrated One Health report on AMR

	Establish an antimicrobial use (AMU) monitoring system for human health, animal health and crops	<ul style="list-style-type: none"> • Antimicrobial use data collected for humans and updated annually • Antimicrobial use data collected for animals and updated annually • AMU data collected for crops and updated annually 	<ul style="list-style-type: none"> • Reduction in AMU in humans • Reduction in AMU in animals • Reduction in AMU in crops
	Analyze and report out surveillance data to support clinical and policy decision making in all sectors	<ul style="list-style-type: none"> • EML and STGs updated regularly against AMR data in animals • EML and STGs updated regularly against AMR data in humans 	<ul style="list-style-type: none"> • % compliance to STG's in hospitals • % compliance to STG's in primary health care • % compliance to STG's in animals health
3. IPC and biosecurity	Strengthen the existing biosecurity measures on hatcheries, farms, slaughter houses and food processing establishments to prevent, reduce and contain pathogens to improve livestock productivity, animal welfare, food security and food safety	<ul style="list-style-type: none"> • Updated biosecurity guidelines for each relevant animal species and farming system • % of animal keepers and farmers trained in good animal husbandry and biosecurity measures 	<ul style="list-style-type: none"> • Food safety testing—% of food contaminants (all bacteria, AMR bacteria and antimicrobial residues) detected • % compliance of animal keepers and farmers with good animal husbandry and biosecurity measures
	Improve movement controls of animals and animal products and border control mechanisms to reduce trans-boundary animal disease	<ul style="list-style-type: none"> • # of breaches of movement control measures 	<ul style="list-style-type: none"> • % reduction of breach movement control
	Track and reduce the burden of health care associated infections (HAIs) through improving IPC practices in all health care facilities in Zimbabwe	<ul style="list-style-type: none"> • Updated IPC guidelines • % of facilities with necessary PPE and IPC equipment • % compliance with hand hygiene practices • Improvement in knowledge, attitudes and behaviours on IPC of health workers as determined by a KAP study/ survey 	<ul style="list-style-type: none"> • % reduction of incidence of health care associated infections i.e. surgical sites, catheter associated urinary tract, central line blood stream, ventilator pneumonias
	Strengthen the vaccination programs in animals and humans to improve prevention and control of disease and reduce AMU	<ul style="list-style-type: none"> • Increase the number of herds covered with vaccinations. 	<ul style="list-style-type: none"> • Increased % vaccination coverage of under 1 years old —humans from the current of 89% • % of herds covered with vaccines
	Reduce the transmission of infectious diseases in communities, healthcare centers, veterinary facilities through effective water, sanitation and hygiene practices and provision of appropriate facilities.	<ul style="list-style-type: none"> • % of population using improved sanitation facilities 	<ul style="list-style-type: none"> • # of outbreaks of waterborne diseases • % reduction of prevalence/ incidence of typhoidal and non-typhoidal salmonellosis and cholera by 5% annually

4. Rational Use	Improve access to antimicrobials by animal keepers by increasing access points for the sale and provision of antimicrobials	<ul style="list-style-type: none"> Total number of licensed AM access points # of licensed AM access points in rural areas 	<ul style="list-style-type: none"> Antimicrobial use of OTC medications—kgs of antimicrobials
	Strengthen control of antimicrobials and their use in animal health by animal keepers and veterinary para professionals without limiting access	<ul style="list-style-type: none"> % of planned inspections successfully conducted Guidelines on veterinary pharmacovigilance in place ADR reporting tools in place 	<ul style="list-style-type: none"> Antimicrobial use of OTC medications—kgs of antimicrobials
	Implement sustainable supervision, audit and feedback mechanisms in health facilities by having functional hospital medicines therapeutic committees in hospitals to ensure appropriate antimicrobial use by prescribers	<ul style="list-style-type: none"> % of hospitals with functioning Hospital Therapeutics Committee % compliance with STGs 	<ul style="list-style-type: none"> % of compliance with antimicrobial prescription in hospitals Antimicrobial use in humans—DDDs
	Ensure that standard treatment guidelines (STGs) and Essential Medicine List (EML) reflect the current diseases and pathogens in humans	<ul style="list-style-type: none"> Up to date EML and STG's— not more than 5 years old Animal health EML developed 	<ul style="list-style-type: none"> Presence of an up to date EML and STGs that are not >5 years old. Presence of an up to date EML.
	Ensure adequate supplies of quality assured essential AM at various levels of human and animal health delivery systems.	<ul style="list-style-type: none"> % availability of antimicrobials that are on the EML 	<ul style="list-style-type: none"> Presence of antimicrobials that are on the EML at appropriate sites.
	Control public access to antimicrobials at the point of the pharmacy and veterinary medicine general dealers	<ul style="list-style-type: none"> # of illegal access points of antimicrobials 	<ul style="list-style-type: none"> % reduction of illegal access points of antimicrobials.
	Strengthen regulations to ensure appropriate use of antimicrobials in animals	<ul style="list-style-type: none"> % of acts requiring revision that have been revised for animal health 	<ul style="list-style-type: none"> # of acts that have been revised for animal health
5. Investment, R&D	Develop innovate modern diagnostics, vaccine and alternative therapy to antimicrobials	<ul style="list-style-type: none"> # of research projects initiated # of articles in peer-reviewed international journals 	<ul style="list-style-type: none"> % of research projects that have caused policy change.