2017 - 2027

Multi-sectoral National Action Plan on Antimicrobial Resistance

Government of the Republic of Zambia

Table of Contents

ACKNOWLEDGEMENTS

This National Antimicrobial Resistance Action Plan was prepared by the National Multi-Sectorial Technical Working Group on Antimicrobial Resistance, whose membership was drawn from the Ministries of Health; Fisheries and Livestock; and, Agriculture. Other members were drawn from ZEMA, ICAP, ZCHI, Academia, WHO, and CDC.

The Government of the Republic of Zambia is grateful to all of them for their effort and expertise in collecting data for the situation analysis, and writing the NAP.

Special thanks are extended to the CDC, WHO and FAO for material and financial support during collaborative workshops and meetings in the development process of this document.

Furthermore, the Government would like to appreciate the services of other government officials, particularly Permanent Secretaries in respective Ministries who contributed staff and supported them to undertake this initiative.

ABBREVIATIONS AND ACRONYMS

AMR	Antimicrobial Resistance
AMRCC	Antimicrobial Resistance Coordinating Committee
AMU	Antimicrobial Use
ATLASS	Assessment Tool for Laboratory and AMR Surveillance System
AU-IBAR	Africa Union Inter African Bureau for Animal Resources
CDC	Centers for Disease Control and Prevention
CHAZ	Churches Health Association of Zambia
CIDRZ	Centre for Infectious Disease Research in Zambia
COMESA	Common Market for Eastern and Southern Africa
CPD	Continuous Professional Development
CSO	Central Statistical Office
DDCC	District Development Coordinating Committees
DFID	Department for International Development
DVS	Department of Veterinary Services
eLMIS	Electronic Logistics Management Inventory System
eZICS	Electronic Zambia Inventory Commodities System
EPI	Expanded Programme for Immunization
EQA	External Quality Assurance
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Produce
GNP	Gross National Product
GLASS	Global Antimicrobial Resistance Surveillance System
HIV	Human Immunodeficiency Virus
HQ	Head Quarters
IDSR	Integrated Disease Surveillance and Response
IEC	Information, Education and Communication
IFAD	International Fund for Agricultural Development
IPC	Infection Prevention and Control
IPPC	International Plant Protection Convention
JAR	Joint Annual Reviews
JSI	John Snow Inc.
LIMS	Laboratory Information Management System
LIMS	Livestock Information Management System
MIS	Malaria Indicator Survey
MoH	Ministry of Health
MTEF	Medium-Term Expenditure Framework
MTRs	Mid-Term Reviews
NALEIC	National Livestock Epidemiology and Information Centre

NAP	National Action Plan
NDP	National Development Plan
NFP	National Focal Points
NHA	National Health Account
NGO	Non-Governmental Organization
NGOCC	Non-Governmental Organizations Coordinating Council
NMSC	National Multi-sectoral Steering Committee
NPHI	National Public Health Institute
NTP	Nation Tuberculosis Program
OIE	World Organization for Animal Health
PDCC	Provincial Development Coordinating Committee
QMS	Quality Management System
SADC	Southern African Development Community
SADCPF	Southern African Development Community Parliamentary Forum
SOP	Standard Operating Procedures
STI	Sexually Transmitted Infections
TB	Tuberculosis
TCM	Traditional and Complimentary Medicines
ToR	Terms of Reference
TWG	Technical Working Group
UNDP	United Nations Development Program
UNICEF	United Nations Children's Fund
UNZA	University of Zambia
USAID	United States Agency for International Development
UTH	University Teaching Hospital
VDR	Veterinary Drug Residues
WAHIS	World Animal Health Information System
WDC	Ward Development Committees
WHO	World Health Organization
ZEMA	Zambia Environmental Management Agency
ZAMRA	Zambia Medicines Regulatory Authority
ZCHI	Zambia Community Health Initiative
ZNPHI	Zambia National Public Health Institute

FOREWORD

The World Health Organisation defines Antimicrobial Resistance (AMR) as the development of resistance in a microorganism – bacterium, virus, fungus, or parasite – to an antimicrobial agent to which it was previously sensitive. Resistance is the property or characteristic of the microbe and not the person, animal, and plants affected by the microbe.

Antibiotics are one of the most important therapeutic discoveries in human and animal medical history that revolutionised the way infections are treated. This has contributed in reducing morbidity and mortality caused by microorganisms. Antimicrobial resistance is therefore of concern, as previously treatable infections like pneumonia and diarrhoea can become serious health threats.

One of the five strategic objectives in the global action plan to combat AMR is creating awareness on AMR. Human use and abuse of antimicrobial has accelerated development of resistance in some microbes. Evidence based information is therefore required to facilitate behavioural changes on appropriate use of antimicrobials and safeguard human and animal health.

There is evidence of antimicrobial resistant microorganisms in human and animal health in Zambia and therefore to tackle this challenge the Zambian Government undertook a multi-sectoral approach to develop this National Action Plan (NAP) in line with the global AMR strategy.

It is our sincere hope that through this NAP, strategic interventions will be initiated towards the long-term goal of containing the AMR threat in Zambia, the African region, and the World at large.

Dr. Jabbin Mulwanda

Permanent Secretary _ Health Services,
Ministry of Health,
CHAIRPERSON, AMR NMSC

Dr David Shamulenge
Permanent Secretary

Ministry of Fisheries and Livestock
CO-CHAIRPERSON, AMR NMSC

EXECUTIVE SUMMARY

Zambia has recognised the Public Health threat of antimicrobial resistance and its impact on morbidity and mortality, as well as the subsequent economic consequences. The country has recorded microorganisms which have developed resistance to antimicrobial drugs. Notable among these are; Multidrug Resistant *Mycobacterium Tuberculosis* (MDR), Human Immunodeficiency virus resistant to antiretroviral drugs, *Plasmodium* resistance to antimalarial drugs, and fungal species showing indications of resistance to antifungal drugs. Emergence of "Superbugs" such as Methicillin Resistant *Staphylococcus aureus* (MRSA), Extended Spectrum beta-lactam (ESBL) producing *Klebsiella pneumoniae* and Vancomycin Resistant Enterococci (VRE) have also been reported. This information suggests increasing trends in antimicrobial resistance and suggests that Zambia shares the worldwide trend of this problem. This implies that serious conditions of public health concern such as diarrhoea, pneumonia, and meningitis may be difficult to treat or not possible to treat at all.

Antimicrobial resistance (AMR) has the potential of becoming a global pandemic in the near future. In response to this possible threat, the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Animal Health Organization (OIE) signed a tripartite agreement whose objective is to foster concerted efforts aimed at combating the threat of AMR at a global level.

Member states signed an agreement to adopt the resolutions contained in the tripartite agreement, and at the 2015 World Health Assembly (WHA) of the WHO, it was agreed that National Action Plans (NAPs) on AMR be developed by May, 2017. Consequently, Zambia through the President, His Excellency Mr. Edgar Chagwa Lungu at the 71st UN General Assembly of September 2016, where a declaration for a collaborative global response to the threat of AMR was made, asserted to join the fight against AMR.

Zambia has developed a Multisectoral National Action Plan (NAP) to address ways of combating antimicrobial resistance. The country has adopted the "One Health" approach as proposed in the Global Action plan (GAP) on antimicrobial resistance. Hence this plan was developed by a multidisciplinary team that was constituted from different sectors in May 2016. The Ministry of Health as the lead Ministry drew members of the committee from different sectors. These were personnel from the following sectors; human health,

agriculture, livestock, environmental protection, academia, regulatory bodies, civil society, planning and finance. This plan is therefore representative of a broad-based consensus on actions to be undertaken to combat the threat of antimicrobial resistance.

The country has a National Multi-Sectoral Steering Committee (NMSC) which shall guide, oversee, and monitor AMR-related activities in all sectors to ensure a systematic and comprehensive implementation. This is composed of Permanent Secretaries from key Ministries and cooperating partners, WHO, FAO, OIE, CDC and other key partners. The Anti-Microbial Resistance Coordinating Committee (AMRCC) shall co-ordinate and implement AMR related activities, while focal point persons from different sectors shall coordinate AMR activities and tasks in their respective sectors. The focal point persons will lead different technical working groups (TWG) in five key areas.

The NAP on antimicrobial resistance has adopted the five strategic objectives from the Global Action Plan (GAP) which was adopted at the World Health Assembly in May 2015. The five-strategic objective are;

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

The main objective of the Multi-Sectoral Antimicrobial Resistance National Action Plan is to provide a coherent framework for combating AMR using the “One Health” approach embracing human, animal, agriculture and environment sectors in Zambia from 2017 to 2027.

The AMR-NAP outlines the status quo and acknowledges challenges of antimicrobial resistance (AMR) in Zambia among its population estimated at about 16,500,000 people in 2016. Excessive or inappropriate use, among other problems that can lead to the emergence of antimicrobial resistance, have been documented.

Furthermore, the plan outlines the Country response in which various stakeholders have been identified. In addition to this, it provides for a governance and leadership structure; strategic plan; operational plan and budget estimated at US$ 17,893,100 and, monitoring and evaluation plan.

The focus areas that have been addressed in this plan include; awareness and education, surveillance and research, regulation, infection prevention, sanitation and hygiene, optimising drug use and investment in research and development. A summary of each of these priority areas and actions to be undertaken are as follows;

Awareness and education

The plan proposes to establish an evidence-based public communications programme targeting audiences in human, animal, plant and environment practices. This shall be done by estimating awareness and knowledge through behavioural studies in different professional groups then design communications programmes. The plan promotes the inclusion of AMR and related topics into the education curricula at all levels, and develop accredited continuing professional development (CPD) and in-service training programmes on AMR, including alternative learning methods.

Surveillance and research

A national coordination structure for surveillance of AMR shall be established interlinking the sector-specific surveillance systems into the National Surveillance System. A traceability strategy for food safety surveillance system shall include AMR. Laboratory capacity (human, material and infrastructure) will be built and an AMR laboratory network shall be established and linked to the Global Antimicrobial Surveillance system, a platform for sharing AMR data. This is important to ensure reliable drug susceptibility data and will provide information to interpret trends and variations in rates of AMR for policy decisions. Surveillance in agriculture will allow for early detection of pathogens that enter the food chain, and their resistance patterns and provide information to develop intervention strategies.

An AMR research plan shall be developed and implemented through engagement of research institutions and researchers who shall mobilize resources for conducting research in accordance with the national AMR research plan.

Regulation

Legal provisions in the existing regulations shall be strengthened to address AMR and related factors. Regulations for antimicrobials in food and feed shall be enforced, as well as strengthen antimicrobial policies and standard treatment guidelines for human, terrestrial and aquatic animals, plants, and environment.

Infection prevention, sanitation and hygiene

National coordination structures for sanitation, infection prevention and control, hygiene, biosecurity, and phytosanitary shall be established. Situation analysis on sanitation, infection prevention and control, hygiene, biosecurity, and phytosanitary shall be conducted, and national guidelines and protocols will be developed or revised. There shall be advocacy to the players at all levels to implement the national guidelines. Promotion of vaccination programmes will also be enhanced. Interventions in this key area will prevent and control emergence of the existing AMR problems in Human agriculture and veterinary sectors.

Optimal use of antimicrobial medicines in human, animal, and plant health

There's a plan to establish/strengthen antimicrobial stewardship programmes in human, animal, and plant health practice through engagement of healthcare facility management and professional bodies to mainstream stewardship committees. The plan also proposes to strengthen the pharmaceutical manufacturing and supply chain by reviewing and strengthening the existing quality management system for the supply of medicines, covering manufacturing, production, storage, transport etc. and strengthening the regulatory mechanisms (ZAMRA and Professional bodies) for access to antimicrobial medicines in human, animal, and plant health. Quality management systems will be introduced at all levels of the supply chain. Guidelines for proper disposal of antimicrobials, and animal, and plant waste will also be developed.

Investment for research and development of new medicines, vaccines, diagnostic tools, and other interventions.

A plan to secure and use financing for implementation of the AMR NAP and measure the burden of AMR in various sectors. This shall include assessment and mobilisation of investment requirements for implementation and development of policies, guidelines, and procedures for implementation of NAP. Measurements of QALYs, DALYs, mortality rates, cost associated to infectious diseases/bed spaces/drugs/treatment shall be done to establish the impact of AMR with periodic efficacy studies on antimicrobial medicines.

The plan promotes access to incentives for industry to invest in the research and development of new antimicrobials and vaccines, and promotes linkages among various relevant stakeholders to search for new drugs, vaccines and diagnostic tools.

The implementation of this plan will require close collaboration among all stakeholders, and it is hoped that there shall be timely dissemination of data to relevant parties in order to take quick actions to contain the spread of antimicrobial resistant pathogens.

BACKGROUND

1.0 Country Profile

Administrative, Demographic and Community structures

Zambia is a landlocked Sub-Saharan country sharing boundaries with Malawi, Mozambique, Zimbabwe, Botswana, Namibia, Angola, Democratic Republic of the Congo and Tanzania. It has a total surface area of about 752,614 Km^2, and is among the biggest countries in Southern-Central Africa.

Zambia's annual average temperature is 20^0C and the relative humidity averages around 61.5% per annum (range 34% - 86%). The coldest period is between June and July and the warmest is October.

Administratively, the country is divided into ten provinces, namely: Central, Copperbelt, Eastern, Luapula, Muchinga, Lusaka, North-Western, Northern, Southern, and Western provinces. Each of these provinces is subdivided into districts and there are currently 109 districts in the country (figure 1). A district is divided into constituencies that are made up of wards. Lusaka is the capital city and administrative headquarters for government. There are three wings of governance; executive, legislative and traditional leadership in each district. For any program to receive adequate support, all the three wings need to be involved so that all aspects are well handled.

Under the executive leadership is the District Commissioner who is appointed and oversees that government policies and programs are implemented. The Members of Parliament are under the legislative wing and are in-charge of constituencies in the district. They facilitate and initiate community based developmental projects. The traditional leadership works with the communities and assists in the implementation of the government programs. For operational purposes, there are various structures which include zones, Ward Development Committees (WDC), District Development Coordinating Committees (DDCC), and at provincial level, the Provincial Development Coordinating Committee (PDCC).

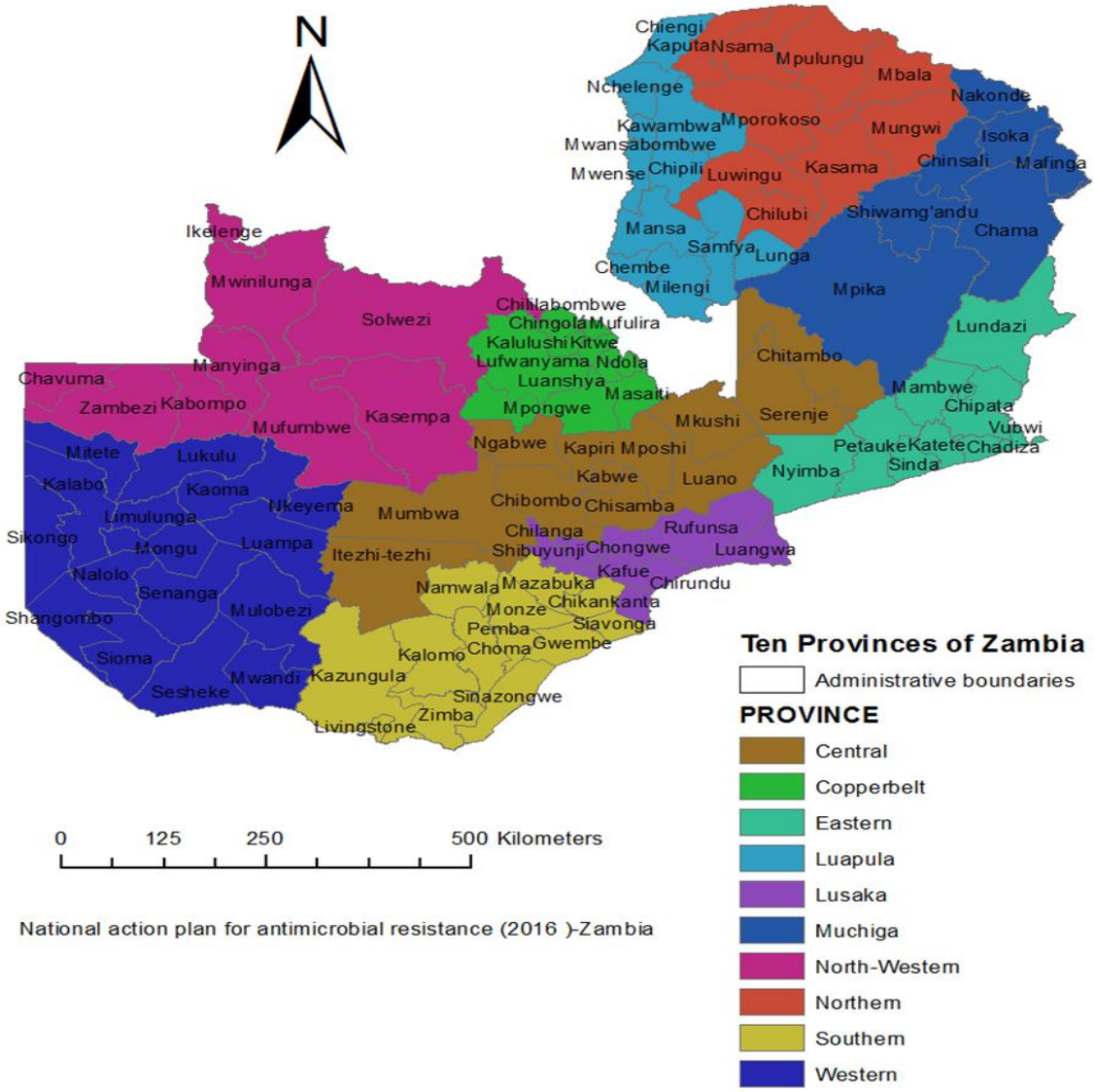


Figure1: Map showing provinces and districts in Zambia *(Courtesy of the Department of Veterinary Services)*

The population of Zambia has been increasing from 7,759,161 in 1990 to 13,046,508 persons in 2010 (figure 2), giving an average annual growth rate of 2.8 % between 2000 and 2010 (CSO, 2010). The 2016 estimated population stands at 17,117,369 (Country meters, 2017). The most populated province is Lusaka with a density of 100.4 persons per square kilometre whereas North-western province has the least with 5.6 persons per square kilometre. There are seventy-three (73) local languages, while Bemba, Kaonde, Lozi, Lunda, Luvale, Nyanja, and Tonga are the main local languages spoken. English is Zambia's official language.

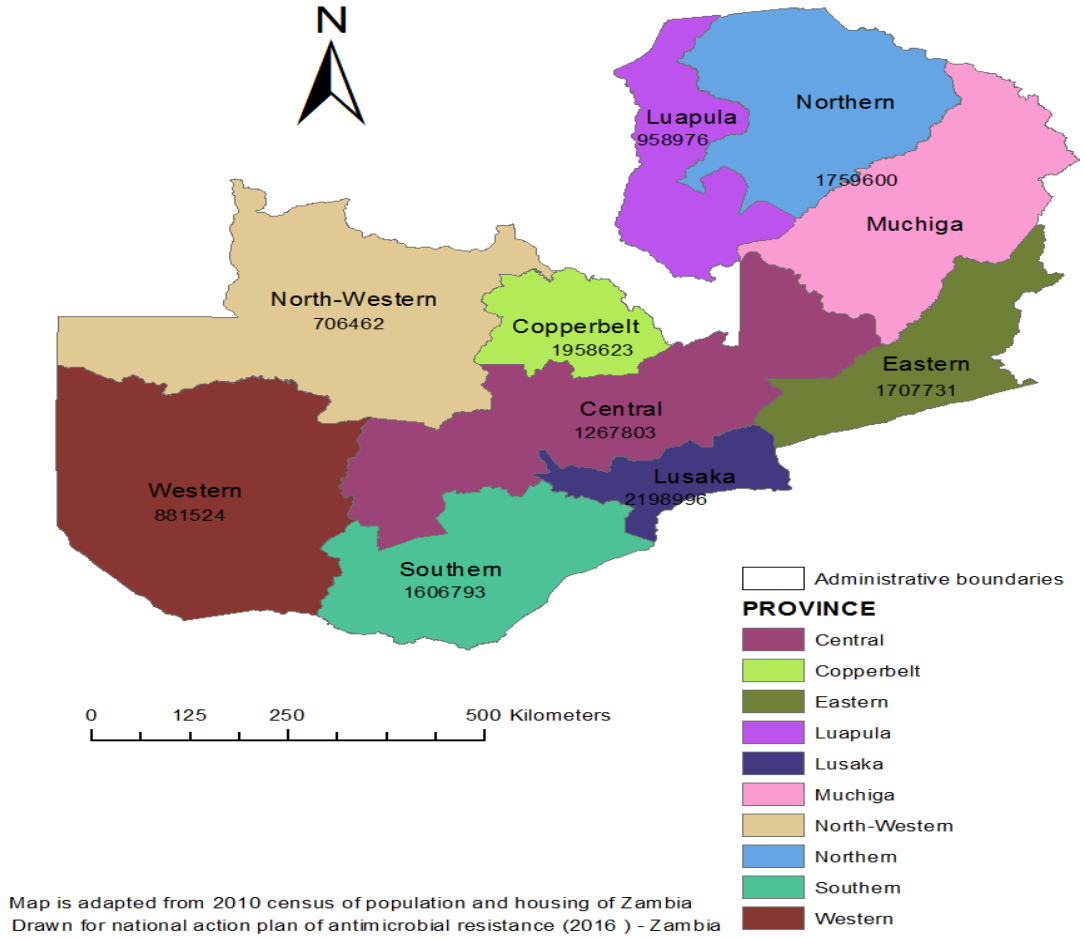


Figure 2: Population Distribution by Province in, Zambia, 2010 census *(Courtesy of the Department of Veterinary Services)*

The Male: Female ratio is 0.99: 1.01 and the age structure is 17.2% for 0-5years, 29.5% 5-14 years, 43.2% for 15-50 years and 10.1% for those above 50 years. The current population structure shows a predominatly younger population with a median age of 17 years (figure 3). The average life expectancy is 57 years (males 57 and females 58). The infant mortality rate is 45deaths /1000 live births, while the percentage of of children under 5 years who were under weight was 15% (CSO, 2015).

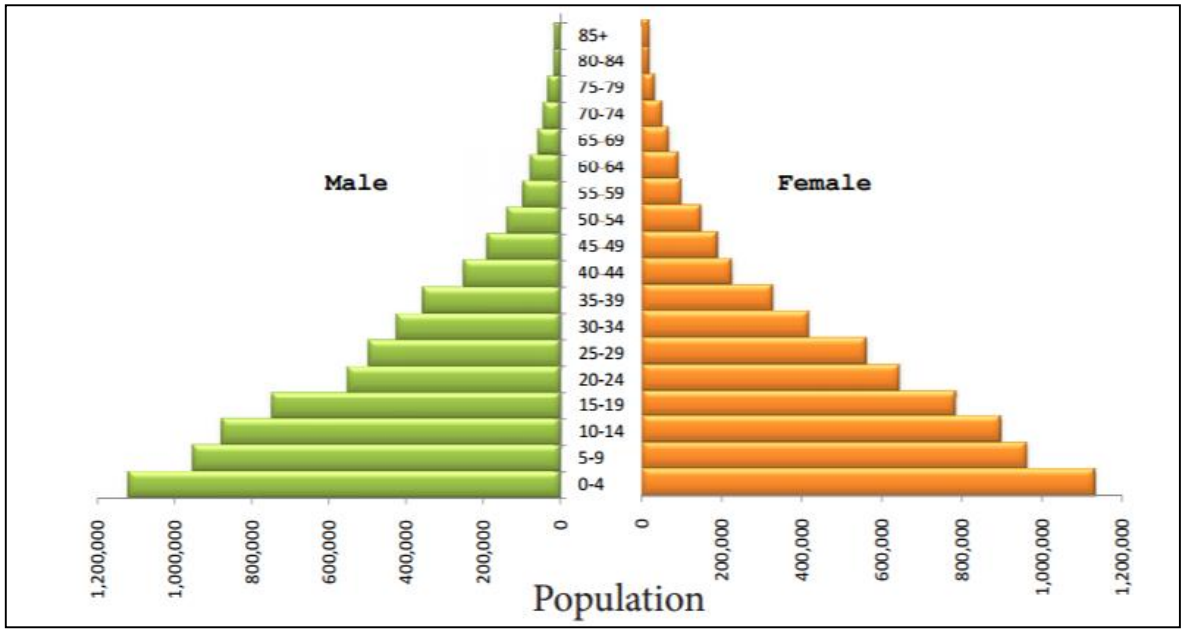


Figure 3: Zambia Population structures *(Courtesy of CSO, 2010 Census of Population and Housing Report)*

The Department of Veterinary Services (DVS) estimated the population of cattle to have been 2.2 million in 1990 (DVS annual report 1990) and 4.2 million in 2016 (DVS annual report 2016). Approximately 20% of this national herd is in the commercial sector with 80% in traditional sector. The commercial sector utilises more modern production methods with a relatively higher input (including veterinary products) and outputs than the traditional sector (Aregheore, 2009). It is estimated that cattle number in the traditional sector increases by 3.5% per annum (Daka, 2002). Population figures are based on administrative data collection in the districts and growth projections with corrections as the livestock census has not been undertaken in over 20 years. The detailed cattle and other livestock population by province for the year 2016 is shown in Table 1.

Table 1: Livestock population by province, 2016

	Cattle	Pigs	Goats	Sheep	Donkeys	Cats	Dogs
Central	533,337	142,551	594,876	11,838	5,124	29,637	155,973
Copperbelt	57,396	81,294	135,449	3,492	-	5,171	38,532
Eastern	671,861	598,486	396,268	34,186	4,4779	35,733	134,380
Muchinga	140,972	48,897	135,453	6,837	491	9,198	52,324
Luapula	14,133	40,539	162,420	3,024	-	5,335	25,822
Lusaka	106,040	188,112	136,909	1,810	48	9,787	30,669
Northern	71,292	73,867	215,807	8,191	-	6,112	43,735
North-western	76,036	36,109	191,053	3,115	-	3,596	50,483
Southern	1,728,475	258,847	1,070,124	30,817	5,270	95,421	279,316
Western	750,698	110,964	82,521	-	707	33,217	93,721
Total	**4,150,240**	**1,579,666**	**3,120,880**	**103,310**	**16,118**	**233,208**	**904,955**

(Source: National Livestock Epidemiology and Information Centre – NALEIC)

Socio-Economic Status and Indicators

Socio-Economic Status

Zambia is one of Sub-Saharan Africa's highly urbanized countries. Around half of the country's population is concentrated in a few urban zones strung along the major transportation corridors, while rural areas are scantly populated. Most of the employment opportunities lie along the major transportation corridors, but unemployment and underemployment still remain as serious challenges. National GDP has doubled since independence in 1964. However, due to high birth rates and AIDS amongst other factors, per capita annual incomes are currently at about two-thirds of their levels at independence. As of 2015 the gross domestic product (GDP) per capita stands at $1,330 (World Bank, 2015). Zambia is one of the fastest growing economies in Africa and its capital, Lusaka is the fastest growing city in theSouthern African Development Community (SADC)
(https://en.wikipedia.org/wiki/Economy_of_Zambia#cite_note-SADC).

The Seventh National Development Plan 2017-2021 (SNDP) provides practical implementation strategies for the government's goals to achieve economic transformation through an integrated approach that links key sectors. For example, by

leveraging the joint potential of agriculture and tourism, the government intends to galvanize and stimulate diversification. The NDP provides an opportunity to prioritize government objectives toward poverty reduction and strengthening the linkages between budgeting and planning. It is part of the cascading system of planning that commenced with the Vision 2030 prepared in 2005, based on the African Union's Agenda 2063. The national development agenda is spearheaded by the Ministry of National Planning and Development, while the NDP and Vision 2030 are executed through MTEF and annual budgets

Contribution of the Crop and Livestock Sector to the Economy

The fisheries and livestock sectors have been identified to be among the key drivers in reducing poverty, especially in rural communities, with the potential to contribute to sustained economic growth. The Zambian Government has therefore created a Ministry dedicated to Fisheries and Livestock to adequately address the affairs of the two sectors. The Agricultural sector contributes about 21% of GDP, of which the Livestock sector's contribution is approximately 42% (IFAD, 2014; IAPRA, 2012). The agricultural sector supports the livelihood of over 70% of the population, employing 78% of women and 69% of men.

In Zambia, about 23% of the per capita supply of protein comes from animal products (Aregheore, 2009). The major sources of animal protein are beef, pork, chicken, fish, milk, egg, and to a lesser extent, sheep, goat, and rabbit meat. There are other traditional sources of animal protein such as game meat, rats, monitor lizards, insects, frogs, and wild birds. Cattle contribute at least 61% of the meat and milk consumed in the country. The livestock sector has tremendous potential and capacity in contributing to poverty alleviation, increasing the socio-economic status of most people and, consequently, contributing significantly to the economic growth of the country. However, the potential of the sector is under-estimated. The sector has experienced low production and productivity resulting from a range of factors including, high disease prevalence, poor husbandry management especially among the small-scale farmers and inadequate diversification and integration of small livestock.

Farming systems vary according to agro-ecological conditions, but are dominated by Maize. Small holder farmers also cultivate Sorghum, rice, millet, beans, groundnuts, sugar cane, vegetables and cassava. Commercial crop farming focuses on cash crop production including wheat, soybeans, tea, coffee, tobacco, cotton, and floriculture. Antimicrobials, mainly anti-fungals, and chemicals are used to support production, and if not guarded, have the potential to affect AMR.

Transportation and Communication

Zambia's transport system comprises of airports, road network, railway and water transport. Zambia's four designated international airports are found in Lusaka, Livingstone, Mfuwe and Ndola, with Kenneth Kaunda International Airport (KKIA) in Lusaka being Zambia's main airport. Other airfields and airstrips are found in various locations including Chipata, Kitwe, Kasama, Mongu, Solwezi and Mansa.

The telecommunication system in Zambia is generally good. Internet connectivity and mobile phone services are becoming widespread, with services available in most districts. There are at least three major telecommunication service and various other communication service providers. However, services and network are limited to central business districts, shopping or trading centres, close to transmission masts.

Human Health Services

In order to achieve the health sector goals of improving the health status of people in Zambia and contribute to socio- economic development, the government started decentralizing health services under a health sector reform program in the early 1990s. The health reforms introduced fiscal decentralization through direct grants to district health boards and hospital management boards. With the implementation of the Sector Wide Approach (SWAP) in 1993, pooling of resources through basket funding was introduced initially as a district basket and later the expanded basket in 2004. Basket funding was by far the most novel aspect of health care financing reform in Zambia and provided the MoH increased flexibility in financial allocations. The intention was to transfer key management responsibilities and resources from the central MoH to the district level.

Health Facilities

Health services in Zambia are provided through public facilities, private for-profit institutions, and private not-for-profit institutions including faith-based organisations. There are currently 1,958 health facilities in Zambia, of which 81.3% are Government owned (Ministry of Health, 2012). The majority of faith-based organizations come under the umbrella of the Churches Health Association of Zambia (CHAZ).

Health facilities are grouped into three main types depending on the level, function, capacity, and the intended population coverage: Primary Health Care covering community health posts, health centres and district hospitals; Secondary Health Care covering regional referral hospitals; and Tertiary Health Care covering national referral and specialist hospitals.

Human Health Workforce

The healthcare workforce continues to be inadequate. This situation poses a big challenge to the prevention, control and management of communicable and non-communicable diseases. The most affected are the rural areas where health facilities and social amenities are inadequate, and populations are sparsely distributed, making them hard to reach. For instance, staff to population ratios nationally are as high as 1 doctor per 14500 people and 1 nurse per 1800 people (Ministry of Health, 2008; Central Intelligence, 2008, Zambia). The high ratio results in skills mixing among the health workers, which has its own maladies. This has led to the identification of community health assistants and volunteers that assist health workers administer community health programmes and services.

Health Information System

Zambia has long recognized the critical need for timely, relevant and reliable health data to support evidence-based decision making. A comprehensive set of appropriate Health Information Systems has been developed and implemented. This comprises, among others, a computerized Health Management Information Systems which has been recently revamped, the Integrated Disease Surveillance and Response system (IDSR), and a number of other routine data systems and periodic data systems which include the Demographic and Health Survey (DHS), the National Health Account (NHA), the Joint Annual Reviews (JARs) and Mid-Term Reviews (MTRs) and the Malaria Indicator Survey (MIS).

The IDSR was adopted in 2000, with the objective of providing appropriate data for facilitating efficient and effective responses to epidemics. IDSR is among the national priorities identified in the National Health Strategic Plan.

Health Financing

In the Abuja declaration of April 2001, the heads of states of the African Union countries pledged to set the target of at least 15% of the annual budgets to improve the health sector. It was further agreed that donor countries should fulfil at least 0.7% of their Gross National Product (GNP) as official development assistance to developing countries. In line with this declaration the Zambian government has in the six years from 2011 to 2017 contributing on average 8.5 % of its GDP towards the Health Sector. The Zambian health care system has three key financing sources namely donor funding, out-of-pocket payments and tax-based government financing.

In recognition of the prioritization of the AMR agenda sufficient funds need to be allocated both from Government and external sources (cooperating partners) in order to carry out all the planned activities in a year. In addition there is need for sector contributions in line with the one health concept and development of other funding mechanisms to finance antimicrobial resistance activities.

Animal Health Services

Veterinary Services System

The Department of Veterinary Services (DVS) under the Ministry of Fisheries and Livestock (MFL) is responsible for animal health services. In undertaking its mandate, DVS works with other departments, agencies and the private sector in provision of animal health services at national, provincial, district and camp levels. There are four sections responsible for specialized activities: the National Livestock Epidemiology and Information Centre (NALEIC) is responsible for surveillance and monitoring of livestock diseases; the Central Veterinary Research Institute (CVRI) is responsible for the diagnosis and research into all livestock diseases; the Veterinary Services section is responsible for implementation of disease control programmes in the 109 districts; Veterinary Public Health unit operates under the veterinary services section and is responsible for food safety and zoonotic disease control; and, the Tsetse and Trypanosomiasis section is responsible for control and monitoring of tsetse flies and trypanosomiasis.

The national headquarters of DVS is involved in management, policy formulation and resource mobilisation to facilitate provincial and district operations. The provincial offices of the department are involved with the supervision of districts and facilitate control of diseases of national economic importance. The district veterinary office is the interface between the livestock farmers, agencies, and the private sector. The District Veterinary Officers and the Livestock Officers with the Veterinary assistants are responsible for provision of services such as extension, meat inspection, disease surveillance and implementation of diseases control programmes.

The provision of Veterinary services is done by private animal health facilities. However, the majority of these are situated in urban areas with very limited provision to the rural areas. The veterinary council of Zambia is responsible for registering veterinary professions and the animal health facilities

Veterinary Laboratory Infrastructure

The Central Veterinary Research Institute (CVRI), the School of Veterinary Medicine of the University of Zambia (UNZA) and some private laboratories carry out laboratory diagnostics for livestock and wildlife diseases. However, only CVRI is the designated

national reference laboratory for animal health and has five regional diagnostic laboratories located in the Southern, Western, Eastern, Copperbelt and the Northern provinces. Districts laboratories handle basic diagnostics (mostly microscopy) mostly involving parasitic and bacterial diseases.

Animal Health Financing

In an effort to attain the aspiration of the Vision 2030 with regard to the livestock sector financing, the Comprehensive African Agriculture Development Program (CAADP, 2013) was initiated in 2003 in Maputo, Mozambique as a continent wide African initiative whose core principles includes the allocation of 10% of the national budget to agricultural and livestock sector development (CAADP, 2013).

In recent years, the budget allocation towards agriculture has been averaging around 5% translating to an increase of about 3.3%, since 2011. Although about 90% of the allocation has been going towards Farmers Input Support Programme (FISP) and very minimal allocation to livestock and fisheries sector (Kuteya, 2012). This allocation has been far below the targeted 10% budgetary allocation to agriculture as agreed under CAADP. Livestock budget allocation is only 17% of the total agriculture budget.

The overall agriculture contribution to GDP stand at about 21%, while the livestock sector contribution is at 3.2 %. Livestock makes up 42% of the total agricultural contribution to GDP (MAL et al., 2012). These figures do not include the contribution from the manure and animal draught power. "If all these are taken into account, the contribution to national GDP increases to 6.4%" (Lubungu et al 2012). Despite the significant contribution to the national economy, the livestock is underfunded.

Animal health Workforce

The workforce in animal sectors continues to be inadequate and it has been identified to pose a big challenge to the prevention, control and management of animal diseases. The animal health delivery system is administered by veterinarians, veterinary para professionals (veterinary assistants –VA, livestock officers) and in some few locations by the community based animal health workers (CBAHW). The veterinary camps which are the smallest operational unit of the DVS are manned by the veterinary assistants who are

then supervised by the district veterinary officers. There are approximately 400 veterinary assistants under DVS which falls far below the required number for the effective service delivery. In addition, the catchment areas for the VA are very wide and further affects their effectiveness in service delivery.

In western Europe it is recommended that each country should have one veterinarian for 1000 to 6000 livestock unit (LU), but in Africa the ratio still ranges from 20 000 to 400 000 LU per veterinarian and continues to compromise the delivery of veterinary services (Cheneau,1985). FAO recommends a ratio of 1 veterinarian per 100, 000 LU. However, this does not take into account veterinarians that work in diagnostics, surveillance, international and other emerging areas of veterinary science such as apiculture and aquaculture.

Medicine Regulation

Post-marketing surveillance and Pharmacovigilance system

The Medicines and Allied Substances Act (No.3) of 2013, established the Zambia Medicines Regulatory Authority (ZAMRA), whose functions among others include post-marketing surveillance and adverse drug reaction monitoring. Pharmacovigilance activities are important in showing trends in medicines-related morbidity, mortality, and economic impact. These services are carried out through the National Pharmacovigilance Unit (NPVU).

In order to ensure the general provision of equity of access for all Zambians to good quality, safe and efficacious drugs which are affordable and rationally used as close to the family as possible, the Government of Zambia also has a National Drug Policy. This policy articulates four key intent areas linked to the logistics elements management including drug selection, quality assurance, finance/procurement/storage and rational drug use.

OVERVIEW OF AMR

Antimicrobials play an essential role in combatting infectious diseases in human and veterinary medicine, agriculture and environment (Ling et al., 2015; Kohanski et al., 2010; OIE., 2007). Antimicrobial resistance (AMR) is defined as the development of resistance in a microorganism, -bacteria, virus, Fungi and parasite to an antimicrobial agent to which it was previously sensitive (http://www.who.int/mediacentre/factsheets/fs194/en/). AMR is now recognized as one of the most significant global threats to public health. According to WHO global situation Analysis report of 2015, it was noted that information on the true extent of the problem of AMR was limited in the African Region. It is estimated that AMR will lead to 10 million annual human deaths globally by 2050 if no interventions are put in place to combat AMR at global, regional and national levels (O'neill, 2014). Despite scanty information, the data available showed evidence of increasing trends in AMR suggesting that the African region shared the worldwide trend of this problem (WHO, 2015).

In developed countries, a rapid rise in rates of resistance to antibiotics used to treat common infections such as pneumonia, diarrhoea, meningitis, and urinary tract infections has been documented. In low- and middle-income countries resistance to drugs has been observed, such as those used to treat Tuberculosis (TB) and Malaria in humans, Trypanosomiases (Matovu et al, 2001) in animals, and fungal infections in crops (Kapata et al., 2013; Habeenzu et al., 2007,). The rise in AMR will lead to a reduction in options available to treat infectious diseases, support chemotherapy, surgery, and significant impact on health systems and economies (World Health Organization, 2014). One of the main ways to fight antimicrobial resistance globally is to have comprehensive national plans in place that are based on a multi-sectoral approach and with sustainable financing (Mendelson et al., 2016).

A situation Analysis and needs assessment on AMR conducted in 2010-2011, funded by Bill and Melinda Gates foundation, highlighted some factors that contribute to AMR in Zambia (APUA, 2014). Some factors highlighted include easy access to antibiotics without prescription; poor laboratory capacity to conduct antimicrobial susceptibility testing; and poor quality of some antibiotics (Knobler et al., 2003). In particular, the quality of antimicrobials is an important issue in the development of AMR, especially when illegal cross border trade is rampant (SADC, 2017). Until now, Zambia has had no deliberate

program for national AMR surveillance.

Addressing AMR is thus a shared global responsibility requiring all sectors and stakeholders to mobilize around the One Health approach for the prevention and containment of the public health threat (World Health Organization, 2001). It is only through strong commitment to working together and sharing information and resources at all levels can the fight against AMR be won.

Global Perspective on AMR Interventions

For many years, member states were being guided on AMR by sector-specific global agencies. In recent years, the WHO, FAO, and OIE have recognised the need to use a Multisectoral "One Health" approach in the fight against development and spread of AMR. This has translated into the tripartite collaboration, which provides mechanisms for coordination of efforts. In 2015 the WHO issued a GAP on AMR developed in close collaboration with its tripartite partners, OIE and FAO. The GAP recognised the need to address the challenge of AMR through a "One Health" approach. This approach emphasizes the interconnectedness of the health of humans, animals and ecosystems. Issues and solutions are viewed through the lens of Multisectoral collaboration between stakeholders in all sectors.

In May 2015, the World Health Assembly adopted resolution WHA68.7 and endorsed the GAP on AMR. In the same month, the 83rd General Session of the World Organisation for Animal Health (OIE) World Assembly of Delegates adopted a resolution "Combating Antimicrobial Resistance and Promoting the Prudent Use of Antimicrobial Agents in Animals" in support of the GAP. In June 2015, the 39th Session of the governing conference of FAO adopted a resolution outlining the role of the Food and Agriculture Organization of the United Nations (FAO) and its partners and calling for increased political awareness, engagement, leadership and urgent action at the national and international level, including all sectors of government and society. In September 2016, the UN president convened a meeting of member states and other organisations to discuss the issue of AMR. The 71st UN General Assembly adopted a political declaration which called for a collaborative global response to the threat of AMR (UN General Assembly , 2016).

Following the AMR global resolutions, the WHO Global Antimicrobial Surveillance System

(GLASS) has been rolled out to member states, and Zambia has enrolled and participated in an introductory meeting and training on the use of the IT platform. The OIE initiated in 2015 an annual data collection activity on antimicrobial use in member states, which will form a global database to be incorporated in World Animal Health Information System (WAHIS) (OIE, 2016a). Zambia has participated in this activity and submitted data in 2015 and 2016 and a global report has been published (OIE, 2016b). FAO has developed a tool aimed at assessing the national AMR surveillance system, including the laboratory AMR capacities (ATLASS), and Zambia participated in the first training for the use of this tool to give feedback on it finalisation in 2017. FAO has also instituted a regional project which includes Africa and Asia targeting specific countries to enhance their capacities in addressing AMR, and Zambia is one of the participants.

Regional Perspective on AMR Interventions

The regional offices in Africa for FAO, OIE, and WHO have convened meetings for AMR National Focal Points (NFPs) to discuss the issues related to AMR. Support has also been provided to member states to facilitate the conduction of National Situation Analysis on AMR and the development of NAPs. The AU and sub-regional bodies such as SADC have also initiated activities towards addressing the issue of AMR.

National Perspective on AMR Interventions

As a follow up to the regional meetings on AMR, the national teams initiated meetings to form a Multisectoral working group to spearhead implementation of specific AMR intervention based on the "One Health" approach in Zambia. The working group is composed of representatives from key stakeholder ministries and agencies, with the Ministry of Health being the chair and Ministry of Fisheries and Livestock being the co-chair. The working group has been responsible for conducting a country situation analysis on AMR and development of the NAP.

AIMS AND OBJECTIVES OF AMR NAP

Aim

The purpose of the Antimicrobial Resistance National Action Plan is to provide a coherent framework for combating AMR using the "One Health" approach encompassing human, animal, plant and environment in Zambia from 2017 to 2027.

Objectives

1. To improve awareness and understanding of AMR through good governance, effective communication, education and training.
2. To strengthen knowledge evidence base through surveillance and research
3. To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures, and biosecurity.
4. To optimise the use of antimicrobial medicines in human, animal, and plant health.
5. To develop the economic case for sustainable investment that takes account of the national needs and to increase investment in new medicines, diagnostic tools, vaccines, and other interventions.

SITUATIONAL ANALYSES AND ASSESSMENT

Introduction

In Zambia, there is information on AMR dating as far back as the 1960s which was derived from published and unpublished data from program specific research, clinical activities, and academic institutions. From the late 1970s onwards, there are publications providing data on AMR. However, there has been no multisectoral systematic way of capturing, documenting, sharing and use of AMR information. To this effect, the true extent of the problem has not been established. Although currently there is no national policy specific to AMR, there are policies, legislation, standard guidelines on use of antimicrobials, international agreements and standards relating to the use of antimicrobials and control of AMR in Zambia (see annex 1).

In view of the above a situation analysis was conducted by the multisectoral working group to determine the prevailing circumstances in the country, in relation to AMR. The findings of the study are contained in a detailed report "Antimicrobial Resistance Country Situation Analysis Report, 2017" and summaries presented below.

Current AMR-related activities:

In the human health sector, there are national programme specific AMR activities for TB, Malaria and HIV. Additionally, data on antimicrobial susceptibility are collected through routine laboratory testing at the Lusaka UTH for epidemic prone bacterial pathogens such as *Salmonella Typhi*, *Shigella species*, *Neisseria meningitides, Vibrio Cholerae,* Methicillin Resistant *Staphylococcus aureus* (MRSA), Extended Spectrum Beta-Lactamase (ESBL) producing enterobacteriaceae, and Vancomycin Resistant Enterococci (VRE). There is a Paediatric Bacterial Meningitis surveillance program at Lusaka UTH which has so far detected penicillin-resistant *Streptococcus pneumoniae.* Zambia has enrolled into GLASS which provides a platform for sharing data.

In the animal health sector, there are no national programmes aimed at combating AMR. However, there is a national Veterinary Drug Residue Monitoring (VDRM) plan, which is yet to be fully implemented. Under this plan, a pilot surveillance of VDR in milk is being

conducted in Central and Lusaka Provinces, focusing on penicillins, sulphonamides and tetracyclines. There are Veterinary Drug Residues (VDR) surveillance activities being conducted at the CVRI in beef, pork, and poultry from the major meat processing plants in Lusaka. There is also a surveillance of Veterinary Drug Residue Monitoring (VDRM) in milk funded by FAO. Additionally, data on antimicrobial susceptibility are collected through routine laboratory testing at the School of Veterinary Medicines of the University of Zambia.

ZAMRA registers and regulates all medicines and allied substances for human and veterinary use in Zambia. It conducts routine post-marketing surveillance (PMS), pharmacovigilance and quality control testing activities on selected registered medicines, including antimicrobials. It also licenses facilities for manufacture, wholesale, storage and distribution of medicines and allied substances. In addition, it conducts enforcement activities to curb illegal distribution of registered and unregistered medicines. However, there are no AMR specific regulatory activities being conducted. ZAMRA, in collaboration with relevant professional bodies, enforces provisions related to dispensing of prescription only medicines, though with limitations.

The national CODEX committee is in place with members drawn from relevant areas, with the mandate to coordinate the review and formulation of standards for foods and food safety; however, no such standards which have an impact on AMR have been domesticated or implemented yet.

Capacity and structures to conduct surveillance of antimicrobial resistance:

In the human health sector, laboratories which are expected to conduct antimicrobial susceptibility testing (AST) are available in all hospitals. For most laboratories, the capacity of staff to reliably isolate, identify, and conduct AST is poor due to lack of training in aspects of AST. Availability of reagents, SOPs and specialised equipment required to conduct AST is inadequate and varies by level of the facility. Of the facilities assessed, only two of the Level III hospitals (UTH and Arthur Davison Children's Hospital (ADH)), and the national reference laboratories (TDRC and CDL) are able to conduct AST reliably. Moreover, the UTH has been using the WHONET software for collection, analysis, and sharing of AST data.

In the animal health sector, there is in place under the DVS a National Laboratory at the CVRI, six (6) Regional Laboratories in selected provinces, and laboratories at district level. Although CVRI has capacity to screen for VDR, the capacities (human and material resources) to isolate, identify, and conduct AST at all levels needs strengthening. There is capacity for phenotypic and genotypic characterisation of bacteria, fungi and viruses at UNZA School of Veterinary Medicine.

Perceptions and behaviour related to known drivers of AMR:

Perceptions on known drivers

Of the surveyed clinicians in the human health sector, 84% agreed that they had managed cases of treatment failure related to AMR. One of the reasons for them to prescribe antimicrobials was that clients were expected clinicians to prescribe antimicrobials at each consultation (63.9%). 85% of the surveyed clinicians agreed that they can reduce rate of prescribing antimicrobials by 25% without jeopardizing the treatment outcome. 58% of the clinicians perceived that their clients would change medical personnel if they antimicrobials were not prescribed for them.

Among surveyed pharmacy practitioners, it was found that the main reasons for dispensing antimicrobials without a prescription was to assist the patients who cannot afford a doctor's visit even though a few indicated to make money or retain the customer.

In animal health, 64% the understanding of AMR was derived through reporting cases of suspected treatment failure. The main drivers of AMR were: farmers treating their animals without consulting experts (66%), sharing medication with other farmers (60%), poor adherence to treatment guidelines (71%), and under dosing of prescribed antimicrobials (55%). The requirement for a diagnostic test before making a decision on the choice of antibiotic was supported by 64% of the respondents.

Knowledge on AMR

In the human health sector, antimicrobial resistance was known to 95% of the respondents while 5% had no idea. And 75% of the clinicians agreed that a diagnostic test is necessary in decision making regarding the choice of an antibiotic. 99% of the surveyed clinicians knew the risks involved with misuse or overuse of antibiotics.

In veterinary practice, all the respondents were actively involved in the practice and 95% of them knew what AMR is, while the 5% who did not know and were not trained in any veterinary skills but in extension and aquaculture services. The concept of AMR was known to 74% of the surveyed community members with 64% being able to correctly define what AMR is. Radio and person to person were the mostly used platforms for AMR information accounting for 54% and 71 %, respectively. Television and print media platforms were the least used platform as sources of information on AMR (> 40%). 34% of the community respondents claimed to understand animal withdrawal period, with 70% of those who claimed to know withdraw being able to correctly interpret it.

In plant health sector, 72% of the respondents knew what antimicrobials are and of these 78% correctly defining what antimicrobials are. However, only 30% were familiar with the concept AMR, of which only 64% provided a correct definition of AMR. The main source of the information on AMR was from person to person communication (64%).

Among the pharmaceutical practitioners, 94% understood what antimicrobials are and 90% of the respondents agreed that AMR is a problem in Zambia. 89% of the respondents agreed that they counsel clients on whether the antibiotic is necessary in some infections. Of the surveyed pharmacists, 33% agreed that they sometimes dispense antimicrobials for financial benefit.

The community users of laboratory services were interviewed and it was found that 63% knew what an antibiotic is, with 73% giving a correct definition of an antibiotic. Regarding AMR, only 41% had heard of AMR from various media platforms.

Practices and usage of Antimicrobials

More than one antibiotic is prescribed by 60% of the clinicians and 78% had reported case treatment failure. The most common infections for which more than one antimicrobial is prescribed are; Urinary tract disease, pelvic inflammatory disease and pneumonia. The most common way that clinicians used to choose antimicrobials was found to be standard treatment guidelines, consultation from colleagues and laboratory results. The most commonly prescribed antibiotics were amoxicillin, penicillin,

cephalexin, ciprofloxacin, erythromycin, Cotrimoxazole and metronidazole. At a tertiary hospital, 53% of the drugs prescribed are antibiotics.

Pharmacy personnel, Antibiotic dispensation without a prescription was rejected (77%) and 94% agreed to dispensing using knowledge. Injectable antimicrobials are dispensed by 69% of the respondents with 76% dispensing more than one antibiotic. Some pharmacists recommend on symptoms such as urinary discomfort (75%), skin infection (72%), vaginal/penile discomfort (63%) and dental sores (58.5%).

In animal health, 60% of the veterinarians agreed to give antibiotics to farmers as they were expected to prescribe antibiotics while 28% prescribed antibiotics for fear of losing their clients. Antibiotic prescription was observed in all respondents with 54% prescribing more than one antibiotic. Antibiotics were prescribed in many viral infections such as Newcastle disease, parvo virus and lumpy skin, and blood parasitic infections such as East coast fever. Antibiotics are chosen according to laboratory results (67%), consultations (85%) and standard treatment guidelines (95%). Other factors in antibiotic choice are clinical signs, client's explanation, physical examination, previous experience, post-mortem findings and knowledge from attended seminars. The most used antibiotic in all cases was penicillin and tetracycline.

Treating plant diseases without consulting a specialist ranked as a leading cause of resistance followed by poor adherence to treatment instructions and continuous use of the same agro-chemicals to teat plant diseases. The motivation of farmers to use chemicals is that it improves profits, produce, cures disease and lack of awareness to other treatment methods. Visiting specialists or an agriculture officer was a shire waste of time. The level of prescribing antibiotics by themselves was found to be 43%, with some respondents agreeing to finishing treatment as advised.

The availability of alternatives to antimicrobials:

A number of alternatives to use of antimicrobials exist which include vaccines for diseases such as yellow fever, cholera, typhoid, rabies, etc. Under the Expanded Programme for Immunisation (EPI), scheduled vaccinations are undertaken against several pathogens including Polio, Streptococcus pneumoniae, Haemophilus influenza,

Hepatitis B, Measles, Rubella, Pertussis, and TB in human health. Therefore, strengthening the EPI would be one way of reducing the risk of AMR in the country.

In animal health, vaccines against a good number of livestock diseases (Brucellosis, Rabies, Anthrax, East Coast Fever, Gumboro, New castle disease, Foot and mouth disease, etc.) are available. Comprehensive implementation of herd health programmes such as regular vaccination, good veterinary and animal husbandry practices and application of sanitary and bio-security measures to minimise use of antimicrobials among livestock farmers is promoted. Similarly, improving vaccination coverage against most of the listed diseases would reduce the risk of AMR in Zambia.

In the crop and horticultural production, several innovations such as crop rotation, conversation farming, selection / breeding, and genetic engineering are used to limit dependence of antimicrobials.

Current capacity to regulate and enforce regulations on antimicrobial use.

Regulatory bodies such as ZAMRA, Veterinary Council of Zambia (VCZ), Health Professionals Council of Zambia (HPCZ), General Nursing Council (GNC) and Zambia Environmental Management Agency (ZEMA) are in place. Other bodies such as the DVS coordinate laboratory networks that would play a role in enforcing surveillance and monitoring the use of antimicrobials in animals.

Policies and legislation on antimicrobial use

Zambia currently does not have specific legislation addressing AMR, but has several Acts of Parliament, Policies, and is signatory to various international agreements and standards that have a bearing on antimicrobial use. These are enumerated in annex 1.

COUNTRY RESPONSE

STAKEHOLDER IDENTIFICATION

A team of experts from various government ministries, regulatory bodies, Cooperating Partners, NGOs, Academia, and other institutions convened an initial AMR NAP development meeting in May 2016. During that meeting a stakeholder mapping process was undertaken to identify all players for inclusion/engagement in the development of AMR NAP in Zambia. Stakeholders listed below were identified:

Sector	**Stakeholders**
WILDLIFE	World-Wide Fund for Nature (WWF)
	Department of Wild Life Services
ANIMAL HEALTH	Veterinary Services:
	• Central Veterinary Research Institute (CVRI)
	• Ministry of Livestock and Fisheries - Public Health Unit
	• Ministry of Livestock and Fisheries - Disease Control Unit
	• National Livestock Epidemiology Information Centre (NALEIC)
	Livestock Production
	Department of Policy and Planning
	Private sector
	Poultry Association of Zambia
HUMAN HEALTH	Ministry of Health
	Ministry of Local Government
	Pharmaceutical Business Forum (Retailers, Wholesalers And Manufacturers)
	Traditional Healers' Associations
	Health Professions bodies (Health Professions Council of Zambia, General Nursing Council of Zambia)
	Private Practitioners Association of Zambia
	Private Laboratory services
PLANT HEALTH	Ministry Of Agriculture
	• Extension services
	• Zambia Agriculture Research Institute

	Zambia National Farmers Union
	Retailers, Wholesalers and Manufacturers (Agro-Chemical Traders, etc.)
ENVIRONMENT	Ministry of Water development, Sanitation and Environmental Protection
	Zambia Environmental Management Agency
	Zambia National Tourism Board
DEFENCE	Ministry of Defence
REGULATORY / ENFORCEMENT AGENCIES	Zambia Medicines Regulatory Authority
	Zambia Environmental Management Agency
	Consumer and Competition Protection Commission
	Home Affairs
	• Immigration
	• Police
	National Biosafety Authority
	National Health Research Authority
	Zambia Bureau of Standards
ACADEMIA	Public Universities and Colleges
	• UNZA
	- School of Medicine
	- School of Veterinary Medicine
	- School of Agriculture
	- School of Natural Sciences
	• Copperbelt University, School of Medicine
	• Private Universities and Colleges
	Ministry of Education
	• Primary Education
	• Secondary Education
PROFESSIONAL ORGANISATIONS	Health Professions Council of Zambia
	Veterinary Council of Zambia
	General Nursing Council of Zambia
	Agriculture Institute of Zambia
	Veterinary Association of Zambia

	Zambia Medical association
	Biomedical Society of Zambia
	Pharmacy Association of Zambia
INFORMATION, EDUCATION AND COMMUNICATION	Ministry Of Information
	Media
	Zambia Information Communication Technology Authority
	Zambia National Broadcasting Corporation
	Private Print and Electronic Media organizations
	Ministry of education
	Ministry of Community Development and Social Welfare
COOPERATING PARTNERS	UNDP
	WHO
	CDC
	DFID
	FAO
	OIE
	WORLD BANK
	IFAD
	EU
	SADC
	AU-IBAR
	USAID
	COMESA
	UNICEF
	ADB
	DBZ
	ECSA-HC
CIVIL SOCIETY AND NON-GOVERNMENTAL ORGANISATIONS	NGOS (NZP+, NGOCC, CHAZ, Chemonics, CIDRZ, ZAMBART, ICAP)
	Church Mother Bodies
	Traditional Healers Associations
	Cross Boarder Traders association of Zambia

RESEARCH INSTITUTES	National Institute for Scientific And Industrial Research (NISIR)
	Central Veterinary Research Institute (CVRI)
	Zambia Agricultural Research Institute (ZARI)
	Tropical Diseases Research Center (TDRC)
	Golden Valley Agricultural Research Trust (GART)
COMMERCE AND TRADE	Zambia Revenue Authority (ZRA)
	COMESA
	SADC
	AU
COMMUNITY	

GOVERNANCE AND LEADERSHIP

Zambia's AMR governance mechanism is based on the One Health approach, and comprises of the National Multisectoral Steering Committee, a Coordinating Committee, and Technical Working Groups focused on the five strategic areas.

National Multisectoral Steering Committee (NMSC)

Purpose

The purpose of the NMSC is to guide oversee, and monitor AMR-related activities in all sectors to ensure a systematic and comprehensive implementation.

Scope

The NMSC is the highest policy and governance body responsible for all activities related to AMR in Zambia.

Roles and responsibilities

Leadership

The Permanent Secretary for the Ministry of Health shall be the Chairperson, and the Ministry of Fisheries and Livestock as co-chairperson. The Ministry of Health shall

provide overall coordination for the NMSC. The NMSC shall be responsible for ensuring that the AMR activities consistently address all five strategic objectives of the global action plan. The Director Zambia National Public Health Institute (ZNPHI) shall be secretariat to the NMSC.

Information sharing

The NMSC shall provide a structure for information-sharing to mutually reinforce activities among sectors.

Facilitation and Guidance

The NMSC shall facilitate and guide all stakeholders' efforts to contain and reduce the threat of AMR at district, provincial, national and supranational levels.

Internal and External interactions

Collaboration with internal and external agencies or organizations is essential for successful implementation of AMR programmes. The NMSC shall therefore collaborate closely with WHO, OIE, FAO and other stakeholders in identifying and facilitating relations with both internal and external partners.

Membership

The NMSC shall be composed of members representing the relevant sectors, notably human health, animal health, plant health and environment sectors. The NMSC shall be composed of ten members as follows:

1. Ministry of Finance
2. Ministry of Health Permanent Secretary _ Chairperson
3. ZNPHI Director _ Secretariat
4. Ministry of Fisheries and Livestock – Co-chairperson
5. Ministry of Agriculture
6. Ministry of Water development, Sanitation and Environmental Protection
7. FAO
8. OIE
9. WHO
10. CDC

Where need arises, the NMSC shall co-opt representation from any relevant agency.

Meetings

The NMSC shall meet at least twice a year. The meeting shall be called to order following formation of a quorum of at least five permanent members.

Antimicrobial Resistance Coordinating Committee (AMRCC)

Purpose

The purpose of the Antimicrobial Resistance Coordinating Committee (AMRCC) is to co-ordinate and implement AMR related activities in Zambia.

Scope

The AMRCC shall be answerable to the NMSC and be responsible for developing and implementing country specific strategies, programmes and activities across the five thematic areas as outlined in the Global Action Plan. It shall be supported by a secretariat that shall be responsible for the day to day management of the activities of the AMRCC.

Roles and responsibilities

Leadership

The AMRCC shall spearhead the implementation of this National Action Plan and coordinate a national response to the threat of AMR. The AMRCC shall be chaired by the Director – Zambia National Public Health Institute (ZNPHI) in the Ministry of Health.

Data and Information sharing

The AMRCC shall be responsible for efficient and effective multi-modal data and information sharing, vertically and horizontally. The AMRCC shall also be responsible for developing Standard Operating Procedures (SOPs) for data and information sharing.

Facilitation and coordination

The AMRCC shall facilitate and coordinate the implementation of activities to contain and reduce the threat of AMR at district, provincial and national levels. The AMRCC shall build a collaborative, cooperative, supportive environment for sharing knowledge, information and experience.

External interactions

The AMRCC shall, where appropriate, collaborate with external agencies and organizations in the implementation of AMR activities essential for Zambia.

Internal interactions

The AMRCC shall initiate interaction with the health system and public health and disease-specific programmes. The guiding principle of the AMRCC is to find the most appropriate ways to facilitate and provide synergy with new or existing work so that the overall objectives of the programme are achieved. Furthermore, the AMRCC shall appropriately integrate and have clearly defined roles and responsibilities in existing health system, public health and disease-specific programmes, animal health, plant health and environmental initiatives.

Membership

The AMRCC shall be composed of Focal Points and Heads of Technical Working Groups (TWGs) representing the relevant sectors, notably human health, animal health, plant health and environment sectors. These shall include the following:

1. Ministry of Health – Director Public Health
2. Ministry of Fisheries and Livestock – Director Veterinary Services
3. Zambia National Public Health Institute (ZNPHI) – Director
4. National Focal Point and Coordinator
5. Ministry of Health Focal Point Person.
6. Ministry of Fisheries and Livestock Focal Point Person
7. Ministry of Agriculture Focal Point Person
8. Ministry of Water development, Sanitation and Environmental Protection Focal Point Person
9. Ministry of General Education Focal Point Person

10. Zambia Medicines Regulatory Authority (ZAMRA) Focal Point Person
11. Department of Wildlife Services Focal Point Person
12. Zambia Community Health Initiative (ZCHI) Focal Point Person
13. Churches Association of Zambia (CHAZ) Focal Point Person
14. OIE Focal Point Person
15. WHO Focal Point Person
16. CDC Focal Point Person
17. FAO Focal Point Person
18. Chairperson of Education and Awareness TWG
19. Chairperson of Research and Development TWG
20. Chairperson of Hygiene and Infection Prevention and Control (IPC) TWG
21. Chairperson of Surveillance and Research TWG
22. Chairperson of Antimicrobial use TWG

Where the Chairperson of the TWG is also a focal point person, the co-chair of that particular TWG shall be adopted member of the AMRCC. Where a person is Director for 2 institutions, their Deputy Director shall represent them for one of the institutions.

Meetings

The AMRCC shall meet quarterly. The meeting shall be convened at least once a quorum of two-third of the members is formed, provided the chairperson or assigned chairperson is present. All substantive members shall attend all meetings; otherwise the alternate shall attend in their stead. Any member who misses three (03) consecutive meetings without justifiable explanation shall be replaced. In this regard, a written request shall be made by the Permanent Secretary, Ministry of Health to the institution the member was expected to represent.

Secretariat for Antimicrobial Resistance Coordinating Committee (AMRCC)

Purpose

The purpose of the secretariat for the Anti-Microbial Resistance Coordinating Committee (AMRCC) is to provide secretarial support to the AMRCC.

Scope

The secretariat of the AMRCC shall be responsible for the preparation of AMRCC meetings, sourcing for funds for the activities, management of documentation, drafting of work-plans and budgets, and consolidation of meetings and inputs of the TWGs.

Roles and responsibilities

Leadership

The Director of the ZNPHI shall spearhead the secretariat of the AMRCC.

Data and Information sharing

The secretariat of the AMRCC shall be responsible for data and information sharing, within the AMRCC and with the TWG.

Membership

The AMRCC secretariat shall be composed of staff from ZNPHI and MFL. It is proposed that a person be appointed on full time basis to undertake the functions of the secretariat.

National Focal Point Person and Coordinator

The National Focal Point and Coordinator shall be the country's contact on all AMR related matters.

Purpose

The National Focal Point and Coordinator (NFPC) shall be designated to oversee and coordinate all multi-sectoral AMR activities in Zambia. The NFPC shall work closely with the Sector-specific National Focal Point Persons (SSFPs) to ensure timely implementation of both national and sector specific AMR activities.

Scope, roles and responsibilities

The National focal point and coordinator should:

- represent the country on all technical AMR related matters
- build sustained partnerships and work nationally and internationally on containment of AMR in Zambia;

- identify stakeholders and AMR drivers in Zambia;
- participate in the meetings of the AMRCC;
- lead and coordinate drafting of national action plans and participate in joint planning for containment of AMR;
- coordinate all AMR related research activities in Zambia
- facilitate and oversee implementation and M&E of the multi-sectoral AMR NAP
- ensure regular data collection and information sharing by instituting effective communication and coordination among all constituencies, sectors and disciplines;
- coordinate national and international activities for establishment of national AMR surveillance systems; and
- Report on the prevalence of and trends in AMR to the national surveillance system and the Global AMR Surveillance System (GLASS).

In view of the complexity of AMR, which requires a collaborative response, coupled with the importance of a comprehensive approach to addressing AMR at country level, the NFPC should have good communication skills, convening power, resources and strong managerial skills. The NFPC shall be the primary contact for all issues related to AMR in Zambia.

Sector-specific Focal Point Persons (SSFP)

Sector-specific focal point persons have been appointed from the following institutions/Organisations:

1. Ministry of Health
2. Ministry of Fisheries and Livestock
3. Ministry of Agriculture
4. Ministry of General Education
5. Zambia Environmental Management Agency
6. Zambia Medicines Regulatory Authority
7. Agency responsible for Zambia Wildlife.

8. WHO
9. CDC
10. FAO
11. OIE
12. ZCHI
13. CHAZ

Purpose

The Sector-Specific Focal Points (FPs) shall be designated to coordinate AMR activities and tasks in their respective sectors.

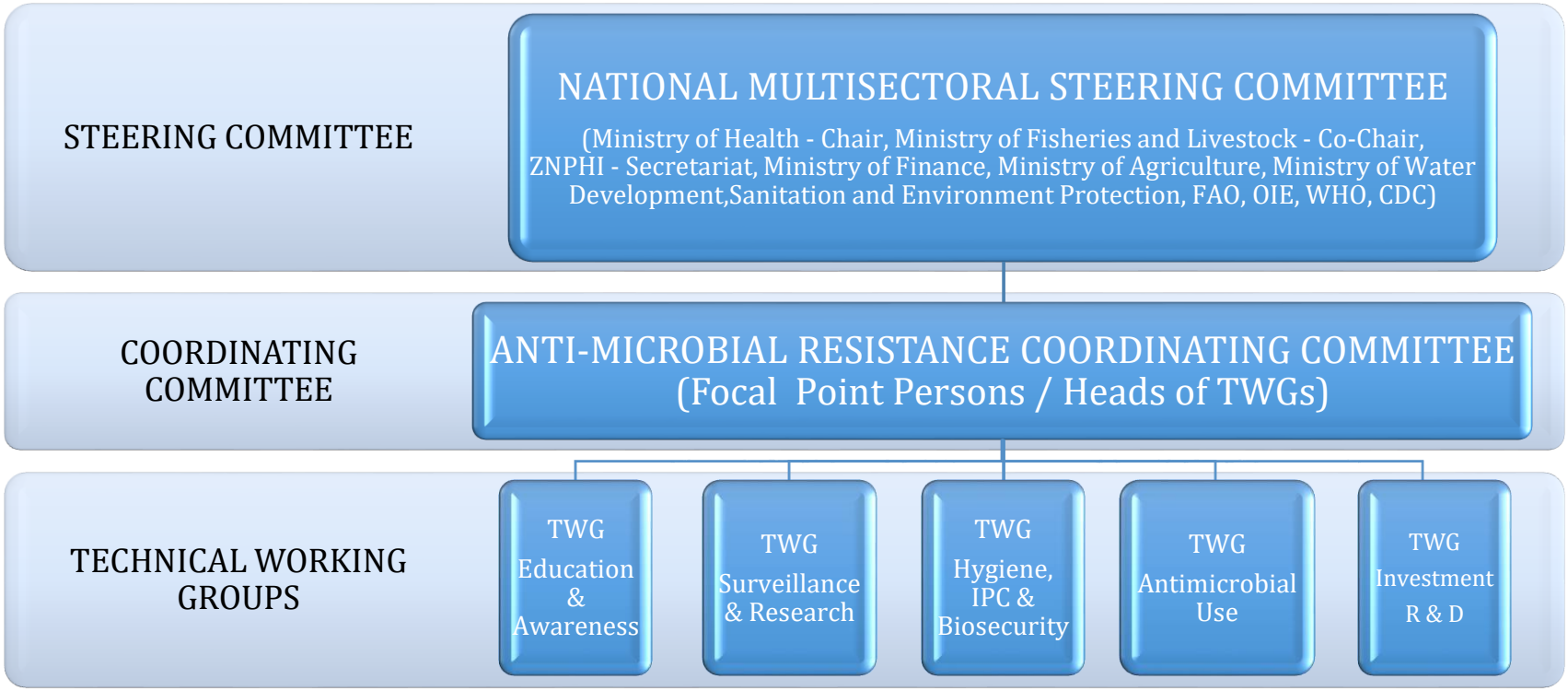
Scope, roles and responsibilities

The SSFP should:

- build sustained partnerships and work nationally and internationally on containment of AMR in their respective sector;
- identify stakeholders and AMR drivers in their respective sectors;
- participate in the meetings of the TWGs and AMRCC;
- lead and coordinate drafting of sector specific action plans and participate in joint planning for containment of AMR;
- facilitate and oversee implementation and M&E of the NAP in their specific sectors;
- ensure regular data collection and information sharing by instituting effective communication and coordination among all constituencies, sectors and disciplines;
- coordinate national and international activities for establishment of sector specific AMR surveillance systems; and
- Report on the prevalence of and trends in AMR to the national surveillance system and the Global AMR Surveillance System (GLASS).

In view of the complexity of AMR, which requires a collaborative response, coupled with the importance of a comprehensive approach to addressing AMR at country level, the focal point should have good communication skills, convening power, resources and strong managerial skills. The focal point shall be the primary contact for all issues related to AMR in their respective sector.

ORGANOGRAM FOR GOVERNANCE AND COORDINATION



STRATEGIC PLAN

STRATEGIC INTERVENTIONS	ACTIVITIES
Objective 1: To improve awareness and understanding of AMR through good governance, effective communication, education and training	
1.1. Establish an evidence-based public communications programme targeting audiences in human, animal, plant health, and environment practices	1.1.1. Estimate awareness and knowledge through behavioural studies in different professional groups and the general public. 1.1.2. Design communication programmes targeting different audiences in human, animal, plant and environment health practices, and the general public.
1.2. Promote the inclusion of AMR and related topics into the education curricula at all levels (general education, pre- and in-service)	1.2.1. Conduct assessment of various curricula to determine current extent of AMR inclusion 1.2.2. Advocate for the inclusion of AMR and related topics in various curricula at all levels in the formal education sector (primary, secondary, and tertiary)
1.3. Develop accredited continuing professional development (CPD) and in-service training programmes on AMR, including alternative learning methods	1.3.1. Engage professional bodies in various sectors 1.3.2. Develop an AMR CPD training strategies 1.3.3. Develop AMR CPD training materials 1.3.4. Make available and conduct CPD on AMR for in-service professionals 1.3.5. Conduct annual antimicrobial stewardship training programmes
1.4. Establish a trace-back system in livestock and foods of animal origin	1.4.1. Conduct community mobilization and capacity building 1.4.2. Include AMR and related topics in community based training programmes on human, animal and plant health

STRATEGIC INTERVENTIONS	ACTIVITIES
Objective 2: To strengthen knowledge and evidence-base through surveillance and research	
2.1. Establish a national coordination structure for surveillance of AMR	2.1.1. Integrate AMR surveillance into the national surveillance system (clinical and laboratory) for human, animal, plant, food, and environment 2.1.2. Interlink the sector-specific surveillance systems into the national and international AMR surveillance systems 2.1.3. Establish/integrate an early warning system for the public to report suspected AMR issues 2.1.4. Establish a surveillance system for zoonotic foodborne diseases
2.2. Establish a food safety surveillance system including AMR	2.2.1. Develop a traceability strategy for food safety surveillance 2.2.2. Conduct training on traceability of AMR in food production
2.3. Strengthen legal provisions to address AMR and related factors	2.3.1. Conduct regulatory impact assessment (RIA) of all relevant Zambian legal provisions on antimicrobials 2.3.2. Develop/strengthen antimicrobial policies and standard treatment guidelines for human, terrestrial and aquatic animals, plants, and environment
2.4. Designate national reference laboratories for AMR surveillance	2.4.1. Develop and approve terms of reference and MoUs for national reference laboratories 2.4.2. Identify and designate national reference laboratories with capacity to assay specific pathogens 2.4.3. Procurement of equipment and supplies for conducting AMR testing 2.4.4. Develop a biorepository facility
2.5. Establish an AMR laboratory network	2.5.1. Conduct a countrywide needs assessment for laboratories 2.5.2. Build capacity (human, material, and infrastructure) in network laboratories to conduct AMR activities 2.5.3. Establish a safe and appropriate specimen collection and transport system 2.5.4. Strengthen QMS in laboratories

STRATEGIC INTERVENTIONS	ACTIVITIES
2.6. Develop and implement a national AMR research plan	2.6.1. Prepare a national AMR research agenda 2.6.2. Engage the research community to implement the national AMR research agenda
Objective 3: To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures, and biosecurity.	
3.1. Establish a national coordinating structure for sanitary and phytosanitary measures; infection prevention and control, and biosecurity	3.1.1. Conduct situation analysis of sanitary and phytosanitary measures, infection prevention and control, and biosecurity 3.1.2. Develop/revise national guidelines and protocols as identified through the situation analysis 3.1.3. Advocate for the implementation of the national sanitation, infection prevention and control, hygiene, biosafety, and phytosanitary guidelines
3.2. Strengthen biosecurity and sanitary measures in animal/plant health	3.2.1. Strengthen livestock /plant census and national database 3.2.2. Mapping of livestock/plant populations and biosecurity points 3.2.3. Strengthen existing biosecurity checkpoints and barriers
Objective 4: To optimize the use of antimicrobial medicines in human, animal, and plant health	
4.1. Strengthen the pharmaceutical manufacturing and supply chain	4.1.1. Review and strengthen the existing quality management system for the supply of medicines, covering manufacturing, production, storage, transport, etc. 4.1.2. Strengthen the regulatory mechanisms (ZAMRA and Professional bodies) for access to antimicrobials in human, animal, and plant health 4.1.3. Develop / review guidelines for disposal of antimicrobials, animal, and plant waste

STRATEGIC INTERVENTIONS	ACTIVITIES
4.2. Establish/strengthen antimicrobial stewardship programmes in human, animal, and plant health practice	4.2.1. Develop terms of reference for sector-specific antimicrobial stewardship teams.
Objective 5: To develop the economic case for sustainable investment that takes account of the national needs and to increase investment in new medicines, diagnostic tools, vaccines, and other interventions.	
5.1. Measure the burden of AMR in various sector	5.1.1. Measure QALYs, DALYs, mortality rates, and costs associated with infectious diseases / hospitalization / treatment to establish the impact of AMR 5.1.2. Conduct periodic studies on efficacy of antimicrobials
5.2. Promote access to incentives for industry to invest in research and development of novel antimicrobials and therapeutics	5.2.1. Enhance awareness among industry players of existing incentives for research and development of novel antimicrobials and therapeutics
5.3. Promote national and international collaboration among industry, government, academia, and other institutions in the search for novel drugs, vaccines and diagnostic tools	5.3.1. Promote linkages among stakeholders to search for new drugs, vaccines and diagnostic tools
5.4. Establish database of potential research funding agencies with an interest in AMR	5.4.1. Map available sources of funding for research in AMR 5.4.2. Create database of available and potential research funding agencies with an interest in AMR 5.4.3. Create database of researchers and institutions interested in conducting AMR research

OPERATIONAL PLAN AND BUDGET

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Objective 1: To improve awareness and understanding of AMR through good governance, effective communication, education and training.								
Strategic intervention 1.1. Establish an evidence-based public communications programme targeting audiences in human, animal, plant and environment practices.								
Activity 1.1.1. Estimate awareness and knowledge through behavioural studies in different professional groups, and the general public.								
Sub-activity 1.1.1.1 Conduct baseline survey	Awareness survey	1	April 2019	Nationwide	AMRCC	100,000	GRZ/CPs	Baseline data on awareness
Sub-activity 1.1.1.2 Conduct mid-term survey(s)	Awareness survey	2	December2020 December 2024	Nationwide	AMRCC	400,000	GRZ/CPs	Post-intervention data on awareness
Sub-activity 1.1.1.3 Conduct post-intervention survey	Meeting	1	December 2027	Nationwide	AMRCC	100,000	GRZ/CPs	Post-intervention data on awareness
Activity 1.1.2. Design communications programmes targeting different audiences in human, animal, plant and environment health practices, and the general public.								
Sub-activity 1.1.2.1 Develop communication strategy based on Baseline Survey	Meeting	4	April – June 2018	Siavonga	TWG/AMRCC	150,000	GRZ/CPs	Communication plan developed
Sub-activity 1.1.2.2 Launch communication strategy	Launch	1	September2018	Lusaka	Steering Committee	15,000	GRZ	Launch done
Sub-activity 1.1.2.3 Develop sector specific Information, Education and Communication (IEC) materials	Workshop	2	September to December 2018	Lusaka	TWG – Education & Awareness	100,000	GRZ/CPs	IEC materials developed
Sub-activity 1.1.2.4 Pre-testing of IEC materials by type	Pre-test	1	December 2018	2 Provincial Sites (1 urban, 1 rural)	TWG – Education & Awareness	33,000	GRZ/CPs	Improved IEC materials
Sub-activity 1.1.2.5 Print IEC materials	IEC by type and sector	50,000 printed TV Radio Billboards	January 2019 to December 2027	Nationwide	AMRCC	400,000	GRZ/CPs	IEC disseminated

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Sub-activity 1.1.2.6. Conduct campaigns to disseminate and distribute IEC in various sectors	Campaign Session	8	Annually from November,2019	Nationwide	TWG – Hygiene, IPC, and Biosafety	400,000	GRZ/CPs	Report
Sub-activity 1.1.2.7 Develop a media award program on AMR awareness	Annual Award program	8	Annually from November 2019	Nationwide	AMRCC	100,000	GRZ/Business Houses	AMR Awards Ceremony held
Sub-activity 1.1.2.8 Commemorate AMR awareness week	AMR awareness week	Annually	November 2018	Nationwide	AMRCC/Line Ministries	10,000	Line Ministry budgets	AMR awareness conducted
Strategic intervention 1.2. Promote the inclusion of AMR and related topics into the education curricula at all levels (general education, pre- and in-service)								
Activity 1.2.1. Conduct assessment of various curricula to determine current extent of AMR inclusion.								
Sub-activity 1.2.1.1 Conduct desk review and KII survey	Desk review / KII survey	1	April 2018	Nationwide	AMRCC	100,000	GRZ/CPs	Baseline survey data on curricula
Activity 1.2.2. Advocating to the players at all level in the formal education sector for the inclusion of AMR and related topics in various curricula (primary, secondary and tertiary)								
Sub-activity 1.2.2.1 Conduct advocacy meetings with stakeholders for mainstreaming AMR and related issues in curricula	Meeting	8	June 2018	Lusaka	TWG –Education and awareness	20,000	CPs	Meeting held
Sub-activity 1.2.2.2 Develop curricula, manuals, and SOPs	Workshop	2	December 2020 December 2026	Lusaka	TWG – Hygiene, IPC, and Biosafety	40,000	GRZ/CPs	Manuals/ SOPs developed
Sub-activity 1.2.2.3. Print training materials	Training materials by type	1	April 2020	Lusaka	AMRCC	200,000	WHO/Other CPs	Printed training packages
Sub-activity 1.2.2.4. Distribute training materials	Distribution of materials	10	May to December 2020	Countrywide	AMRCC/Operational entities	10,000	GRZ	Training packages distributed
Sub-activity 1.2.2.5. Mainstream the curricula, manuals, and SOPs	Manuals/SOPs by sector	2	December 2020 December 2026	Nationwide	TWG – Hygiene, IPC, and Biosafety	100,000	GRZ/CPs	IPC materials disseminated
Strategic intervention 1.3. Develop accredited continuing professional development (CPD) and in-service training programmes, including alternative learning methods								

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Activity 1.3.1. Engage professional bodies in various sectors								
Sub-activity 1.3.1.1 Conduct KII	KII survey	1	December 2019	Nationwide	AMRCC	100,000	GRZ/CPs	Baseline survey data on curricula
Activity 1.3.2. Develop AMR CPD training strategies								
Sub-activity 1.3.2.1. Advocate for incorporating of AMR in sector CPDs	Meetings	4	January to March 2019	Lusaka	AMRCC/Line Ministries	10,000	GRZ/CPs	Advocacy conducted
Sub-activity 1.3.2.2. Launch CPD strategy	Launch	1	September2019	Lusaka	Steering Committee	15,000	GRZ	Launch done
Activity 1.3.3. Develop AMR CPD training materials								
Sub-activity 1.3.3.1 Develop the AMR CPD training materials	Meetings	12	January to March 2019	Lusaka	TWG – Education and awareness	30,000	GRZ/CPs	Approved CPD training manuals developed
Sub-activity 1.3.3.2 Print training materials	Publish	1	June 2019		TWG for CPDs	10000	GRZ/CPs	Copies of published training guidelines
Activity 1.3.4. Make available and Conduct CPD on AMR for in-service professionals								
Sub-activity 1.3.4.1 Distribute training materials	Meetings	1	Sept 2019		TWG	5000	GRZ/CPs	Minutes
Sub-activity 1.3.4.2 Conduct CPD trainings in various sectors	AMR CPD training report	4	April 2019	Lusaka	AMRCC	50,000	GRZ/CPs	Training of AMR CPD conducted
Activity 1.3.5 Conduct annual antimicrobial stewardship training programmes								
Sub-activity 1.3.5.1. Develop training materials for multidisciplinary antimicrobial stewardship committees.	Workshop	3	November 2018	Central Province(Kabwe)	TWG	150,000	GRZ/CPs	Training manuals developed training manuals printed
Sub-activity 1.3.5.2. Print training materials for multidisciplinary antimicrobial stewardship committees	Printing		March 2019 August 2019	Countrywide	``TWG	30,000	GRZ/CPs	Training Materials printed

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Sub-activity 1.3.5.3. Conduct multidisciplinary antimicrobial stewardship training	Training course	2	March 2019 September 2019	Lusaka	TWG	50,000	GRZ/CPs	Trainings conducted
Strategic Intervention 1.4. Establish a trace-back system in livestock and foods of animal origin								
Activity 1.4.1. Conduct community mobilisation and capacity building								
Sub-activity 1.4.1.1. Develop training package on traceability of AMRs	Workshop	2	Jan 2019	Countrywide	TWGs	20000	GRZ/CPs	Report
Sub-activity 1.4.1.2. Orient / sensitise smallholder farmers and NGOs on traceability of AMRs	Workshop	1	March 2019	Countrywide	TWGs	10000	GRZ/CPs	Report
Activity 1.4.2. Include AMR and related topics in community based training programmes on human, animal and plant health								
Sub-activity 1.4.2.1. Develop training packages for multi-sectorial community based trainings on AMR	Meetings	12	January 2019	Lusaka	TWG – Education and awareness	30,000	GRZ/CPs	Meeting held
Sub-activity 1.4.2.2. Print training materials	Printing	150	March 2019	Lusaka	TWG	20,000	GRZ/CPs	Training Materials Printed
Sub-activity 1.4.2.3. Distribute training materials	Distribution	10	July 2019	Countrywide	TWG	40,000	GRZ/CPs	Number of Materials Distributed
Sub-activity 1.4.2.4. Conduct TOTs in various sectors	Training of Trainers	4	August to Oct 2019	Livingstone	AMRCC	40,000	GRZ/CPs	TOT conducted
Sub-activity 1.4.2.5. Train sector program officers on AMR community based packages for inclusion into their routine plans	Training of program officers by sectors	4	Nov 2019	Kafue/Rufunsa	AMRCC/Line Ministries	50,000	GRZ/CPs	Training of program officers conducted
Sub-activity 1.4.2.6. Conduct community based trainings on AMR in specific sectors	Community trainings	Several	Dec 2019 onwards	Nationwide	AMRCC/Line Ministries	800,000	GRZ/CPs	Community trainings conducted

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Objective 2: To strengthen knowledge- and evidence-base through surveillance and research.								
Strategic intervention 2.1. Establish a national coordination structure for surveillance of AMR								
Activity 2.1.1. Integrate AMR surveillance in the national surveillance system (clinical and laboratory) for human, animal, plant, food, and environment								
Sub-activity 2.1.1.1. Assess existing clinical surveillance systems for AMR inclusion	Assessment	4	July 2018	Countrywide	TWG	80,0000	GRZ/CPs	Assessment conducted
Sub-activity 2.1.1.2. Assess existing laboratory surveillance systems for AMR inclusion	Assessment	2	July 2018	Countrywide	TWG	80,000	GRZ/CPs	Assessment Conducted
Sub-activity 2.1.1.3. Conduct consensus meeting to update and harmonise reporting systems for inclusion of AMR variables	Meeting	4	January 2019	Lusaka	TWG	40,000	GRZ/CPs	Meeting Held
Activity 2.1.2. Inter-link the sector specific surveillance systems into the national and international AMR surveillance systems								
Sub-activity 2.1.2.1. Hold meetings to interlink surveillance systems from various sectors	Meetings	6	Dec 2018	Lusaka	TWG	60,000	GRZ/CPs	Meeting Held
2.1.5. Activity 2.1.3. Establish/integrate an early warning system for the public to report suspected AMR issues								
Sub-activity 2.1.3.1. Establish electronic platform for community-based surveillance reporting	Meeting	8	Dec 2018	Lusaka	TWG	80,000	GRZ/CPs	Meeting Held
Activity 2.1.4.Establish a surveillance system for zoonotic foodborne diseases								
Sub-activity 2.1.4.1. Establish a surveillance system for zoonotic foodborne diseases	Workshop	1	Dec 2018	Kabwe	TWGs	20000	GRZ/CPs	Report
Strategic intervention 2.2. Establish a food safety surveillance system including AMR								
Activity 2.2.1. Develop traceability strategy for food safety surveillance.								

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Sub-activity 2.2.1.1. Develop a traceability strategy for foods of animal and plant origin	Meeting	1	April 2019	Lusaka	TWG	5000	GRZ/CPs	Report and committee in place
Sub-activity 2.2.1.2. Launch traceability strategy	Meeting	1	May 2019	Lusaka	TWG	20,000	GRZ/CPs	Meeting Held
Sub-activity 2.2.1.3. Develop traceability training materials and SOPs	Workshop	4	July 2019 to December 2019	Lusaka	TWG	75000	GRZ/CPs	Training manual developed SOPs developed…
Sub-activity 2.2.1.4. Print training materials and SOPs	Printing	500	December 2019	Lusaka	TWG	5000	GRZ/CPs	Training materials printed SOPs printed
Sub-activity 2.2.1.5. Distribute training materials and SOPs	Distribution	500	January 2020	Countrywide	TWG	50,000	GRZ/CPs	Training Materials Distributed
Activity 2.2.2. Conduct training on importance of traceability of AMR in food production								
Sub-activity 2.2.2.1 Training workshop on traceability on AMR in food production	Workshop	1	April 2020	Lusaka	TWG	10000	GRZ/CPs	Orientation workshop conducted
Sub-activity 2.2.2.2 Establish a traceability system for livestock diseases and foods of animal origin	Workshop	1	Sept 2020	Lusaka	TWG	20000	GRZ/CPs	Report
Strategic intervention 2.3 Strengthen legal provisions to address AMR and related factors								
Activity 2.3.1. Conduct regulatory impact assessment (RIA) of all the necessary Zambian legal provisions of antimicrobials								
Sub-activity 2.3.1.1 Conduct a regulatory impact analysis (RIA) of all the legal provisions on AMR	Workshop	1	April 2018	Lusaka	TWG	10,000	GRZ/CPs	RIA and workshop conducted and report developed
Sub-activity 2.3.1.2 Conduct a consultative meeting to develop necessary legislations on	Workshop	1	Sep 2018	Lusaka	TWG	10,000	GRZ/CPs	workshop conducted and report developed

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
AMR								
Sub-activity 2.3.1.3 Develop and enforce regulations for antimicrobials in food and feed	Workshop	2	December 2019	Livingstone	TWG	100,000	GRZ/CPs	Workshop Held
Activity 2.3.2. Develop/strengthen antimicrobial policies and standard treatment guidelines for human, terrestrial and aquatic animals, plant, and environment								
Sub-activity 2.3.2.1. Develop sector-specific treatment protocols / guidelines on antimicrobial use	Workshop	2	June 2018 Sept 2018	Livingstone	TWG on antimicrobial use	50,000	GRZ/CPs	Workshop held
Strategic intervention 2.4. Designate a national reference laboratories for AMR surveillance								
Activity 2.4.1. Develop and approve terms of reference and MoUs for a national reference laboratories								
Sub-activity 2.4.1.1 Develop terms of reference and MoUs for a national reference laboratory	Meeting	4	March 2018	Lusaka	TWG	100	GRZ/CPs	TORs developed
Activity 2.4.2. Identify and designate national reference laboratories with capacity to assay specific pathogens								
Sub-activity 2.4.2.1 Conduct assessment to identify and designate national reference laboratories with expertise in specific pathogens	Assessment	1	March 2018	Lusaka	TWG	150,000	GRZ/CPs	National reference lab on AMR designated
Activity 2.4.3. Procurement of equipment and supplies for conducting AMR testing								
Sub-activity 2.4.3.1 Procure laboratory supplies and equipment	Procurement	Annually	August 2019	Lusaka	TWG	3,000,000	GRZ/CPs	Laboratory supplies and equipment procured
Activity 2.4.4 .Develop a bio repository facility								
Sub-activity 2.4.4.1 Stakeholder consultative meeting on biorepository	Meeting	8 or 3	February 2019 to September 2019	Livingstone	ALL TWGs	160,000	GRZ/CPs	Meeting held

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Sub-activity 2.4.4.2 Establish bio repository facility	Biorepository	1	2025	Lusaka	NPHI	5,000,000	GRZ/CPs	Biorepository established
Strategic intervention 2.5. Establish an AMR laboratory network								
Activity 2.5.1. Conduct a countrywide needs assessment of laboratories								
Sub-activity 2.5.1.1 Develop TORs for network laboratories	Meeting	1	April 2018	Lusaka	TWG	20,000	GRZ/CPs	Meeting Held
Sub-activity 2.5.1.2 Conduct countrywide assessment of laboratories	Assessment	1	February 2018	Nationwide	TWG	40000	GRZ/CPs	Assessment done
Sub-activity 2.5.1.3 Identify and designate network laboratories	Field Visit	4	December 2017 March 2018	Nationwide	TWG	50,000	GRZ/CPs	Field Visits Conducted
Activity 2.5.2 Build capacity (human, material, and infrastructure) in network laboratories to conduct AMR activities								
Sub-activity 2.5.2.1 Procure equipment / supplies for network laboratories	Procurement	-	On-going	Lusaka	TWG	1,000,000	GRZ/CPs	Equipment and supplies procured
Sub-activity 2.5.2.2 Establish laboratory mentorship program	Steering Committee	6	July 2018	Lusaka	TWG	2000	GRZ/CPs	Steering Committee Meeting Held
Activity 2.5.3. Establish a safe and appropriate specimen collection and transport system								
Sub-activity 2.5.3.1 Identification and contracting of a courier company to ship specimen to the central laboratory	Contract / MoU	1	December 2018	Nationwide	TWG	100,000	GRZ/CPs	Contract(s) signed
Sub-activity 2.5.3.2 Procure specimen equipment and supplies	Procurement	-	On-going	Nationwide	TWG	1,000,000	GRZ/CPs	Specimen transport and equipment supplies procured
Activity 2.5.4. Strengthen QMS in laboratories								
Sub-activity 2.5.4.1 Conduct QMS mentorship visits to network laboratories	Mentorship Workshop	10	Biannual	Countrywide	TWG	30,000	GRZ/CPs	Mentorship Workshops conducted

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Strategic intervention 2.5. Develop and implement a national AMR research plan.								
Activity 2.6.1 Prepare a national AMR research agenda								
Sub-activity 2.5.1.1 Assess current gaps in knowledge and identify potential research topics.	Workshops Meetings	5	On-going	Lusaka	TWG	60,000	GRZ/CPs	Workshop held
Activity 2.6.2. Engage research institutions and researchers to implement the AMR national agenda								
Sub-activity 2.5.1.2 Hold meetings with research institutions and researchers	Meetings	10	On-going	Lusaka	TWG	10,000	GRZ/CPs	Meeting Held
Objective 3: To reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures, and biosecurity.								
Strategic intervention 3.1. Establish a national coordinating structure for sanitary and phytosanitary measures; infection prevention and control, and biosecurity.								
3.1.4. Activity 3.1.1. Conduct situation analysis of sanitary and phytosanitary measures, infection prevention and control, and biosecurity .								
Sub-activity 3.1.1.1. Perform sector-specific situation analyses	Surveys	1	Every 3 years	Nationwide	TWG	300,000	GRZ/CPs	Survey report
3.1.5. Activity 3.1.2 Develop/revise national guidelines and protocols as identified through the situation analysis								
Sub-activity 3.1.2.1. Develop/revise national guidelines and protocols	Meetings / Workshops	8	Every 3 years	Nationwide	TWG	20,000	GRZ/CPs	Revised guidelines / protocols
Activity 3.1.3. Advocate for the implementation of the national sanitation, infection prevention and control, hygiene, biosafety, and phytosanitary guidelines								
Sub-activity 3.1.3.1. Conduct an audit for infectious diseases of interest and for which vaccines are available	Meeting	1	July 2019	Lusaka	TWG	20,000	GRZ/CPs	Minutes
Sub-activity 3.1.3.2. Develop a policy for vaccine preventable diseases	Meeting	1	July 2019	Lusaka	TWG	20000	GRZ/CPs	Minutes
Sub-activity 3.1.3.3. Develop public	Meeting	1	July 2020	Lusaka	TWG	20000	GRZ/CPs	Minutes

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
awareness messages on vaccines								
Sub-activity 3.1.3.4. Conduct dissemination sessions for the community	Meeting	1	July 2019	Lusaka	TWG	20000	GRZ/CPs	Minutes
Strategic Intervention 3.2. Strengthen biosecurity and sanitary measures in animal and plant health								
3.2.4. Activity 3.2.1. Strengthen livestock /plant census and national database								
Sub-activity 3.2.1.1. Review / develop data collection tools for census	workshop	2	April 2018	Livingstone	TWGs	200000	GRZ/CPs	Report
Sub-activity 3.2.1.2. Pilot the draft tools	Field visits	10	March 2018	Countrywide	TWG	100000	GRZ/CPs	Reports
Sub-activity 3.2.1.3. Print the data collection tools	Publish	1	Jun 2018	Lusaka	TWG	5000	GRZ/CPs	Published documents
Sub-activity 3.2.1.4. Conduct training for the data collectors	Workshop	2	Aug 2018	Livingstone	TWG	20000	GRZ/CPs	Report
Sub-activity 3.2.1.5. Conduct census	Census	1	Dec 2018	Countrywide	TWGs	2,000,000	GRZ/CPs	Report
3.2.5. Activity 3.2.2. Mapping of livestock/plant populations and biosecurity points								
Sub-activity 3.2.2.1. Hold a sensitisation and consensus building meeting	Meeting	4	July 2018	Lusaka	TWG	50,000	GRZ/CPs	Minutes
Activity 3.2.3. Strengthen existing biosecurity checkpoints and barriers								
Sub-activity 3.2.3.1 Review and strengthen biosecurity check points / barriers	Field visits	10	July 2018	Countrywide	TWG	200,000	GRZ/CPs	Report
Objective 4: To optimise the use of antimicrobial medicines in human, animal, and plant health.								
Strategic intervention 4.1. Strengthen the pharmaceutical manufacturing and supply chain								
Activity 4.1.1. Review and strengthen the existing quality management system for the supply of medicines, covering manufacturing, production, storage, transport, etc.								

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Sub-activity 4.1.1.1. Review the major elements of the supply chain	Stakeholder meeting	2	March 2018 September 2018	Nationwide	TWG	30, 000	GRZ/CPs	Report
Sub-activity 4.1.1.2. Assess implementation of the existing QMS	Survey	1	June 2018	Nationwide	TWG	50,000	GRZ/CPs	Assessment report
Activity 4.1.2. Strengthen the regulatory mechanisms (ZAMRA and Professional bodies) for access to antimicrobials in human, animal, and plant health								
Sub-activity 4.1.2.1. Review the current regulatory mechanisms	Consultative meeting	2	March 2019 June 2019	Copperbelt (Ndola)	TWG	50,000	GRZ/CPs	regulatory mechanisms report
Activity 4.1.3. Develop / review guidelines for disposal of antimicrobials, animal, and plant waste								
Sub-activity 4.1.3.1. Develop / review the guidelines for disposal of antimicrobials	Meeting	2	March 2019	Lusaka	TWG on HCWM	50000	GRZ/CPs	Guidelines approved
Sub-activity 4.1.3.2. Print the guidelines	Publish	1	April 2019	Lusaka	TWG	5000	GRZ/CPs	Hard copies available
Sub-activity 4.1.3.3. Disseminate the guidelines	Meeting	10	July 2019	Countrywide	TWG	100000	GRZ/CPs	Reports
Strategic intervention 4.2. Establish/strengthen antimicrobial stewardship programmes in human, animal, and plant health practice								
4.2.2. Activity .4.2.1 Develop terms of reference for sector-specific antimicrobial stewardship teams.								
Sub-activity 4.2.1.1. Develop terms of reference for sector-specific antimicrobial stewardship teams	Workshops	3	November 2018	Lusaka	Ministry of health, national pharmacists' association	50,000	GRZ/CPs	Terms of reference developed
Sub-activity 4.2.1.2. Engage healthcare facility managements to mainstream antimicrobial stewardship committees	Meetings / workshops	10	Annually	Nationwide	TWG	200,000	GRZ/CPs	Functional antimicrobial stewardship committees
Objective 5: To develop the economic case for sustainable investment that takes account of the national needs and to increase investment in new medicines, diagnostic tools, vaccines, and other interventions.								
Strategic intervention 5.1. Measure the burden of AMR in various sector								
5.1.3. Activity 5.1.1. Measure QALYs, DALYs, mortality rates, and costs associated with infectious diseases / hospitalization / treatment to establish the impact of AMR								

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Sub-activity 5.1.1.1. Engage a consultant to collect data, analyse and report on the burden of AMR	Consultant	3	December 2019	Lusaka	AMRCC	200,000	GRZ/CPs	Burden of AMR report
Activity 5.1.2. Conduct periodic studies on efficacy of antimicrobials								
Sub-activity 5.1.2.1. Create framework for conducting periodic efficacy studies on antimicrobials.	Workshop	3	December2018 February 2019 April 2019	Lusaka	TWG	150,000	GRZ/CPs	Workshop held
Sub-activity 5.1.2.2. Conduct periodic efficacy studies on antimicrobials.	Study	2	August 2019 August 2020	Nationwide	TWG	1,000,000	CPs	Studies conducted
Strategic intervention 5.2. Promote access to incentives for industry to invest in research and development of new antimicrobials								
Activity 5.2.1. Enhance awareness among industry players of already existing incentives for research and development of new antimicrobials								
Sub-activity 5.2.1.1. Engage ZDA/CEEC/Ministry of Commerce on investment incentives	Meeting	5	June 2019	Lusaka	Steering committee	25,000	GRZ	Meetings held
Sub-activity 5.2.1.2. Conduct awareness activities	Meeting	5	November 2018	Lusaka	AMRCC	25,000	GRZ/CPs	Meeting held
Strategic intervention 5.3. Promote national and international collaboration among industry, government, academia, and other institutions in the search for novel drugs, vaccines and diagnostic tools								
Activity 5.3.1. Promote linkages among stakeholders to search for new drugs, vaccines and diagnostic tools.								
Sub-activity 5.3.1.1. Conduct sector consultative meetings	Meeting	4	May 2018	Lusaka	PS MOH	40,000	GRZ/CPs	Meetings held
Strategic intervention 5.4. Establish database of potential research funding agencies with an interest in AMR								
Activity 5.4.1. Map available sources of funding for research in AMR								
Sub-activity 5.4.1.1. Map available sources of funding for research in AMR	Map of funding resources	1	February 2018	Lusaka	AMRCC	5,000	GRZ	Mapping report

Sub-activity	Unit	Quantity	Date	Location	Responsible entity	Cost (USD)	Source of funding	Indicator
Activity 5.4.2. Create database of available and potential research funding agencies with an interest in AMR.								
Sub-activity 5.4.2.1. Creation of database of all available potential research funding agencies with an interest in AMR	Meeting	4	March 2018	Lusaka	TWG	20,000	GRZ	Database available
Activity 5.4.3. Create database of researchers and institutions interested in conducting AMR research								
Sub-activity 5.4.3.1. Create database of researchers and institutions interested in conducting AMR research	Meeting	4	April 2018	Lusaka	TWG	20,000	GRZ	Database available

MONITORING AND EVALUATION PLAN

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
1.1.1 Estimate awareness and knowledge through behavioural studies in different professional groups and the general public	Estimated proportion /level of awareness by target group	Assessment, baseline survey, M&E of outcome	Awareness scores stratified by target group (composite indicator)	Baseline, according to schedule	Baseline survey report	Survey	Measured in baseline survey
1.1.2 Design communication programmes targeting different audiences in human, animal, plant and environment health practices, and the general public.	Improved communication for different audiences.	M&E of input	Yes/No	Annually	TWG	Workshop	Baseline survey report
1.2.1. Conduct assessment of various curricula to determine current extent of AMR inclusion.	Level of AMR inclusion in various curricula assessed	M&E of input	Yes/No	Baseline, according to schedule	TWG	Assessment	Measured in assessment
1.2.2. Advocate for the inclusion of AMR and related topics in various curricula at all levels in the formal education sector (primary, secondary, and tertiary)	Inclusion of AMR and related topics in various curricula	M&E of input	Yes/No No. of curricula / No. of professional groups to target	N/A	TWG Ministry of education	Key informant	No curricula with AMR and related topics
1.3.1. Engage professional bodies in various sectors							
1.3.2. Develop an AMR CPD training strategies	Improved AMR CPD strategy	M&E of input	Presence or absence (Yes/No)	Once	AMR secretariat	Multi-sectoral Expert Worksop	Situational analysis, existing training and

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
							CPD programs
1.3.3. Develop AMR CPD training materials	Availability of the manuals	M&E of input	Presence or absence (Yes/No)	4 workshops	AMR secretariat	Multi-sectoral Expert Worksop	Existing manuals
1.3.4. Conduct CPD on AMR for in-service professionals	Improved knowledge on AMR for in-service professionals	M&E of input	Yes/No	Quarterly	Training reports	Trainings	Existing training programmes
1.3.5. Conduct annual antimicrobial stewardship training programmes	Improved knowledge and capacity of health personnel in AMR	M&E of input	Yes/No	Annually	Training reports	Trainings	No stewardship training programmes
1.4.1. Conduct community mobilization and capacity building	Improved knowledge and capacity of community members in AMR	M&E of input	Yes/No	Annually	Key informant at ministry fisheries and livestock	Key informant interviews	None
1.4.2. Include AMR and related topics in community based training programmes on human, animal and plant health	Current extent of AMR inclusion established	M&E of input	N/A	Once	AMR secretariat	Multi-sectoral Expert workshop	Existing training packages
2.1.1. Integrate AMR surveillance in the national surveillance system (clinical and laboratory) for human, animal, plant, food, and environment	Improved surveillance of AMR	M&E input	Yes/No	Monthly	NPHI	Base year	Existing systems
2.1.2. Inter-link the sector specific surveillance systems into the national and international AMR surveillance systems	Improved national and international surveillance of AMR	M&E input	Yes/No	Annually	Key informant at NPHI	Key informant	No link

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
2.1.3.Establish/integrate an early warning system for the public to report suspected AMR issues	Improved early warning system for the public to report suspected AMR issues	M&E of input	Yes/No	Annually	Key informant at ministry of health and Fisheries and Live stock	Key informant interview	None
2.1.4.Establish a surveillance system for zoonotic foodborne diseases	Improved surveillance of zoonotic foodborne diseases	M&E of input	Yes/No	Annually	Key informant at ministry of health and Fisheries and Live stock	Key informant interview	None
2.2.1. Develop a traceability strategy for food safety surveillance	Traceability strategy for livestock, foods of animal origin and human developed	M&E of input	Yes/No	Annually	Key informant at ministry of health and Fisheries and Live stock	Key informant interview	No traceability strategies
2.2.2. Conduct training on traceability of AMR in food production	Increased number of personnel trained in traceability	M&E of input	YES/No	Bi-annually	Reports	Inspection	None
2.3.1.Conduct regulatory impact assessment (RIA) of all relevant Zambian legal provisions on antimicrobials	Knowledge of all the necessary Zambian legal provisions	M&E of Input	Yes/No	Annually	Key informant at the Ministry of Health and Ministry of Livestock	Key informant interview	Existing regulatory mechanism
2.3.2.Develop/strengthen antimicrobial policies and standard treatment guidelines for human, terrestrial and aquatic animals, plants, and environment	Improved regulation of AMR for human, terrestrial and aquatic animals, plant, and environment	M&E of input	Yes/No	Annually	Key informant at ministry of agriculture	Key informant interview	No policies
2.4.1.Develop and approve terms of reference and MoUs for national reference laboratories	National reference laboratory terms of reference written and approved	M&E of input	Yes/No	Annually	Key informant at ministry of health	AMR surveillance programme implementation	No terms of reference for national reference

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
						report	laboratory
2.4.2.Identify and designate national reference laboratories with capacity to assay specific pathogens	Improved capacity to assay specific pathogens	M&E of input	Yes/No	Annually	Key informant at ministry of health	AMR surveillance programme implementation report	No terms of reference for national reference laboratory
2.4.3. Procurement of equipment and supplies for conducting AMR testing	Improved equipment and supplies for testing AMR	M&E of input	Yes/No	By June 2017	Inventory	Inspection	None
2.4.4.Develop a bio repository facility	Improved storage of AMR biological materials	M&E of input	Yes/No	By end of 2017	Physical bio bank	Inspection	None
2.5.1.Conduct a countrywide needs assessment for laboratories	Increased proportion of laboratories assessed	M&E of input	Yes/No	By end of 2017	Report	Inspection	None
2.5.2. Build capacity (human, material, and infrastructure) in network laboratories to conduct AMR activities	Improved capacity to conduct AMR activities	M&E of input	Yes/No	Annually	Report	Inspection	None
2.5.3. Establish a safe and appropriate specimen collection and transport system	Improved collection and transport of specimens	M&E of input	Yes/No	Bu June 2017	MoU	Inspection	None
2.5.4. Strengthen QMS in laboratories	Improved performance in laboratories	M&E of input	Yes/No	By end of 2018	Accreditation Certificate	Inspection	None
2.6.1. Prepare a national AMR research agenda	Research conducted in Priority areas for AMR	M&E of input	Yes/No	Annually	Key informant at ministry of health	Key informant interview	No research agenda

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
2.6.2. Engage the research community to implement the national AMR research agenda.	Research conducted in Priority areas for AMR	M & E of input	Yes/No	Annually	Key informant in the Ministry of health	Key informant interviews	Existing community
3.1.1. Conduct situation analysis of sanitary and phytosanitary measures, infection prevention and control, and biosecurity.	Knowledge on sanitation, infection prevention and control, hygiene, biosafety, and phytosanitary activities known	M & E of input	Yes/No	Annually	Key informant at ministry of health	Situation analysis Report	None
3.1.2.Develop/revise national guidelines and protocols as identified through the situation analysis	Increased knowledge on sanitation, infection prevention and control, hygiene, biosafety, and phytosanitary activities known	M & E of input	Yes/No	Annually	Key informant at ministry of health	Situation analysis Report	None
3.1.3. Advocate for the implementation by all players of the national sanitation, infection prevention and control, hygiene, biosafety, and phytosanitary guidelines.	Implemented the national sanitation, infection prevention and control, hygiene, biosafety, and phytosanitary guidelines	M&E of input	Yes/No No. of curricula / No. of community groups targeted	Annually	Key informant at ministry of fisheries and Livestock, Agriculture and Health	Key informant interview	No curricula with hygiene and infection prevention and control for community workers
3.2.1. Strengthen livestock /plant census and build national database capacity	Livestock census done	M&E of input	Yes/No	Annually	Key informant at ministry fisheries and livestock	Report	None
3.2.2. Mapping of livestock/plant populations and biosecurity points	Possible Biosecurity points mapped	M&E of input	Yes/No	Annually	Key informant at ministry fisheries and livestock	Report and physical inspection	None
3.2.3. Strengthen existing biosecurity checkpoints and barriers	Biosecurity checkpoints and barriers available and strengthened	M&E of input	Yes/No	Annually	Key informant at ministry fisheries and	Inspection	Measured by Baseline data

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
					livestock		
4.1.1. Review and strengthen the existing QMS for the supply of medicines, covering manufacturing/production, storage, transport, etc.	Quality management system established and introduced	M&E of input	Yes/No	Annually	Key informant at drug regulation agency	Key informant interview	No quality management system
4.1.2. Strengthen the regulatory mechanisms (ZAMRA and professional bodies) for access to antimicrobial medicines in human, animal, and plant health	Regulatory mechanisms for access to antimicrobial medicines in human and animal health strengthened	M&E of Input	Yes/No	Annually	Key informant at the Ministry of Health and Ministry of Livestock	Key informant interview	Existing regulatory mechanism
4.1.3.Develop / review guidelines for disposal of antimicrobials, animal, and plant waste	Availability of guidelines for proper disposal of antimicrobials of livestock and plant waste	M&E of input	Yes/No	Quarterly	TWG	Workshop	Situation analysis report
4.2.1. Develop terms of reference for sector-specific antimicrobial stewardship teams.	Terms of reference developed	M&E of input	Yes/No	Annually	Key informant at ministry of health	AMR surveillance programme implementation report	No terms of reference
5.1.1. Measure QALYs, DALYs, mortality rates, and costs associated with infectious diseases/hospitalisation/ treatment to establish the impact of AMR.	Estimate QALYs, DALYs, mortality rates, cost associated to infectious diseases/bed spaces/drugs/treatment)	M&E of input	Counts/Proportions	Annually	Baseline survey report, post-intervention survey reports	Passive data reviews Primary data	Measured in baseline survey

Planning Elements	Indicator	Type and Purpose	Value (Calculation)	Data Collection Frequency	Data Source	Method	Baseline
5.1.2. Conduct periodic studies on efficacy of antimicrobials	Increased evidence on efficacy	M&E of input	Count	Annually	Minutes and reports, Study protocols, Publications	Document reviews	None
5.2.1.Enhance awareness among industry players of existing incentives for research and development of novel antimicrobials and therapeutics	Increased level of awareness	Assessment survey	Yes/No	Every 3 years	Baseline survey report	Awareness survey	None
5.3.1. Promote linkages among stakeholders to search for new drugs, vaccines and diagnostic tools.	Improved linkages among various stakeholders	M&E of input	Yes/No	Quarterly	Players reports	Reviews	None
5.4.1.Map available sources of funding for research in AMR	Improved funding for research in AMR	M&E of input	Yes/No	Quarterly	Players reports	Reviews	None
5.4.2. Create database of all available and potential research funding agencies with an interest in AMR.	Improved funding for research in AMR	M&E of input	Yes/No	Once off/Baseline	Reports (Funding Agencies, Ministries	Reviews	None
5.4.3. Create database of researchers and institutions interested in conducting AMR research.	Increased proportion of researchers conducting research in AMR	M&E of input	Yes/No	Once off/Baseline	Reports (Funding Agencies, Ministries	Reviews	None

Monitoring and Evaluation Results Framework

Strategic Objectives	**Short term/proxy indicators for outcomes** (to report within 5 years)	**Outcome indicators** (to report within 10 years)
1. To Improve awareness and Understanding of AMR	**1.1:** Government-supported antimicrobial awareness campaign(s) undertaken, by various target group.	Awareness levels on AMR, understanding/ attitudes and behaviours by various target group.
	1.2: Country has a One Health AMR communications strategy in place.	1.2.1: Percentage of public awareness on the use of antimicrobial and causes of AMR.
		1.2.2: Percentage of actors (e.g. policy-makers, veterinarians, animal health workers, farmers, food processing workers) that have knowledge about AMR.
2. To Strengthen knowledge through Surveillance and Research	**2.1: A National** system for active feedback to prescribers on their prescribing trends.	**2.1.1.:** Regular reports on use of data in non-human/animal health sectors, e.g. plant production.
		2.1.2: Percentage of hospitals where AMR data is provided on regular basis to local prescribing hospital based physicians on regional or local level.
	2.2: Number of production sectors collecting data on veterinary/plant AM sales/use.	**2.2.1:** Number of sectors that have amended food production management practices to minimize development or transmission of AMR
	2.3: National reference laboratory for AMR surveillance in human health designated and participating in an external quality assurance scheme	**2.3.1:** National body in charge of national strategy to contain AMR receives information on AMR rates and progress of implementation of surveillance systems at least once per year and discusses implications for national strategy.

	2.4: National AMR surveillance programme organizes and runs external quality assurance for all laboratories participating in GLASS, for bacterial identification and antimicrobial susceptibility testing [GLASS indicator].	**2.4.1:** National review of existing legislation and developed a framework for revision of legislation to achieve effective system of regulation of manufacture, distribution, supply and administration of medical and non-medical AMs.
	2.5: National veterinary public health lab network with capacity to conduct standardized, repeatable, antimicrobial susceptibility testing for key isolates (veterinary/food borne pathogens and commensals) based on recognised international standards.	
	2.6: National system of surveillance for five key isolates from animals/plants/ environment implemented	
	2.7: National system for collecting non-human health AMR surveillance data including prevalence of ESBL commensal *E.coli* in healthy animals in 2 key food producing species.	
	2.8: Publish and report National AMR surveillance data.	
	2.9: National database for collection and reporting of resistance data on non-human-health isolates.	
	2.10: Availability of antimicrobial susceptibility tests in plant and animal health, e.g. tests available for specified pathogen and animal species for specific presentation and class of antimicrobial.	
3. To reduce the incidence of Infection	**3.1: Percentage** of health facilities with a functional built environment (including water and sanitation), and necessary materials and equipment to perform IPC, as per national standards.	**3.1.1:** Percentage of commercial farms that have implemented a biosecurity programme.

		3.1.2: Percentage of population using safely managed drinking water services
		3.1.3 Percentage of population using safely managed sanitation services, including a handwashing facility with soap and water
		3.1.4: Percentage of children with full immunisation coverage according to national immunization guidelines.
4. To Optimize the use of antimicrobial agents	**4.1:** National guidelines and regulations of prescription and sale of AMs for human use.	**4.1.1:** Percentage of prescriptions that are supported by a clinical diagnosis.
	4.2: Established National target for AM use per capita in human health.	**4.2.1:** Percentage of empirical prescribing of AM in line with guidelines or hospital prescribing policy.
	4.3: Established National targets for AM prescribing, with systems or incentives to encourage appropriate behaviours.	**4.3.1:** Established National Watch and Reserve for Am use compared to Access of AM ratio to sales.
		4.3.1: National prescribing guidelines updated to reflect local and epidemiological antimicrobial susceptibility data (for human and animal health).
5. To develop the economic case for sustainable Investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions	**5.1:** National estimates available of investment needs and funding gaps.	-
	5.2: Proportion of NAP activities and budget implemented.	-
	5.3: Commitments and expenditure on R&D for priority pathogens (new products, new drug combinations, diagnostics, vaccines, etc.).	-
	5.4: Level of funding raised for the Global Antibiotic Research and Development Facility.	-

REFERENCES

1. Aregheore E.M, 2009. FAO-Country Pasture/Forage Resource Profiles, Zambia.

2. APUA, 2014. Alliance for the prudent use of Antibiotic, 136 Harrison Avenue M&V Suite 811, Boston, MA, 211.

3. Auckland Kuteya, 2012. Analyzing Zambia's Agricultural Sector Budget, Presentation at the ACF/IAPRI Budget Meeting, Lusaka.

4. Chitah B.M. and Dick Johnsson D, 2015. Universal Health Coverage Assessment Zambia. Global Network for Health Equity (GNHE).

5. CSO 2010, 2011. Census of Population and Housing Preliminary Report.

6. CSO, 2015. Zambia Demographic and Health Survey 2013-14.

7. Central Intelligence Agency: Zambia, 2008. https://www.cia.gov/library/publications/the -world-factbook/geos/za.html, (accessed on 3rd of November 2008).

8. CAADP, 2013. Investment facilitation Programme -Zambia Agriculture Investment opportunities Brief.

9. Cheneau, 1985. The organization of veterinary Services in Africa.

10. Daka D. E, 2002. Livestock Sector in Zambia: Opportunities and limitations. In; Development and field evaluation of animal feed supplementation packages IAEA, Vienna 2002 IAEA-TECDOC. Proceedings of the final review meeting of an IAEA technical cooperation regional AFRA project organized by the joint FAO/IAEA Division of Nuclear technics in food and agriculture, Cairo, Egypt 25-29 November 2000 pp141-143.

11. Essack, S., Desta, A., Abotsi, R. & Agoba, E, 2016. Antimicrobial resistance in the WHO African region: current status and roadmap for action. Journal of Public Health, fdw015.

12. Foster S.D, 2011. Antibiotic Resistance Situation Analysis and Needs Assessment (ARSANA) in Uganda and Zambia.

13. Habeenzu, C., Mitarai, S., Lubasi, D., Mudenda, V., Kantenga, T., Mwansa, J. & Maslow, J, 2007. Tuberculosis and multidrug resistance in Zambian prisons, 2000–2001. The International Journal of Tuberculosis and Lung Disease, 11, 1216-1220.

14. http://emerald.tufts.edu/med/apua/research/gates_16_2730949707.pdf, and, http://emerald.tufts.edu/med/apua/research/gates.shtml, Accessed on 26/05/2016.

15. https://en.wikipedia.org/wiki/Economy_of_Zambia#cite_note-SADC-9 (accessed on 2May 2017)

16. http://www.who.int/mediacentre/factsheets/fs194/en/.(accessed on 2May 2017)

17. http://www.who.int/mediacentre/factsheets/fs194/en//. accessed on 2nd May 2017 at 10:12.

18. IFAD, 2014; Enhanced Smallholder Livestock Investment Programme, Final Design Report. Project Number 1650. East and Southern Africa Division, Programme Management Department.

19. Kapata, N., Chanda-Kapata, P., Bates, M., Mwaba, P., Cobelens, F., Grobusch, M. P. & Zumla, A. 2013. Multidrug-resistant TB in Zambia: review of national data from 2000 to 2011. Tropical Medicine & International Health, 18, 1386-1391.

20. Kohanski, M. A., Dwyer, D. J. & Collins, J. J. 2010. How antibiotics kill bacteria: from targets to networks. Nature Reviews Microbiology, 8, 423-435.

21. Knobler SL, Lemon SM, Najafi M, et al., editors. Washington (DC): National Academies Press (US); 2003. The Resistance Phenomenon in Microbes and Infectious Disease Vectors: Implications for Human Health and Strategies for Containment: Workshop Summary. Institute of Medicine (US) Forum on Emerging Infections

22. Ling, L. L., Schneider, T., Peoples, A. J., Spoering, A. L., Engels, I., Conlon, B. P., Mueller, A., Schäberle, T. F., Hughes, D. E. & Epstein, S. 2015. A new antibiotic kills pathogens without detectable resistance. Nature, 517, 455-459.

23. Lubungu M and Mofya-Mukuka R, 2012. IAPRA The Status of the Smallholder Livestock Sector in Zambia; Submitted to the Parliamentary Committee on Livestock. Technical Report 1.

24. Mainda, G., Bessell, P. B., Muma, J. B., Mcateer, S. P., Chase-Topping, M. E., Gibbons, J., Stevens, M. P., Gally, D. L. & Barend, M. 2015. Prevalence and patterns of antimicrobial resistance among Escherichia coli isolated from Zambian dairy cattle across different production systems. Scientific reports, 5.

25. Mendelson, M., Røttingen, J.-A., Gopinathan, U., Hamer, D. H., Wertheim, H., Basnyat, B., Butler, C., Tomson, G. & Balasegaram, M. 2016. Maximising access to achieve appropriate human antimicrobial use in low-income and middle-income countries. The Lancet, 387, 188-198.

26. Mshana, S. E., Matee, M. & Rweyemamu, M. 2013. Antimicrobial resistance in human and animal pathogens in Zambia, Democratic Republic of Congo, Mozambique and Tanzania: an urgent need of a sustainable surveillance system. Annals of clinical microbiology and antimicrobials, 12, 28.

27. Ministry of Health 2012: The 2012 List of Health Facilities in Zambia, preliminary report

28. Ministry of Health: Ministry of Health Payroll data 2008. 2008, Accessed on 3rd November 2008.

29. MAL – Ministry of Agriculture and Livestock, IAPRI- Indaba Agricultural Policy Research Institute, WORLD BANK, UNZA – University of Zambia and consultants from ALIVE and CIRAD (2012), "Livestock Sector in Zambia for Economic Growth and Poverty Reduction: An Analysis

30. Mary Lubungu and Rhoda Mofya-Mukuka, 2012. The status of the smallholder livestock sector in Zambia submitted to the parliamentary committee on agriculture, IAPRI, Technical Report 1

31. Matovu E, Seebeck T, Enyaru JC, Kaminsky R. Drug resistance in Trypanosoma brucei spp., the causative agents of sleeping sickness in man and nagana in cattle. Microbes and Infection. 2001 Jul 31;3(9):763-70.

32. O'neill, J. 2014. Antimicrobial resistance: tackling a crisis for the health and wealth of nations. Review on antimicrobial resistance.

33. OIE Resolution No. XXVIII (2007) list of antimicrobials of veterinary importance. Woolhouse, M., Ward, M., Van Bunnik, B. & Farrar, J. 2015. Antimicrobial resistance in humans, livestock and the wider environment. Philosophical Transactions of the Royal Society of London B: Biological Sciences, 370, 20140083.

34. OIE, 2016a, The OIE Strategy on Antimicrobial Resistance and the Prudent Use of Antimicrobials

35. OIE, 2016b OIE Annual report on the use of antimicrobial agents in animals: Better understanding of the global situation.

36. Public Health Agency of Canada, 2013. One Health – Inter-sectoral approach diagram. http://phac-aspc-gc.ca/owoh-umus/index-eng.php, accessed on 1st May 2017. Cover page diagram

37. SADC (2017) Situation analysis of pharmaceuticals in the SADC region

38. Sosa. A, Foster.s, Ochieng. D, Grimm. D, Mwenya. D. (2010). Resistant acute respiratory infections and diarrheal disease in Zambia: A situation and needs assessment. http://emerald.tufts.edu/med/apua/research/gates_2_1388265035.pdf, accessed on 26/05/2016

39. UNDP HDR, Human development report 2015, (Accessed 26th August, 2016); hdr.undp.org/sites/all/themes/hdr_theme/country/notes/zmb.pdf

40. UN General Assembly, 2016, Resolutions of the 71st session. www.un.org/en/ga/71/resolutions.shtml. Accessed on 4th May 2017 at 16:27.

41. World Bank WDI and Macro Poverty Outlook. Notes (a) Most recent values (2015) (b) Most recent WDI value (2014)

42. www.countrymeters.info/en/Zambia/, Accessed on 2nd May 2017 at 14:35.

43. World health organisation (2015): Worldwide country situation analysis; response to antimicrobial resistance.

44. World Health Organization 2014. Antimicrobial resistance: global report on surveillance, World Health Organization

45. World Health Organization 2001. WHO global strategy for containment of antimicrobial resistance.

LIST OF CONTRIBUTORS

The following persons made contributions to the development of this document:

1. Dr. Jabin Mulwanda: Permanent Secretary – Technical Services, MoH
2. Mr. John Moyo: Permanent Secretary – Administration, MoH
3. Dr. David Shamulenge: Permanent Secretary – MFL
4. Dr Peter Mwaba: Permanent Secretary (former) – MoH
5. Dr Elizabeth Chizema: Director – Disease Surveillance and Research (former), MoH
6. Dr. Yona Sinkala: Director – Veterinary Services, MFL
7. Dr. Victor Mukonka: Director – ZNPHI, MoH
8. Dr. Maximillian Bweupe: Director – Policy and Planning, MoH
9. Dr Kennedy Malama: Director - Health promotions, Environmental and social determinants (Former),MoH
10. Mr. Mulonda Mate: Deputy Director – Environmental and Occupational Health, MoH
11. Miss. Otridah Kapona: Laboratory Scientist – ZNPHI, MoH
12. Dr. Matthew N. Kabeta: Head of Public Health – DVS/MFL
13. Dr. Fusya Y. Goma: Acting Principal Epidemio-surveillance Officer, NALEIC – DVS/MFL
14. Dr. Geoffrey Mainda: Veterinary Officer – DVS/MFL
15. Dr. Chileshe Lukwesa-Musyani: Consultant Clinical Microbiologist, MoH
16. Dr. Emmanuel Kabali: Senior Quality Assurance Officer, ZAMRA
17. Mr. Mpanga Kasonde: Laboratory Scientist, ZNPHI, MoH
18. Mr. Wamunyima Lubinda: Senior Mental Health Officer, MoH
19. Mr. William Ngosa: Principal Biostatistician, ZNPHI, MoH
20. Mr. Shaderick Kayeye: FETP Coordinator – ZNPHI, MoH
21. Dr. Kunda G. Musonda: Head of Laboratory Systems and Networks – ZNPHI, MoH
22. Dr Costantine Malama: Public Health Specialist,CDC
23. Dr. Callistus Kayunga: Clinical Specialist – Communicable Diseases, MoH
24. Dr. James Mwansa: Consultant Microbiologist, MoH
25. Prof. Bernard Hangombe: Microbiologist, School of Veterinary Medicine, UNZA
26. Mr. Darlington Mwenya: Clinical Microbiologist, UNZA
27. Mrs. Florence Ngala: Chief Environmental Health Officer, MoH
28. Mrs. Albertina Moraes: Knowledge Translation Officer, MoH
29. Mrs. Vivian Mwale: Data Manager – ZNPHI, MoH
30. Mrs. Angela Gama Butale: Laboratory Scientist, MoH
31. Mrs. Namundi S. Nshimbi: Information Management Officer, MoH
32. Mrs. Grace M. Musonda: CDC CoAg Coordinator – MoH
33. Mr. John Mayeya: Senior Mental Health Officer, MoH
34. Dr. Kenn K. Msiska: ZARI
35. Ms. Martha Chooka: ZARI
36. Mr. Clement Phiri: Consultant, APHL
37. Mr. Carson Mubanga: ICAP
38. Mrs Evidence C Mataa: ZNPHI

ANNEX 1

ACTS OF PARLIAMENT

A. Public Health Act Cap 295; the Food and Drugs Act Cap 303
B. Medicines and allied substances Act No.3 of 2013
C. Biosafety Act No. 10 of 2007
D. Animal Health Act No. 27 of 2010
E. Medical and Allied Professions Act Cap 297
F. National Health Research Act; the Environmental Management Act
G. Veterinary and Veterinary Para-Professions act No. 45 of 2010
H. Control of Goods Act
I. Plant Pests and Disease Protection Act

POLICIES

A. National Health Policy
B. National Medicines Policy
C. National Agriculture Policy
D. National Drug Formulary
E. Standard Treatment Guidelines (Human)
F. HIV Guidelines
G. 2010 IPC Guidelines
H. National Health Care Waste Guidelines
I. Waste Management Guidelines.

INTERNATIONAL AGREEMENTS AND STANDARDS

A. Regional agreements for AMR interventions: SADC and COMESA (regional standards on AMR)
B. Global Action Plan on AMR
C. OIE membership
D. Codex Alimentarius standards,
E. IPPC convention
F. FAO membership
G. Global Health Security agenda
H. International Health Regulations (2005)
I. Basel Convention on Environmental Management
J. One Health promotion (UNZA in partnership with SACIDS)