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MINISTRY OF HEALTH-ETHIOPIA

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MINISTRY OF AGRICULTURE

FDRE ENVIRONMENT, FOREST & CLIMATE CHANGE COMMISSION
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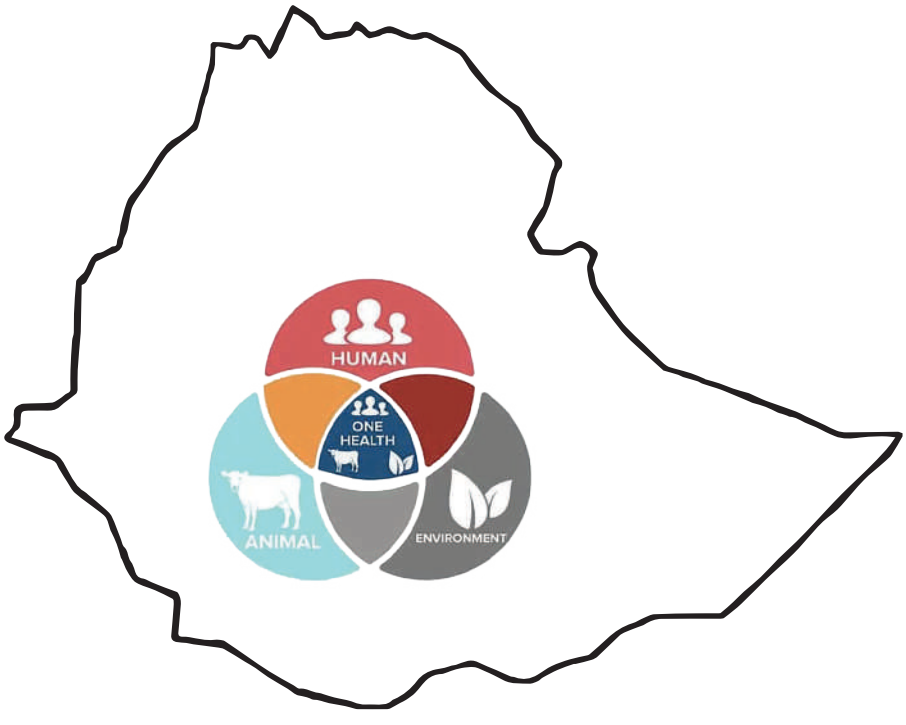
ETHIOPIA

ANTIMICROBIAL RESISTANCE PREVENTION AND CONTAINMENT STRATEGIC PLAN THE ONE HEALTH APPROACH

2021–2025
Third edition



May 2021
Addis Ababa, Ethiopia

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E T H I O P I A

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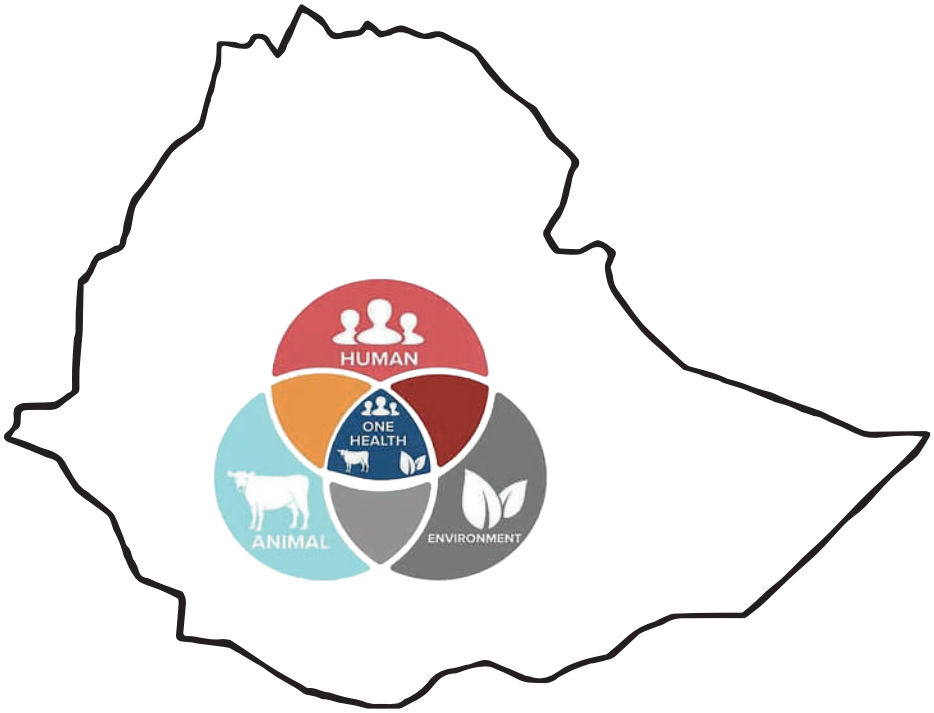

May 2021
Addis Ababa ,Ethiopia

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FOREWORD

There is global consensus on the profound threat that antimicrobial resistance poses to human and animal health. The global health community recognized the urgency of this crisis in 2015 when it adopted the World Health Organization's Global Action Plan on Antimicrobial Resistance.

After realizing widespread and emerging antimicrobial resistance and the grave consequences on the country's health, economy and security, the Government of Ethiopia joined the global community in seeking to better understand and disable the threat. The Government launched in 2011 a National Strategy for the Prevention and Containment of Antimicrobial Resistance, followed by a second strategy for 2015–2020 that integrated the One Health approach. Various efforts followed each edition.

This third iteration of the national Antimicrobial Resistance Prevention and Containment Strategic Plan, for 2021–2025, sharpens the One Health approach to target the large amount of work still to be done. It integrates recent national and global updates and reflects the best available local evidence, stakeholders' concerns and inputs, the socioeconomic and sociocultural context of Ethiopia and the components of the country's health system. This third strategic plan defines the role of all implementing stakeholders and shall be the focus for investments into antimicrobial resistance prevention and containment efforts in Ethiopia.

We want to express our sincere appreciation to all the stakeholders and development partners whose immense contribution and support made the development of this third strategic plan possible despite the COVID-19 pandemic situation.

Because antimicrobial resistance is one of the challenges of our time, fighting this threat is a priority that requires a collaborative approach across sectors. We call upon all stakeholders for continued, coordinated and effective support for achieving the goals and priority objectives of the strategic plan.

We would like to assure you of our commitment to promote, facilitate, finance and monitor the effective implementation of the national strategic plan and achievement of the strategic objectives.

Dr Lia Tadesse

Hon. Minister
Ministry of Health

Dr. Fikru Regasa

Hon. State Minister
Ministry of Agriculture

Prof. Fekadu Beyene

Hon. Commissioner

Environment, Forest and Climate Change Commission

MESSAGE FROM AMR PREVENTION AND CONTAINMENT ADVISORY COMMITTEE

One of the major breakthroughs in the history of humankind was the discovery of antimicrobials. Considered "miracle drugs", they changed the health of human beings. Their use in animal husbandry and veterinary medicine also has resulted in healthier and more productive farm animals, thus ensuring the welfare and health of both animals and humans.

Unfortunately, from the first use of penicillin, resistance emerged. Sir Alexander Fleming recognized its deadly potential early on. Yet, antimicrobial resistance was denied proper attention until recent times. It gained concern over the past two decades, reaching public health crisis in the past few years for its impact on health as well as economies. The issue is multidimensional and requires collaboration among many stakeholders to overcome. Thus, Ethiopia created the multisector National Antimicrobial Resistance Advisory Committee in 2008. It has many appreciable results to its credit. But the country has a long way to go to prevent and contain the antimicrobial resistance threats.

The Government has put in place a framework with this strategic plan to address the threats that antimicrobial resistance poses to the welfare of the people and livestock of Ethiopia. The strategic plan sets out a coordinated and collaborative One Health approach involving key stakeholders in government and other sectors. The National Antimicrobial Resistance Advisory Committee will continue to coordinate the work to be done and monitor the progress. The Government also will continue to work with other governments, international organizations and partners to counter this global public health crisis.

The objectives of the strategic plan can only be successful through the continued political commitment, collaboration and concerted effort of all stakeholders. I hope that our collaboration with communities, civil society organizations, development partners, donors, academics, associations and the private sector will continue to strengthen the antimicrobial resistance prevention and containment efforts. I am looking forward to working with you all towards the successful implementation of the Antimicrobial Resistance Prevention and Containment Strategic Plan and the realization of its vision.

Yakob Seman

Director General, Medical Services

Ministry of Health, Ethiopia

ACKNOWLEDGEMENTS

The development of the third strategic plan was possible through the contributions and support from the Ministry of Health, the Ministry of Agriculture, the Environment, Forest and Climate Change Commission and their agencies.

The AMR secretariat would like to thank the World Health Organization, the Food and Agriculture Organization of the United Nations and the Medicines, Technologies and Pharmaceutical Services Programme of the United States Agency for International Development (USAID/MTaPS) for their generous financial and technical support in the drafting of this third strategic plan.

We also acknowledge the National Antimicrobial Resistance Advisory Committee members and the USAID Global Health Supply Chain Program's Procurement and Supply Management for their significant technical support throughout the process.

Sincere appreciation is extended to the members of the third strategic plan revision task force, whose support was central during development of this strategic plan.

The strategic plan through different revision processes that included drafting, reviewing and enriching through consultative and validation workshops comprising the Ministry of Health, the Ministry of Agriculture, the Environmental, Forest and Climate Change Commission, professional associations, academia, partner organizations and facilities. We heartily thank all the individuals and organizations who participated and contributed to this third strategic plan revision process..

ABBREVIATIONS

AHRI	Armauer Hansen Research Institute
AISCO	Agricultural Inputs Supply Corporation
AMR	antimicrobial resistance
AWaRe	access, watch and reserve
BCC	behaviour change communication
CDC	Africa Centres for Disease Control and Prevention
EBI	Ethiopian Biodiversity Institute
EEFRI	Ethiopian Environment and Forest Research Institute
EFCCC	Environment, Forest and Climate Change Commission
EFDA	Ethiopian Food and Drug Authority
EIC	Ethiopian Investment Commission
EML	Essential Medicines List
EMLA	Ethiopian Medical Laboratory Association
EPHI	Ethiopian Public Health Institute
EPSA	Ethiopian Pharmaceutical Supply Agency
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
GHSA	Global Health Security Agenda
GLASS	Global Antimicrobial Surveillance System
HIV	human immunodeficiency virus
HSTP	Health Sector Transformation Plan
MOA	Ministry of Agriculture
MOE	Ministry of Education
MOF	Ministry of Finance
MOH	Ministry of Health
MOSHE	Ministry of Science and Higher Education
MOTI	Ministry of Technology and Innovation
NAHDIC	National Animal Health, Diagnostic and Investigation Centre
NAMRAC	National Antimicrobial Resistance Advisory Committee
NAP	national action plan
NIMC	National Interministerial Committee
OIE	World Organisation for Animal Health
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VDFACA	Veterinary Drug and Feed Administration and Control Authority
WHO	World Health Organization

EXECUTIVE SUMMARY

Antimicrobials are essential to medical care and public health. They are vital for reducing morbidity and mortality in individuals who present with microbial infections. Antimicrobials are also essential for the prevention and treatment of infectious diseases in veterinary practice and agriculture across the livestock industry, fisheries and crop production. Thus, they are important for the food production chain and national economies.

Antimicrobial medicines have saved millions of lives, substantially reduced the burden of diseases that were previously widespread, improved people's quality of life and helped increase life expectancy. At the same time, the emergence and spread of antimicrobial resistance in several microorganisms has rendered the management of many infectious diseases difficult. Antimicrobial resistance has become a principal public health problem of the twenty-first century. It threatens the effective prevention and treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi that are no longer susceptible to the common medicines used to treat them. Over several decades, to varying degrees, bacteria causing common or severe infections have developed resistance to each new antibiotic coming to market.

Faced with this reality, action to avert the evolving global crisis in health care is imperative.

Globally, antimicrobial resistance causes an estimated 700 000 deaths every year. Failing to tackle antimicrobial resistance could, by 2050, cause an estimated 10 million deaths a year and cost up to $100 trillion. The highest impact likely will be in Asia and Africa, which likely will account for an estimated 4.7 million and 4.2 million deaths, respectively. In Ethiopia currently, misuse of antimicrobials is common among human and animal health care providers, unskilled and animal husbandry practitioners and drug users. Various studies reflect an alarming rate of antimicrobial resistance.

The prevention and containment of antimicrobial resistance has a common approach and requires integrated and well-coordinated efforts at the global, national, institutional and individual levels. The global community recognizes the urgency of this crisis. The Government of Ethiopia has joined the global community in seeking to better understand and curb antimicrobial resistance. In 2006, the Government established the National Antimicrobial Resistance Advisory Committee, followed by the first national strategy framework in 2011. The second Strategy for the Prevention and Containment of Antimicrobial Resistance, for 2015–2020, was launched in October 2015.

In that second strategy, Ethiopia embraced the One Health approach to overcome antimicrobial resistance through concerted, collaborative and integrated efforts across the human, animal, plant health, food, feed and environment sectors. The approaches primarily centre on water, sanitation, hygiene and wastewater management to prevent infection and contain pollution.

In 2017, the Government developed and approved its National Antimicrobial Resistance Surveillance Plan for laboratory-based antimicrobial resistance surveillance. The plan establishes a national surveillance network capable of detecting priority antimicrobial resistance pathogens, analysing and reporting data, characterizing resistance and generating evidence to inform the implementation of targeted prevention and control programmes. It is now (2019–2023) accompanied with an integrated National Antimicrobial Resistance and Residue Surveillance Plan for the animal health care, plant, food safety and environment sectors.

Although Ethiopia initiated antimicrobial resistance prevention and containment practices early and has followed through considerably, the Government fears the country remains behind in controlling the antimicrobial resistance threats and risks. This lagging is attributed to an inadequate multisector approach, insufficient and poor-quality antimicrobial resistance and antimicrobial data and use, lack of sustainable financing, suboptimal practices, inadequate number of trained professionals and insufficient laboratories and supplies.

To catch up with the threats and risks, the third national strategy on prevention and containment

of antimicrobial resistance needed several revisions. In addition to aligning with the World Health Organization's Global Action Plan on Antimicrobial Resistance, it must reflect the country's Growth and Transformation Plan for the health, agriculture and environment sectors. The next strategy for Ethiopia needed a better-articulated vision for protecting the human, animal and plant populations and the environment from the health as well as socioeconomic and environmental consequences of antimicrobial resistance. Yet, it must ensure continuity of the successful approaches already practised for the prevention, control and treatment of infectious diseases in humans, animals and plants through multisector collaboration.

The third edition of the national strategy responds to these requisites through the One Health approach and the following five strategic objectives.

1. **Improve awareness and understanding of antimicrobial resistance through effective behaviour change communication, education and training.**
2. **Strengthen the knowledge and evidence on antimicrobial use and resistance through surveillance and research.**
3. **Enhance infection prevention and control through effective environmental health, infection prevention and bio-risk measures in human, animal and plant health.**
4. **Optimize the use of antimicrobials in human, animal and plant health care.**
5. **Strengthen and establish partnerships, alliances, governance and resource mobilization at all levels.**

The third strategy is a product of a step-wise process, from development of the concept note and establishment of a task force to oversee the revision process to a series of reviews, consultations and validation and approval exercises. This third edition consists of 5 strategies, 22 initiatives, 66 interventions and 180 operational plans with costing and a monitoring and evaluation framework. The estimated budget amounts to $22 794 540. Nearly two thirds (66%) of the budget is allocated for objective two (research and surveillance), followed by 13.1% for objective four (prudent use of antimicrobials) and 11.6% for objective one (awareness and education).

The National Antimicrobial Resistance Advisory Committee will coordinate implementation of this strategy and monitor the progress of interventions. Although its success will rely heavily on the Government's commitment, the private sector, civil society organizations and the general public have significant contributions to make by supporting the government efforts or implementing some of the proposed interventions.

KEY CONCEPTS AND DEFINITIONS

One Health	Is a "whole of society" approach that recognizes that the health of people is connected to the health of animals and the environment. The goal of the One Health concept is to encourage multidisciplinary collaborative efforts across different sectors, such as health, agriculture and the environment, to achieve the best health outcomes for people and animals.
Health care associated infection	Is acquired after contact with health care services. It most frequently occurs due to treatment in hospital but can also happen after treatment in outpatient clinics, nursing homes and other health care settings. Health care-associated infections that are picked up in hospital are also known as "hospital-acquired infections". Surgical site infection, pneumonia, urinary tract infection, bloodstream infection and gastroenteritis are the five most common hospital-acquired infections
Antimicrobial resistance	occurs when an antimicrobial that was previously effective is no longer operative to treat an infection or disease caused by a microorganism. Antimicrobials are medicines used to treat infections or disease and are essential in both human and animal health. The development of resistance is a natural phenomenon that will inevitably occur when antimicrobials are used to treat disease. The problem at present is that the sheer volume of antimicrobials being used globally in humans and animals is leading to significant increases in the rate of resistance, with the result that common infections are becoming more difficult to treat. And micro-or-ganisms that are resistant to many antimicrobials are emerging as the so-called "superbugs".
Antimicrobial stewardship	Is a systematic approach to optimizing antimicrobial therapy through a variety of structures and interventions. It includes limiting the inappropriate use of antibiotics and optimizing antimicrobial selection, dosing, route and duration of therapy to maximize clinical cure while limiting the unintended consequences, such as the emergence of resistance, adverse drug events and costs.
AWaRe list of antibiotics	• **ACCESS** antibiotics that are first- and second-choice options for common infections and should be available in all countries and all facilities. • **WATCH** for antibiotics that only should be prescribed for specific indications because they are at higher risk of bacterial resistance. • **RESERVE** antibiotics, including last-resort options

VISION, MISSION, GOAL AND SCOPE

Vision

To protect human, animal and plant populations and the environment from the health, socioeconomic and environmental consequences of antimicrobial resistance in Ethiopia.

Mission

To reduce the negative impacts of antimicrobial resistance through the generation and utilization of evidence, awareness and education on the prudent use of antimicrobials and the promotion of sectoral, national and global alliance and collaboration.

Goal

To ensure continuity of successful prevention, control and treatment of infectious diseases in the human, animal, plant and environment sectors through evidence-based prevention and containment of antimicrobial resistance following multisector collaboration through a One Health approach.

Scope

This third strategic plan covers improving awareness and understanding on antimicrobial resistance, preventing and controlling infections, strengthening the knowledge and evidence on antimicrobial resistance through surveillance and research, ensuring the prudent use of antimicrobials and the governance of antimicrobial resistance prevention and containment in human, animal and plant health care, food and feed production and the environment sectors at the national, regional and facility levels. The scope is also aligned with the Global Action Plan on Antimicrobial Resistance, the National Growth and Transformation Plan, the National Health Sector Transformation Plan II, the National Action Plan for Health Security and Animal Health Strategy, and the Vision for Ethiopia. This antimicrobial resistance strategy harmonizes with the National Healthcare Quality and Safety Strategy, the National Infection Prevention and Control Strategy and the standard treatment guidelines for general hospitals. In line with the Universal Declaration of Human Right, this strategic plan addresses vulnerable groups and the rights of people living with disabilities.

BACKGROUND

Country Profile

1.1 COUNTRY PROFILE

Geography and climate

Ethiopia is located in the north-eastern part of Africa, also known as the Horn of Africa. It is bordered by Sudan and South Sudan to the west, Eritrea and Djibouti to the north-east, Somalia to the east and south-east and Kenya to the south. Ethiopia has a national government system involving 10 regional states, 2 city administrations and 840 districts. The country occupies an area of 1.1 million square kilometres and has diverse climate and landscapes. The climate is generally divided into three zones: the alpine vegetated cool zones (Dega), at more than 2600 metres above sea level, where temperatures range from near freezing to 16°C; the temperate zones (Woina Dega), where much of the country's population is concentrated, with areas between 1500 and 2500 metres above sea level and temperatures ranging between 16°C and 30°C; and the hot zone (Qola), which encompasses both tropical and arid regions and has temperatures ranging between 27°C and 50°C.

Demographic profile

According to its Central Statistics Agency, Ethiopia is the second-most populous country in Africa and twelfth globally, with a population of about 104 million people in 2021. It is home to various ethnicities, with more than 80 spoken languages. The country is experiencing rapid population growth (at 2.6%), a young age structure and a high dependency ratio, with a high rural–urban differential. Ethiopia had one of the higher total fertility rates in Africa in 2016, at 4.6 births per woman (2.3 in urban areas and 5.2 in rural areas) and a corresponding crude birth rate of 32 per 1000 population. The average household size was 4.6 persons in 2013 (CSA, 2013).

Ethiopia has the largest livestock population in Africa. The national herd comprises 57 million cattle, 30 million sheep, 23 million goats and 57 million chickens as well as camels, horses and a small number of pigs (FAO, 2019).

Socioeconomic situation

Ethiopia is engaged in rapid and comprehensive development activities to transition from impoverished status to sustainable and reliable growth and prosperity. The country registered commendable achievements with the Millennium Development Goals, mainly in reducing the poverty head count, achieving universal primary education, narrowing gender disparities in primary education, reducing child and neonatal mortality and managing HIV, tuberculosis and malaria (FDRE, 2016).

Since 1991, the Government has worked to achieve economic transformation from an agricultural economy to an industrial-led economy. The World Bank classifies Ethiopia as a low-income country, with a gross domestic product (GDP) per capita of $850 in 2019. The country has been one of the fastest-growing economies in Africa and aims to reach lower-middle-income status by 2025 (World Bank, 2019).

As much as 70% of the population keeps livestock. Livestock contribute an estimated 10% of total export earnings. It also contributes 21% of the national GDP and 49% of the agricultural GDP (FAO, 2019). However, the contribution of the livestock sector to the national economy is minimal when compared with its potential. One of the main causes of this mismatch between population size and production output from livestock in Ethiopia is the widespread occurrence of many infectious and parasitic diseases, which drastically reduce the production of livestock due to morbidity, mortality and market restriction. The annual loss due to mortality ranges from 8% to 10% for cattle, 12% to 14% for sheep and 11% to 13% for goats. It is around

56.9% for poultry. The direct and indirect losses from livestock disease have significant economic, food security and livelihood impacts on livestock keepers and the national economy (MOA, 2013). Cultivated crop area accounts for a relatively small share of the total area of Ethiopia because most land is not suited for cultivation. Cereals dominate Ethiopian crop production. As of 2011, cereals were grown on 73.4% of the total land area and cultivated by 11.2 million farmers (IFPRI, 2011).

The human health system structure has three tiers, consisting of primary health care (primary care hospitals, health centres and health posts), secondary health care (general hospitals) and tertiary health care (comprehensive–specialized and subspecialized hospitals). According to the 2019–2020 Ethiopian health and health-related indicators, there are 400 public hospitals, 52 private hospitals, 3800 health centres, 18 000 health posts, 6500 other private health facilities and 6000 medicine retail outlets (MOH, 2020a).

The Government delivers most animal health services. There are 743 public and 877 private veterinary clinics, 4760 veterinary health posts, 4 veterinary teaching hospitals and 1205 veterinary drug retail outlets.

The number of primary, secondary and tertiary education facilities has increased dramatically in the country, and the number of students enrolled was an estimated 30 million in 2019–2020. Ethiopia has 44 public universities. Private higher education enrolled at least 15% of all undergraduate students in 2015. In addition to public universities, there are 32 public teacher training colleges and 11 technical and vocational education and training institutes. And 14 universities provide training for veterinary and animal health professionals (MOE, 2020).


ANTIMICROBIAL
RESISTANCE – A CAUSE
FOR CONCERN

1.2 ANTIMICROBIAL RESISTANCE OVERVIEW

Antimicrobial resistance poses a grave global threat to human, animal and plant health and the environment. It causes an estimated 700 000 deaths every year. Failing to tackle antimicrobial resistance could, by 2050, cause an estimated 10 million deaths a year and cost up to $100 trillion. The highest impact likely will be in Asia and Africa, which likely will account for an estimated 4.7 million and 4.2 million deaths, respectively (O'Neil, 2014). In Ethiopia currently, misuse of antimicrobials is common among human and animal health care providers, unskilled and animal husbandry practitioners and drug users (MOH, 2020a). Various studies reflect an alarming rate of antimicrobial resistance.

The Government of Ethiopia joined the global community in tackling the threat of antimicrobial resistance with a national strategic framework in 2011 (EFDA, 2011). It then followed with the first Strategy for the Prevention and Containment of Antimicrobial Resistance, in 2015 (EFDA, 2015). Ethiopia now embraces a concerted, collaborative and integrated One Health approach to manage the antimicrobial resistance threats appropriately and effectively across the human, animal and plant health, the food and feed production and the environment sectors. It works on better managing water, sanitation, hygiene and wastewater to prevent infections and contain pollution.

Situation analysis and assessment

The Government has undertaken various efforts to prevent and contain antimicrobial resistance. However, the previous human and animal health sector strategies as well as environmental sector strategies have not comprehensively addressed antimicrobial resistance prevention and containment.

Various studies show an alarming rate of antimicrobial resistance in Ethiopia. A systematic review of Salmonella spp. (Tadesse, 2014) and Shigella spp. (Hussen, Mulatu and Yohannes Kassa, 2019) found high resistance for the commonly used antibiotics. Similarly, high E. coli resistance was seen not only for the commonly used antibiotics (access group) but also for third-generation cephalosporins and fluoroquinolones (Sisay, Mengistu and Edessa, 2018; Tuem et al., 2018).

The emergence and prevalence of resistant strains in agricultural food products also seriously compromise the public health. According to a systematic review of studies published from 2013 to 2018, out of the 556 E. coli isolates from different food sources in Ethiopia, resistance to ampicillin, erythromycin and streptomycin have been reported, at 78.7%, 64.1% and 37.6%, respectively (NAHDIC, 2019). Similarly, among 205 Salmonella spp. isolated from food sources, resistance of 64.6% for Streptomycin, 45.1% for ampicillin and 39.1% for tetracycline were reported. Lower percentages of resistance were recorded for gentamycin, ceftriaxone and ciprofloxacin (NAHDIC, 2019, p. 8). Ethiopia has not yet taken action in avoiding or voluntarily phasing-out antimicrobial-growth promoters and non-therapeutic use of antimicrobials in animals, as promoted by research and evidence.

An alarming magnitude of multidrug-resistant infections has been found in a few recent systematic reviews and meta-analyses. According to the 2020 systematic review and meta-analysis, the pooled proportion of extended spectrum beta-lactamase-producing gram-negative bacteria was 50% (Tufa et al., 2020). In addition, the pooled vancomycin-resistant Enterococci estimate accounted for 14.8% (Melese, Genet and Andualem, 2020). Out of 238 gram-negative bacilli isolates, nearly 2% were carbapenem-resistant (Beyene et al., 2019).

The prevalence of multidrug-resistant tuberculosis among newly diagnosed patients has ranged from 2% to 2.7% (Girum et al., 2018; Eshetie et al., 2017; Kebede et al., 2014). Multidrug-resistant tuberculosis is mainly associated with history of previous treatment and to a lesser extent with contact history. Meta-analyses have reported a prevalence of 15% (Eshetie et al., 2017) and 21% (Girum et al., 2018) among previously treated patients.

The 2019 findings of the national antimicrobial resistance surveillance for the priority pathogens augment the evidence from previous reports for the different studies (EPHI, 2019). Although the

data were heterogenic, hospital-based and with less geographic representation, the findings cited here warn of the risks that antimicrobial resistance poses to public health.

Despite the World Health Organization's (WHO) recommendations, antimicrobials prescriptions are widespread in Ethiopia. The average percentage of prescriptions containing antibiotics is 57.6% (MOH, 2020a). Antimicrobial prescriptions are mainly driven by empiric decision (Gebretekle et al., 2020; Gutema et al., 2018). Antimicrobial prophylaxis is used in the majority of surgical procedures, including clean surgical procedures. It is found in wrong doses, duration and indication at levels above what is recommended (Alemkere, 2018).

The irrational and overuse of antimicrobials is driven by poor availability and compliance with standard treatment guidelines, the functionality of the Drug and Therapeutic Committee and Drug Information Services. (MOH, 2020b). Clients' adherence to the prescribed antimicrobials and self-medication practice have been found to be major problems (Sisay, Mengistu and Edessa, 2018; Ayalew et al., 2017; Hailu et al., 2014).

In general, improving evidence-based awareness is still an urgent agenda requiring surveillance on responsible antimicrobial use, residue and resistance trends in food and feed production and in the environment to prevent and contain antimicrobial resistance (O'Neil, 2016).

One Health perspective

In 2015, WHO developed the Global Action Plan on Antimicrobial Resistance, in collaboration with the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE). It was then adopted by the World Health Assembly. The Global Action Plan highlights the One Health approach, which is a collaborative, multisector and transdisciplinary approach adopted as the global framework for streamlining collaboration among different sectors, in this case, to prevent and contain antimicrobial resistance (WHO, 2015).

Ethiopia is fully committed to the collaborative, multisector and transdisciplinary approach, which is supported by the national One Health platform that involves the active participation of multiple stakeholders. Indeed, several policy documents recommend multi-stakeholder and multidisciplinary approaches to better address complex public health issues. The Government endorsed the Public Health Policy of Ethiopia (1993), the Animal Diseases Prevention and Control Proclamation (No. 267/2002) and the National One Health Strategic Plan (2018–2022). All these policies support the adoption of the One Health approach.

Although Ethiopia initiated antimicrobial resistance prevention and containment implementation early and has made much progress, the Government recognizes that the country lags behind the antimicrobial resistance threats and risks, which are still high due to inadequate multisector harmonizing, insufficient and low-quality data on antimicrobial use and resistance, lack of sustainable financing, suboptimal practices, an inadequate number of trained professionals and insufficient laboratories and supplies.

Country response

In Ethiopia, antimicrobial resistance advocacy and containment efforts began back in 2006. The first antimicrobial resistance stakeholders meeting was conducted in March 2006, followed by the establishment of the National Antimicrobial Resistance Advisory Committee under leadership of the Drug Administration and Control Authority of Ethiopia (now the Ethiopian Food and Drug Authority). The major initiative was capacity-building activities targeting the Drug and Therapeutic Committee as an entry point to support the antimicrobial resistance containment effort.

A baseline survey on antimicrobial use, resistance and containment was conducted in 2008 and showed a high level of antimicrobial resistance (DACA, 2009). Following identification of gaps and targets, the first strategic framework for antimicrobial resistance prevention and containment was developed in 2011 (EFDA, 2011). The second strategy was released in October 2015, covering

2015–2020 (EFDA, 2015).

In April 2017, Ethiopia developed and approved the National Antimicrobial Resistance Surveillance Plan. It aimed at establishing a national surveillance network capable of detecting priority antimicrobial resistance pathogens, analysing and reporting data, characterizing resistance and generating evidence to inform the implementation of targeted prevention and control programmes. Three rounds of annual antimicrobial resistance surveillance reporting on priority pathogens from the sentinel sites have been released so far (2018–2020). In addition, the integrated National Antimicrobial Resistance and Residue Surveillance Plan (2019–2023) for the animal health, plant, food safety and environment sectors. Led by the National Animal Health Diagnosis and Investigation Center, it offers great hope. Another baseline survey was conducted in 2018 on the awareness of veterinary drug retail outlets on the trends of antimicrobial resistance and its containment strategies. The survey revealed that pre-service and in-service training on antimicrobial use, resistance and containment are not well addressed in terms of dispensers, over-the-counter dispensing of antimicrobials when directly asked by animal owners and the traditional way of dispensing antimicrobials without evidence-based tools and aids (such as sensitivity test, veterinary standard treatment guidelines, the veterinary medicines formulary, prescription paper, etc.) (Zeru et al., 2019).

Different antimicrobial resistance prevention and containment activities have been implemented. Including but not limited to:

- **Conducting advocacy and communication efforts through different forums and media capacity-enhancement activities in the human and animal health sectors;**
- **Cascading the national antimicrobial resistance action plan to regions and establishment of regional antimicrobial resistance advisory committees;**
- **Implementing the antimicrobial stewardship programme in selected public and private hospitals;**
- **Revising the infection prevention and control guidelines, development of an infection prevention and control policy and implementing infection prevention and control practices;**
- **Revising the national veterinary drug list with restrictions of highest-priority critically important antibiotics for animal use;**
- **Developing and implementing the rational medicine use directive, which restricts-over-the counter use of antimicrobials;**
- **Revitalizing the antimicrobial resistance governance structure;**
- **Revising standard treatment guidelines (human and animal health) and the essential medicines list, incorporating the who access, watch and reserve (aware) categorization of antibiotics;**
- **Reporting annually the antimicrobial resistance surveillance findings to the who global antimicrobial surveillance and use system;**
- **Providing national antimicrobial consumption surveillance training in two rounds; and**
- **Commemorating national antimicrobial days.**

Governance structure

Since 2019, the governance framework of antimicrobial resistance prevention and containment transitioned from the Ethiopian Food and Drug Authority (the former Drug Administration and Control Authority) to the Ministry of Health. The current antimicrobial resistance governance mechanism comprises a high-level National Inter-ministerial Committee, the National Antimicrobial Resistance Advisory Committee, a national antimicrobial resistance focal point (AMR secretariat) and six multi-sector technical working groups (on awareness and education; research and surveillance; infection prevention and control and hygiene; antimicrobial stewardship; regulations and pharmacovigilance;

and partnership and resource mobilization) to address the strategic objectives of the national action plan (see the Annex for the terms of reference for the membership, duties and responsibilities of each governance body). National-level governance is responsible for formulating policies and regulations and providing technical guidance and assistance to regional-level antimicrobial resistance coordinating platforms. Regional antimicrobial resistance governance oversees and assists implementation of the antimicrobial resistance prevention and containment strategy at all levels.

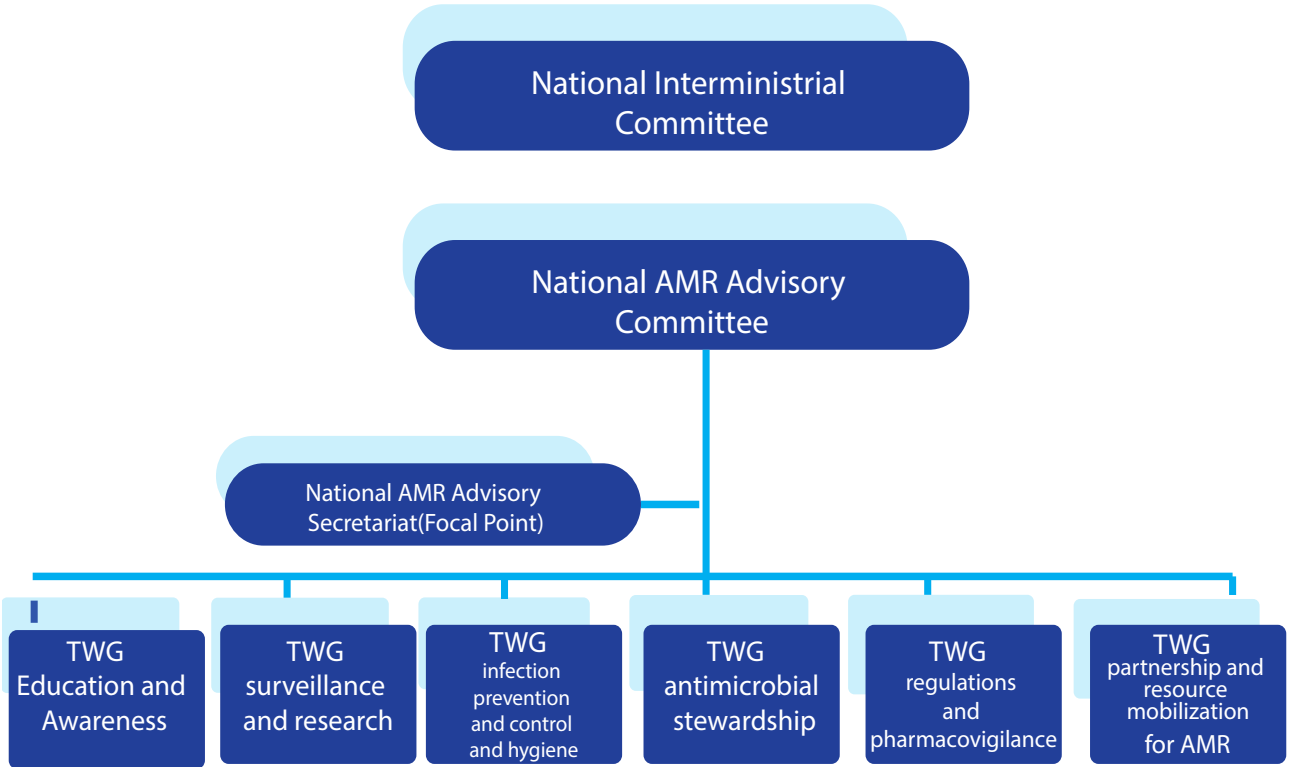


Figure 1 Antimicrobial resistance governance framework

SWOT ANALYSIS OF THE ANTIMICROBIAL RESISTANCE SITUATION IN ETHIOPIA

Table 1. Analysis of the strengths, weaknesses, opportunities and threats regarding antimicrobial resistance prevention and control

Strengths	Weaknesses
• Availability of legal provisions in human, agriculture and environment sectors	• Weak collaboration system among major antimicrobial resistance stakeholders at all levels
• Existence of regulatory bodies for medicine and medical devices and professional conduct in the human and animal health and environment sectors	• Inadequate antimicrobial resistance surveillance capacity and utilization of evidence generated for decision-making
• Existence of antimicrobial resistance governance structure at national and regional levels (Advisory Committees and AMR secretariat) and a One Health Steering Committee	• Inadequate sustainable financial, human and material resources
• Existence of guidelines (Antimicrobial Stewardship I, standard treatment guidelines, infection prevention and control) and directives (Rational Medicine Use II) in the human and animal health sectors	• Inadequate awareness and commitment on antimicrobial resistance among policymakers and the general population.
• Efforts undertaken to improve awareness on antimicrobial resistance	• Inadequate ownership and cascading of a national strategy for antimicrobial resistance by key stakeholders at national, regional and city administration and institution levels
• Launching of the Antimicrobial Stewardship Programme in selected public and private hospitals	• Irrational antimicrobial prescribing, dispensing and use
• Efforts underway to integrate infection prevention and control practices with antimicrobial stewardship, such as integrated training	• Poor laboratory infrastructure and inadequate microbiology supplies
• Established antimicrobial resistance surveillance system in the human and animal health sectors	• Lack of standards in existing food legislation on antibiotic residues
• Presence of research and public health laboratory networks at national, regional and academic public health research laboratories	• Inadequate regulation of antimicrobials, including market surveillance, inspection of antimicrobial use and enforcement and safe disposal of waste
• Existence of accredited reference national bacteriology laboratory in the human and animal health sectors	• Inadequate institutionalized implementation of antimicrobial stewardship
	• Inadequate pre- and in-service training on proper use of antimicrobials and laboratory diagnostic testing capacity
	• Poor community and health facility infection prevention and control programme
	• Poor animal husbandry practice and bio-risk management
	• Absence of a reporting, monitoring and evaluation system
	• Lack of interoperability database and reporting system among human, animal and environment surveillance

Opportunities	Threats
• Existence of health and agriculture extension programmes to reach communities and primary health care settings to strengthen awareness, appropriate prescribing and prevention efforts	• Borderless transmission of resistant pathogens
• Existence of ample international experience and research findings in the field	• Emergence and re-emergence of infectious diseases
• Commitment of international organization in combating antimicrobial resistance including WHO, FAO, OIE, Africa Centres for Disease Prevention and Control (CDC), United States Agency for International Development (USAID) and other partners	• Inadequate number of new antimicrobials in the research and development pipeline
• Availability of advanced technology	• Competition of scarce resources and inflation
• Availability of various print and electronic media	• Circulation of substandard and falsified medical products due to porous borders
• Availability of higher education institutions	• Pressure from pharmaceutical companies
• Improved primary and secondary education coverage	

STAKEHOLDER ANALYSIS

The Government of Ethiopia has identified all relevant antimicrobial resistance stakeholders and presumes their engagement is essential for combating antimicrobial resistance. The majority of stakeholders are already members of the National Antimicrobial Resistance Advisory Committee. However, based on national and regional assessment findings, there is little coordinated engagement and governance among these stakeholders (MOH, 2020a; 2020b; 2019).

Table 2 Stakeholder analysis for antimicrobial resistance prevention and containment

Stakeholders	Level of involvement	Desired behaviours	Their needs	Anticipated challenges	Institutional response
-Ministry of Health (MOH) and its agencies (EPSA, EPHI), AHRI) and regional counterparts -Ministry of Agriculture (MOA) and its agencies (NAHDIC) and regional counterparts -Environment, Forest and Climate Change Commission (EFCCC) and its agencies (Ethiopian Environment and Forest Research Institute (EEFRI), Ethiopian Biodiversity Institute (EBI)) and regional counterparts	High	Advocacy and ownership of AMR Leadership and coordination Develop and update polices and legal frameworks Plan and allocate resources Information exchange Collaboration Efficient utilization of resources Transparency of operations Accountability	Technical and financial support Appropriate data for decision-making Information exchange Collaboration	Inadequate collaboration information sharing leadership support	Update continuously information and lobbying Review gaps and address swiftly Strengthen collaboration Establish joint monitoring and evaluation
Regulatory bodies -EFDA, -EFCCC - VDFACA and regional counterparts	High	Advocacy and ownership of antimicrobial resistance Plan and allocate resources Effective enforcement Transparency and accountability	Technical and financial support Appropriate data for decision-making Information exchange Collaboration	Inadequate enforcement information sharing leadership support Duplication of efforts	Establish joint monitoring and evaluation Strengthen collaboration Design mechanisms that avoid duplication of efforts

Stakeholders	Level of involvement	Desired behaviours	Their needs	Anticipated challenges	Institutional response
Civil society	Medium	Promote ethical practices Lobby government to ensure availability and rational use of antimicrobials and personal protective equipment Antimicrobial resistance advocacy	Recognition Technical and financial support Supportive policies\y	Lack of buy-in Expose unacceptable practices	Identify the resistance areas and respond based on the findings Engage and participate in planning, monitoring and evaluation
Professional associations (relative to human, animal and plant health and the environment)	High	Antimicrobial resistance advocacy Promote infection prevention and control and antimicrobial stewardship Provide continuing professional development on antimicrobial resistance, use, consumption and stewardship, infection prevention and control, etc. Develop standards and protocols Research and development Antimicrobial resistance curriculum review	Technical and financial support Exchange of information	Weak collaboration Loss of trust	Engage in planning, implementation, monitoring and evaluations
Communities and patients, animal owners, clients	High	Compliance and adherence to medications Avoid self-medication Participation, engagement and ownership Avoid non-therapeutic use of antimicrobials	Safe, quality and effective medicines Safe water, sanitation and hygiene facilities Up-to-date and reliable information Engagement and empowerment	Non-compliance Dissatisfaction Opting for poor quality and unsafe alternatives Distrust	Ensure sustained access to good-quality and safe medical products Provide up-to-date, reliable and proper information Engagement and participation in planning, monitoring and evaluation

Stakeholders	Level of involvement	Desired behaviours	Their needs	Anticipated challenges	Institutional response
Public and private health facilities and diagnostic centres (animal and human) and pharmaceutical establishments	High	Ethical and rational use of medicines Institutionalize and integrate infection prevention and control and/or antimicrobial stewardship Participation in public awareness-raising efforts Empower their professionals on antimicrobial resistance	Up-to-date information, standard treatment guidelines and formularies Technical and financial support Supportive policy environment	Unethical practices Refusal to follow standards Inappropriate use of resources	Measures on illegal practices Provision of information Technical support Engagement and participation in planning, monitoring and evaluation
Ministry of Science and Higher Education (MOSHE), Ministry of Education (MOE), Ministry of Information and Technology, academia and research institutions	High	Inclusion of antimicrobial resistance in curriculum and courses Technical assistance Evidence-generation and advocacy on antimicrobial resistance Serve as centre of excellence Innovations	Technical and financial support and collaboration Engagement and participation Information exchange	Poor attention to antimicrobial resistance Dissatisfaction Poor infrastructure or budgeting	Transparency and collaboration Use of evidence and reports generated Up-to-date information Engagement and participation in planning, monitoring and evaluation
Media	High	Awareness-raising on antimicrobial resistance, sanitation, hygiene and infection prevention and control measures Broadcast achievements and best practices Provision of right information to the public on antimicrobial resistance Lobby the Government to combat antimicrobial resistance	Resources for generating up-to-date and reliable information Transparency and participation Technical support Supportive policy Provision of reliable information	Less attention Dissemination of unreliable information Broken trust	Provide up-to-date and reliable information Strengthen collaboration and integrated works Create transparent and participatory platforms for the media

Stakeholders	Level of involvement	Desired behaviours	Their needs	Anticipated challenges	Institutional response
Tripartite organizations (World Health Organization (WHO), Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE)	High	Technical and financial support Advocacy, harmonization and alignment of antimicrobial resistance, infection prevention and control, antimicrobial stewardship, food and feed safety and biosecurity agendas with the global strategy Development and issuance of manuals, guidelines, policy documents Monitoring and evaluation	Efficient utilization of resources Timely reporting and feedback	Reduced technical and financial support Low evaluation of performance reports	Transparency Alignment and harmonization Engagement and collaboration
International organizations and development partners (CDC, United States Agency for International Development (USAID), UNICEF, United Nations Environment Programme, World Bank, European Union, etc.)	High	Technical and/or financial support Engagement on advocacy and promotion of antimicrobial resistance prevention and containment activities, such as infection prevention and control practice, antimicrobial stewardship implementation, research, surveillance, awareness and education	Harmonized and transparent system Participation in planning, monitoring and evaluations Collaboration and engagement	Denial of support or cooperation	Transparency Efficient resource use Collaboration and engagement Provision of up-to-date information

Stakeholders	Level of involvement	Desired behaviours	Their needs	Anticipated challenges	Institutional response
Health professionals (human and animal)	High	Compliance with good prescribing and good dispensing practices Compliance with standard treatment guidelines Refrain from dispensing antimicrobials over the counter Ensuring quality-assured laboratory results Compliance with infection prevention and control practice recommendations	Availability of safe, effective and quality products Pre-service and in-service capacity-building Efficient and fair service and system from the regulatory enforcement Updated information and legal framework	Uncooperativeness Distrust Poor compliance with standards and legal frameworks Poor communication among professionals	Efficient and fare quality assurance system Updating laws and information
Ministry of Finance	High	Recognition of antimicrobial resistance as a social, economic and health threat requiring a multisector approach Understand the benefit of investing in antimicrobial resistance and value for money Allocate required resources for antimicrobial resistance issues	Justification among the competing government priorities and economic benefit Efficient and effective utilization of budget Timely liquidation and reporting	Hesitation or refusal of allocating and approving budget Inadequate information on economic impact of antimicrobial resistance Confidence on the deliverables Budget shortage and competing priorities	Utilize budget properly Demonstrate the results and benefits of investing in antimicrobial resistance prevention Mobilize resource Develop convincing justifications in case of deviations in the implementation

Stakeholders	Level of involvement	Desired behaviours	Their needs	Anticipated challenges	Institutional response
Parliamentarians, community leaders and opinion leaders	Medium	Advocacy of rational medicine use laws and practices Cooperation Monitoring and follow-up Approval and monitoring of enforcement of the legal frameworks	Availability of safe and good-quality medicines Proper drafting legal frameworks Information exchange Timely performance reporting	Unacceptance Deny cooperation Influence on budget allocation	Embrace the approach and engagement Review gaps and address them Embrace capacity-building mechanisms Execute authority and responsibility properly Provide proper information

CRITICAL ISSUES AND CORE ENABLERS RELATED TO ANTIMICROBIAL RESISTANCE

Table 3 Critical issues and core enablers related to antimicrobial resistance

Critical issues	Core enablers
• Inadequate multisector governance, collaboration, coordination and commitment at all levels • Resource constraints • Inadequate needs-based research, diagnostic facilities and antimicrobial resistance, use and consumption surveillance for decision-making • Inadequate awareness on threats of antimicrobial resistance among policymakers, professionals and the general population • Poor infection prevention and control practices and lack of integration of infection prevention and control with the Antimicrobial Stewardship Programme • Irrational use of antimicrobials and circulation of substandard and falsified medical products	• Strengthen the national and regional Antimicrobial Resistance Advisory Committees • Establish and strengthen AMR secretariat, team and focal persons • Strengthen the multisector antimicrobial resistance technical working groups • Mobilize aggressive and sustainable resources • Strengthen partnership and networking • Strengthen communication and coordination forums • Nominate goodwill ambassadors on antimicrobial resistance • Promote antimicrobial resistance knowledge and behaviour change among decision-makers, professionals and the general public through printed and electronic media • Strengthen sentinel surveillance sites and research to generate evidence to improve health care outcomes and decision-making • Access and ensure applicability of up-to-date treatment guidelines • Institutionalize and integrate Antimicrobial Stewardship Programme and infection prevention and control programme into the human and animal health sectors • Improve regulatory enforcement of antimicrobial use, prescribing, dispensing and self-medication as well as prevention, detection and response to substandard and falsified medical products, including participation in WHO global surveillance and monitoring system and member State mechanisms regarding substandard and falsified medical products • Establish and strengthen a monitoring and evaluation system • Strengthen innovation and adoption of technologies

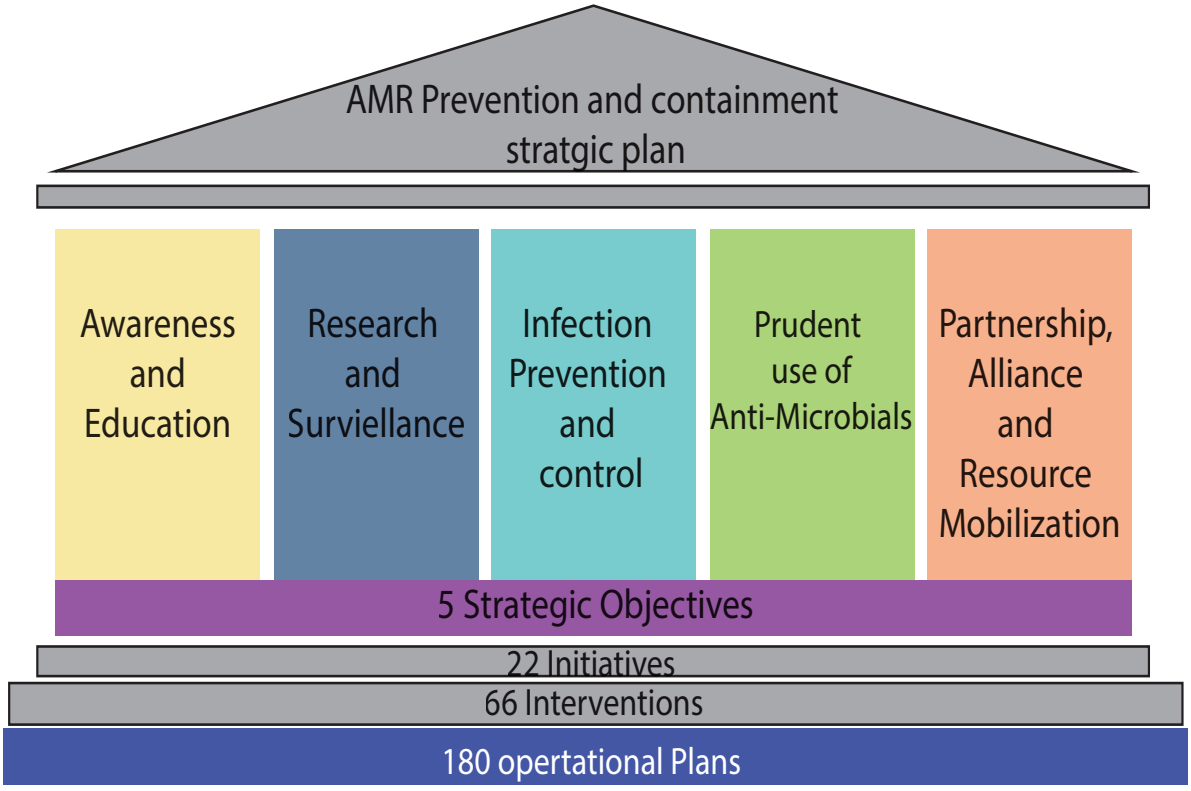
2. RATIONALE FOR REVISIONS IN THE THIRD STRATEGIC PLAN

The second edition of the National Antimicrobial Resistance Prevention and Containment Strategy 2015–2020 was well aligned with the WHO Global Action Plan on Antimicrobial Resistance. But the strategy needed revision, primarily for the following reasons.

- It was not comprehensive enough to address the animal, fisheries, plant, food production and environment sectors.
- The roles and responsibilities of key stakeholders, including private sector engagement, were not clearly articulated.
- It lacked a robust operational plan; a clear line of reporting, monitoring and evaluation and accountability, costing and required resources.
- The strategy was overambitious, which had been difficult to implement in the specified period.
- It needed to integrate recent global and national antimicrobial resistance-related updates.

Completion of the implementation period became the right time to revise the national strategic plan to address these gaps and align with the country's Growth and Transformation Plan for health, agriculture and the environment.

3. STRATEGIC PLAN



3. STRATEGIC PLAN

In line with the World Health Organization's Global Action Plan on Antimicrobial Resistance and country's Growth and Transformation Plan for the health, agriculture and environment sectors, the third national strategic plan on prevention and containment of antimicrobial resistance is designed to ensure continuity of the successful approaches already practised for the prevention, control and treatment of infectious diseases in humans, animals and plants through multisector collaboration. Hence, the third AMR prevention and containment strategic plan consists of 5 strategic objectives with 22 initiatives, 66 interventions and 180 operational plans with costing and a monitoring and evaluation framework.

1. **Improve awareness and understanding of antimicrobial resistance through effective behaviour change communication, education and training.**
2. **Strengthen the knowledge and evidence on antimicrobial use and resistance through surveillance and research.**
3. **Enhance infection prevention and control through effective environmental health, infection prevention and bio-risk measures in human, animal and plant health.**
4. **Optimize the use of antimicrobials in human, animal and plant health care.**
5. **Strengthen and establish partnerships, alliances, governance and resource mobilization at all levels.**

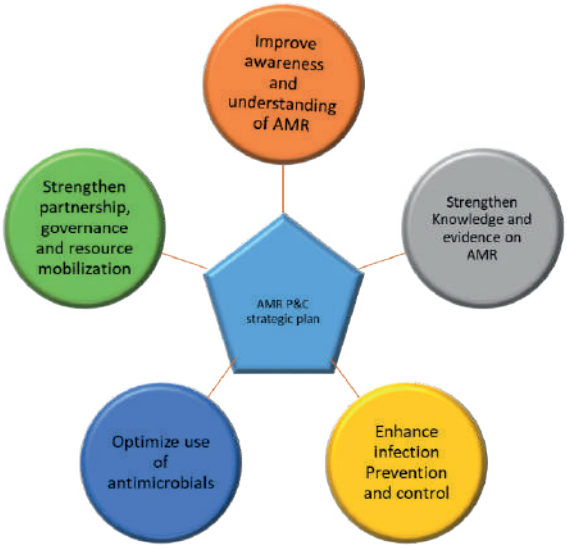


Figure 2. Strategic Objectives of National AMR Strategic Plan

3.1 OBJECTIVE ONE:
IMPROVE AWARENESS AND UNDERSTANDING OF ANTI-MICROBIAL RESISTANCE THROUGH EFFECTIVE BEHAVIOUR CHANGE COMMUNICATION, EDUCATION AND TRAINING

Description

Antimicrobial resistance prevention and containment shall be seen as everyone's responsibility. All human, animal and plant health professionals, environment professionals, public and private institutions, policymakers and communities shall understand the extent and the challenges posed by antimicrobial resistance. Some institutions had raised awareness and expanded knowledge on antimicrobial resistance. However, awareness, understanding of the problem and the attention given to antimicrobial resistance prevention and containment by communities, professionals and policymakers remain inadequate

This strategic objective is designed to encourage a whole-of-society approach in tackling the issue of antimicrobial resistance and ensure that everyone is aware of the problem and challenges. It also seeks to ensure that individuals, communities and institutions understand their role in addressing antimicrobial resistance through effective behaviour change communication, education and training. The objective aims to improve behaviour change on antimicrobial use and resistance among the targeted groups.

This objective involves 4 initiatives, 8 interventions and 18 activities, as explained in the

operational plan.

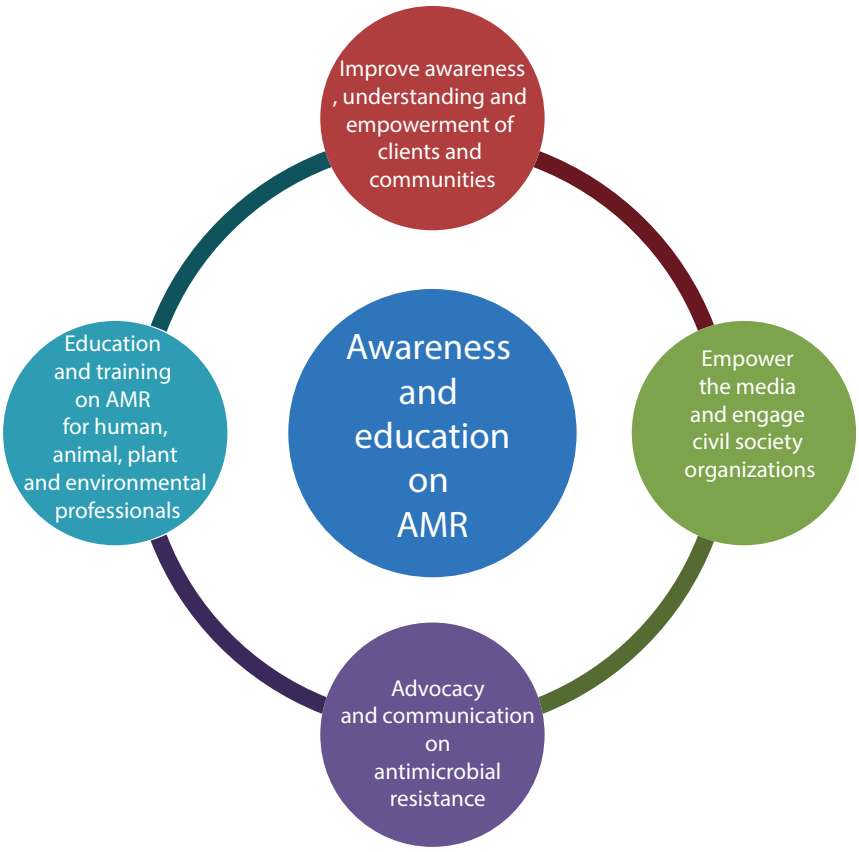


Figure 3. Strategic Initiatives for Awarness and Education Strategic Objective

Table 4: Initiatives and interventions for objective one

Objective 1: Improve awareness and understanding of antimicrobial resistance through effective behaviour change communication, education and training	
Strategic initiatives	**Strategic intervention**
Improve awareness, understanding and empowerment of clients and communities	1. Design and promote sustainable whole-of-society engagement through effective communication platforms 2. Incorporate personal, public and food hygiene, sanitation, nutrition, good farming and environment health-control practices related to antimicrobial use and resistance into school curricula and extracurricular activities 3. Raise awareness of clients and the public on rational use of antimicrobials and adherence to treatment and professional advice through health education and training 4. Improve awareness of the risk of leftover antimicrobials, pesticides, insecticides and heavy metals in the environment
Education and training on antimicrobial resistance for human, animal, plant and environmental professionals in public and private institutions	1. Incorporate antimicrobial resistance in course content of technical and vocational education and training, undergraduate and post-graduate curricula 2. Develop and implement regular and needs-based pre-graduation and in-service training and continuous professional development programmes on antimicrobial use, resistance and stewardship and infection prevention and control, including for health and agriculture extension workers
Empower the media (public and private) and engage civil society organizations on antimicrobial resistance	1. Capacitate media and civil society on antimicrobial resistance to ensure their engagement in educating the public
Advocacy and communication with policymakers and decision-makers	1. Advocate antimicrobial resistance as a national and global priority with pertinent policymakers and decision-makers to mainstream prevention and containment

3.2 OBJECTIVE TWO:
STRENGTHEN THE KNOWLEDGE AND EVIDENCE ON ANTI-MICROBIAL USE AND RESISTANCE THROUGH SURVEILLANCE AND RESEARCH

Description

Surveillance and research on antimicrobial use, consumption and resistance, antimicrobial residues and market surveillance are essential in preventing and guiding the management of infectious diseases. It is necessary for updating infection-control policies and practices. It is also critical to provide early warning of emerging and re-emerging human, animal and plant infectious diseases, to monitor changing patterns of resistance and to target and evaluate antimicrobial resistance prevention and containment measures.

Establishing and strengthening laboratory diagnostic testing through standardizing methods and procedures for surveillance and research on antimicrobial use, consumption and resistance can ensure and generate quality data to influence health care outcomes and policy and programme implementation. An effective network that generates and collates data on surveillance of antimicrobial use, consumption and resistance across the human, animal and environmental interface will be established. This objective focuses on strengthening and standardizing surveillance and research through the One Health approach. It involves 4 initiatives, 14 interventions and 47 activities, as explained in the operational plan. Hence, information and evidence will be generated for decision-making.

Table 5: Initiatives and interventions for objective two

Objective two: Strengthen the knowledge and evidence on antimicrobial use and resistance through surveillance and research	
Strategic initiatives	**Strategic interventions**
Establish and strengthen surveillance of antimicrobial resistance priority pathogens in human and animal health, feed and food safety, plants and the environment.	1. Establish and strengthen antimicrobial resistance surveillance systems to detect and report antimicrobial resistance and disseminate information to facilitate evidence-based decision-making at all levels in all sectors 2. Establish multi-institutional networks to collate and channel surveillance reports and case studies on antimicrobial resistance and informed policymaking and decision-making 3. Establish real-time patient and population-based antimicrobial resistance surveillance system 4. Strengthen and maintain a national bio-repository on antimicrobial resistance priority organisms, strains and genes 5. Establish alert system on emerging and re-emerging antimicrobial resistance issues that do have public and animal health emergency importance
Build up the capacity for a quality management system of laboratories for human, animal and plant health and for feed and food safety and environment testing at the national, regional and facility levels	1. Standardize microbiology laboratory methodologies and techniques including advanced detection methods 2. Establish and strengthen laboratory facilities and equipment maintenance and calibration centres 3. Build up the capacity of human resources for specimen management, for conducting culture, identification and antimicrobial sensitivity tests and for reporting to the human, animal, environment, feed and food sectors using phenotypic and molecular methods 4. Strengthen the laboratory information management system
Basic and operational research	1. Conduct basic and operational research on antimicrobial use, consumption and resistance. 2. Research diagnostic and treatment alternatives for infections that can be treated with antimicrobials 3. Introduce innovative technologies and research on rapid diagnostic tests and methods for infections and antimicrobial resistance 4. Develop an AMR index to communicate gaps in antimicrobial effectiveness and help aggregate data on resistance to assess trends over time and across locations
Establish and strengthen surveillance and research of antimicrobial contaminants and residues and the drivers of antimicrobial resistance in the environment, plant, food and feed sectors	1. Establish and strengthen surveillance and research of antimicrobial residues, effluent and waste in the environment, plant, food and feed sectors

3.3 OBJECTIVE THREE:
ENHANCE INFECTION PREVENTION AND CONTROL THROUGH EFFECTIVE ENVIRONMENTAL HEALTH, INFECTION PREVENTION AND BIO-RISK MANAGEMENT IN HUMAN, ANIMAL AND PLANT HEALTH CARE

Description

Infection prevention and control along with water, sanitation and hygiene measures in human and animal health facilities and in communities reduces the risk of transmission of infections. It also minimizes the need for and use of antimicrobials and prevents the subsequent emergence of resistant strains. Infection prevention and control measures contain the spread of resistant microbes once resistance has emerged. These measures include personnel hygiene and environmental health, specifically water, sanitation and hygiene in communities and health care facilities; promoting vaccinations; improving safety in risky areas of health facilities for humans and animals; safe wastewater and waste management practices; isolation of patients infected by highly contagious microorganisms; good animal husbandry practices; and biosafety and bio-risk management.

This strategic objective is designed to reduce the occurrence of infections and contain the spread of the resistant strains in communities and in veterinary and human health care settings through implementation of a range of recommendations and minimum requirements related to the existence of functional and effective infection prevention and control programmes to reduce the incidence of infection at the national and facility levels.

This strategic objective involves 5 initiatives, 13 interventions and 37 activities, as explained in the operational plan.

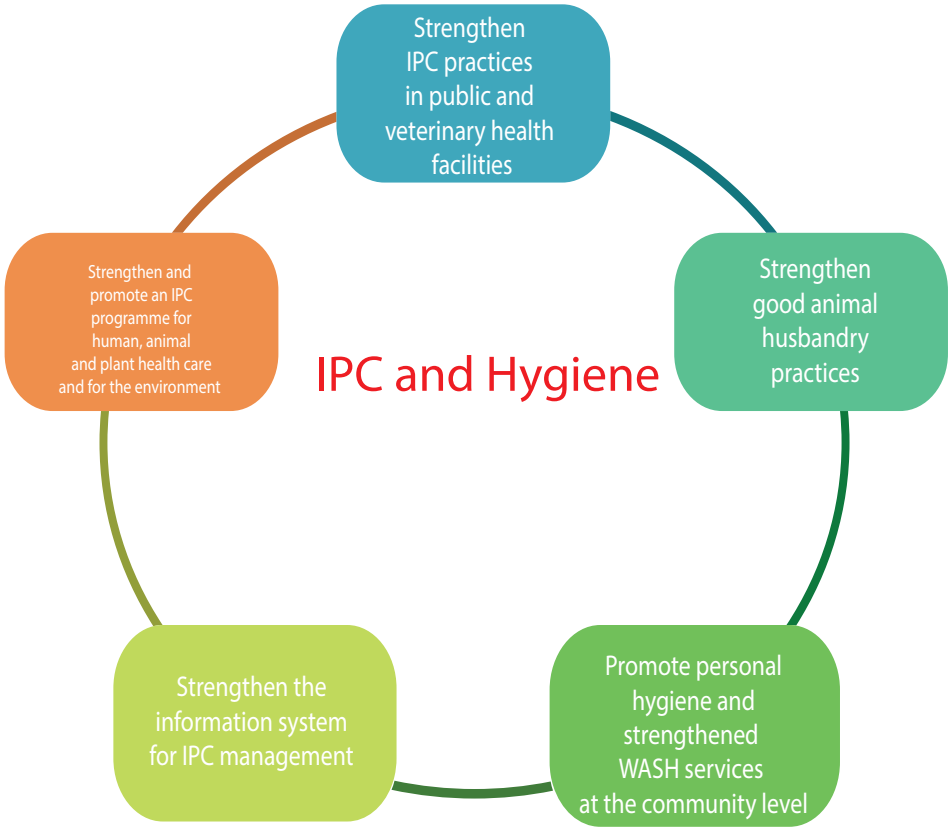


Figure 4. Strategic Initiatives for IPC and Hygiene Strategic Objective.

Table 6: Initiatives and strategic interventions for objective three

Objective three: Enhance infection prevention and control through effective environmental health, infection prevention and bio-risk measures in human, animal and plant health care	
Strategic initiatives	**Strategic interventions**
Strengthen and promote an infection prevention and control programme for human, animal and plant health care and for the environment	1. Coordinate multisector collaboration to limit the emergence, re-emergence and spread of antimicrobial resistance and multiple drug-resistant organisms in humans, animals, plants and the environment 2. Set and enforce standards on infection prevention and control as per the One Health approach 3. Develop protocols and guidelines for infection outbreak detection and case management due to antimicrobial resistance and multiple drug-resistant strains
Strengthen infection prevention and control practices in public and veterinary health facilities	1. Ensure implementation of safe infection prevention and control practices in human and veterinary health facilities 2. Prevent and monitor health care-associated infections in human and veterinary health facilities 3. Strengthen prevention of zoonotic diseases
Strengthen good animal husbandry practices	1. Promote bio-risk management and good husbandry practices 2. Integrate antimicrobial resistance prevention and containment activities with veterinary outreach services and vaccination access
Promote personal hygiene and strengthened water, sanitation and hygiene services at the community level	1. Promote personal and environmental hygiene and sanitation 2. Promote, implement and enforce proper waste management at the community level 3. Encourage and promote safe water supply and sanitation services for humans and animals
Strengthen the information system for infection prevention and control management	1. Develop a multisector infection prevention and control information communication management system (database) 2. Generate and disseminate evidence-based information to improve infection prevention and control practices and decision-making processes

3.4 OBJECTIVE FOUR:
OPTIMIZE THE USE OF ANTIMICROBIALS IN HUMAN, ANIMAL AND PLANT HEALTH CARE

Description

Countries, regions or human and veterinary health care facilities with high antimicrobial use and misuse are associated with high incidence of resistance. Inadequate capacity to diagnose and manage infectious diseases, poor prescribing and dispensing practices, poor adherence to treatments, substandard and falsified medicines and outdated and biased medicine information, poor access to antimicrobials and wrong duration of therapy are all important contributors to antimicrobial resistance.

Evidence-based policies, protocols and regulations that encourage more appropriate and rational use of antimicrobials are key interventions for the containment of antimicrobial resistance. This strategy involves strengthening and integrating antimicrobial stewardship into health care facilities. It also promotes using data on antimicrobial use, consumption and resistance to trigger changes in the behaviour of human and veterinary health care professionals, clients and other actors in the human and animal sectors.

This objective involves 5 initiatives, 24 interventions and 50 activities, as explained in the operational plan.

Figure 5. Core Elements of Anti-Microbial Stewardship

Table 7: Initiatives and strategic interventions for objective four

Objective four: Optimize the use of antimicrobials in human, animal and plant health care	
Strategic initiatives	**Strategic interventions**
Improve access to quality antimicrobials and laboratory supplies in the human and animal health sectors	1. Ensure effective supply chain management of quality essential antimicrobials and laboratory supplies 2. Promote local production of quality antimicrobials and laboratory supplies
Ensure optimal prescribing, dispensing and use of antimicrobials in human health care	1. Integrate antimicrobial stewardship into the Ethiopian Hospitals Services Transformation Guideline and the Ethiopian Health Centre Reform Implementation Guideline 2. Ensure implementation of antimicrobial stewardship in health care facilities 3. Ensure the availability of and monitor compliance to updated and evidence-based guidelines, policies, manuals and formularies for the prescribing and dispensing practice 4. Strengthen antimicrobial use and consumption surveillance data for action to improve health care outcomes at health facilities and at the national level 5. Improve communication and team spirit among health care providers
Ensure optimal prescribing, dispensing and use of antimicrobials in animal health	1. Develop guidelines relevant to the prudent use of antimicrobials 2. Develop and promote implementation of antimicrobial stewardship in veterinary services 3. Strengthen the diagnostic capacity of veterinary health services to promote the rational antimicrobial use and consumption 4. Strengthen the antimicrobial use and consumption surveying for veterinary health services 5. Strengthen professional and animal owner communication to optimize antimicrobial use and consumption
Strengthen diagnostic stewardship at health care facility level	1. Establish, capacitate and standardize diagnostic laboratories 2. Ensure generation and utilization of antibiogram data at the health care facility level 3. Ensure prescribing practices of antimicrobials are based on laboratory diagnostic results

Objective four: Optimize the use of antimicrobials in human, animal and plant health care	
Strategic initiatives	**Strategic interventions**
Strengthen the regulatory system in human, animal, food and feed production and the environment sectors	1. Review, develop and enforce legislation on the prudent use of antimicrobials and laboratory supplies 2. Strengthen pre- and post-market surveillance and control of antimicrobials as well as laboratory and infection prevention and control supplies 3. Capacitate regulatory bodies to ensure the availability and use of quality antimicrobial as well as laboratory and infection prevention and control supplies 4. Regulate food preparation and dispensary centres to enhance food hygiene and safety 5. Ensure proper disposal of unfit-for-use antimicrobials, laboratory supplies and residues 6. Establish standards for waste discharge and treatment from manufacturing, food processing plants and human and animal health care settings 7. Establish predicted no-effect environmental concentration values for resistance selection

3.5 OBJECTIVE FIVE:
STRENGTHEN AND ESTABLISH PARTNERSHIPS, ALLIANCES, GOVERNANCE AND RESOURCE MOBILIZATION AT ALL LEVELS

Description

Antimicrobial resistance is a global and national threat that requires concerted and coordinated national and international efforts to bring together various stakeholders. This will influence opinion, obtain support, mobilize action, harness the expertise and resources available in different sectors and improve governance.

All sectors must collaborate on innovations, resource mobilization and allocation, strengthen stewardship practices and infection prevention and control, address the threats of antimicrobial resistance, and move the issue of antimicrobial resistance to the political level.

This objective is designed to strengthen and establish partnerships, alliances, governance and resource mobilization efforts for the effective implementation of the national strategic plan at all levels.

The objective involves 3 initiatives, 6 interventions and 15 activities, as explained in the operational plan.

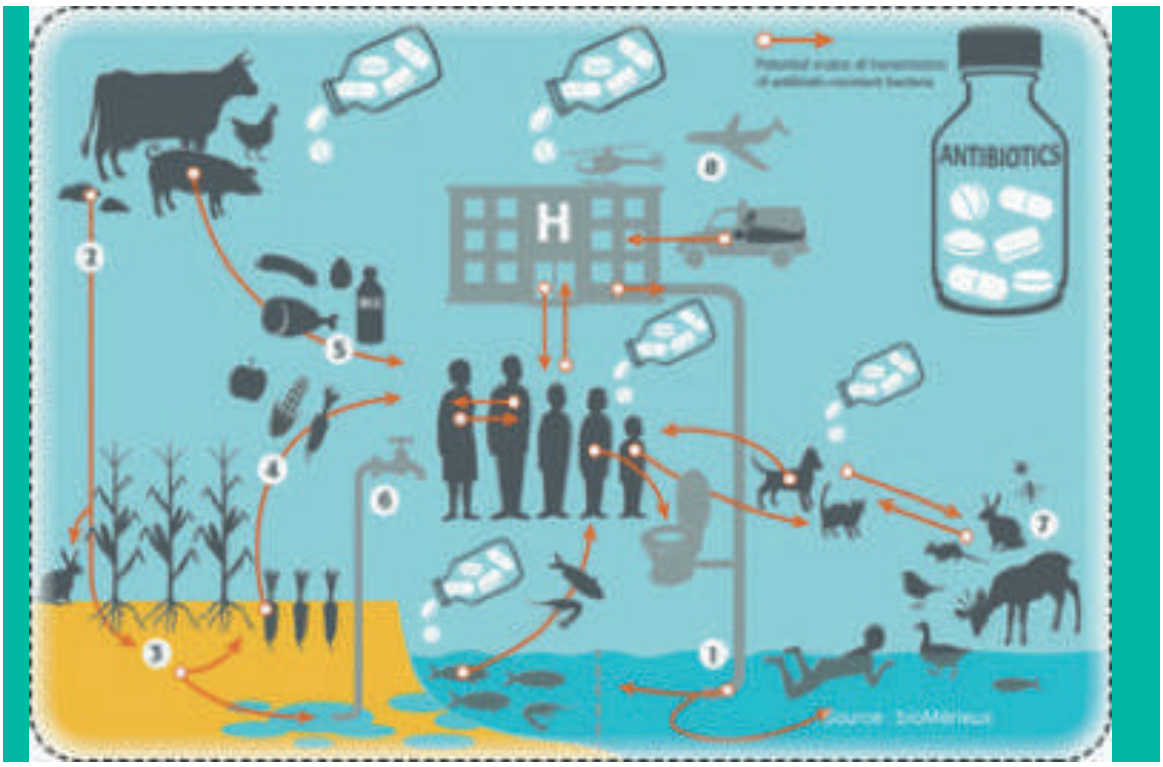
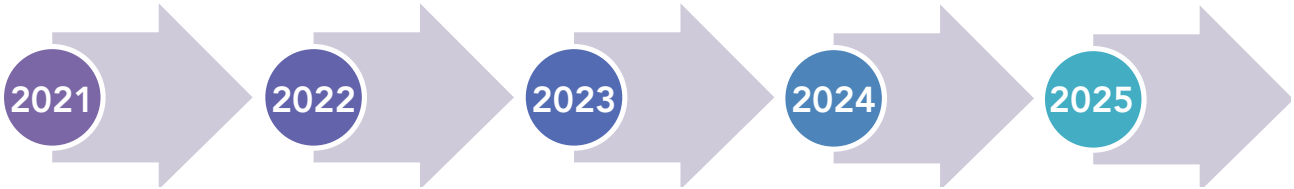


Table 8: Initiatives and strategic interventions for objective five

Objective five: Strengthen and establish partnerships, alliances, governance and resource mobilizations at all levels	
Strategic initiatives	**Strategic interventions**
Strengthen and establish governance, partnerships and alliances	1. Strengthen governance structures and collaboration of national and regional antimicrobial resistance stakeholders 2. Strengthen collaboration with multilateral and bilateral organizations engaging in antimicrobial resistance prevention and containment 3. Promote public–private partnerships on antimicrobial resistance prevention and containment
Strengthen leadership	1. Ensure leadership, ownership and commitment for the sustainable implementation of the antimicrobial resistance strategic plan across sectors
Resource mobilization	1. Ensure the availability of sustainable resources 2. Ensure resource mobilization to encourage innovations in the development of new antimicrobials, vaccines, diagnostics, novel therapies and/or alternatives

4. OPERATIONAL PLAN

The national antimicrobial resistance prevention and containment strategic plan details an operational plan that describes activities to be implemented in line with the five strategic objectives. Priority area, interventions, detailed activity, indicator, time frame, frequency, lead implementer, collaborator and cost or budget have been identified.



4.1 Objective one:
IMPROVE AWARENESS AND UNDERSTANDING OF ANTIMICROBIAL RESISTANCE THROUGH EFFECTIVE BEHAVIOUR CHANGE COMMUNICATION, EDUCATION AND TRAINING

Table 9: Detailed operational plan for objective one

Initiative 1.1: Improve awareness, understanding and empowerment of clients and communities							
Strategic interventions	**Activities**	**Indicator**	**Time of implementation**	**Frequency (within 5 years)**	**Lead implementer**	**Collaborators**	**Indicative budget (US$)**
Design and promote sustainable whole-of-society engagement through effective enforcement of the One Health approach and communication platforms	Develop comprehensive evidence-based national communication strategies for antimicrobial resistance in humans, animals, plants and the environment	Communication strategy developed	2021–2022	1	MOH, MOA, EFCCC and their regional counterparts	Professional associations, academia, media	9450.00
	Develop and disseminate information and education communication and behaviour change communication (printed and audio visual) materials targeting diverse beneficiaries, including people living with a disability	Number of information and education communication and behaviour change communication materials developed	2021–2025	10	MOH, MOA, EFCCC and their regional counterparts	Media, civil society	80 000.00
	Conduct antimicrobial resistance awareness campaigns regularly (such as World Antimicrobial Awareness Week, AMR Day and other events) and collaborate with other campaigns that are linked to antimicrobial resistance to align and mainstream antimicrobial resistance messages (handwashing day, Ethiopian great run, culture day, children's day, etc.)	Number of campaigns conducted	2021–2025	10	MOH, MOA, EFCCC and their regional counterparts	Civil society, academia, media, partners	125 000.00

Cont....							
	Conduct survey (health professionals and community) to assess knowledge, attitudes and behavioural practice about antimicrobials use and antimicrobial resistance in human health, agriculture and the environment	Number of survey reports	2021, 2023 and 2025	3	MOH, MOA, EFCCC and their regional counterparts	Academia, professional associations, partners	112 500.00
	Use multimodal strategies for mass community popularization on antimicrobial resistance using existing community platforms adapted to specific stakeholder groups and tailored to cultural contexts	Number of community platforms utilized	2021–2025	5	MOH, MOA, EFCCC and their regional counterparts	Opinion leaders, media, civil society	318 055.56
	Provide training for food, animal owners, handlers and processors about safe food production and alternatives to antimicrobials in public and private institutions	Number of training sessions	2021–2025	25	MOA and its regional counterparts	MOH, EFCCC, EFDA, VD-FACA and their regional counterparts	390 000.00

Incorporate personal, public and food hygiene and sanitation, nutrition, good farming and environment health control practices, related to the rational medicine use and antimicrobial resistance in to school curricula and extracurricular activities	Advocacy for inclusion of antimicrobial resistance-related topics in curricular and extracurricular activities	Number of advocacy sessions	2021–2025	3	MOH, MOA, EFCCC and their regional counterparts	MOE and their regional counterparts	32 400.00
	Inclusion of antimicrobial resistance and rational medicine use topics in extracurricular works (school health, nutrition programme and clubs)	Antimicrobial resistance incorporated into one or more clubs in selected schools	2022 onwards	1	MOE and their regional counterparts	MOH, MOA, EFCCC and their regional counterparts	45 600.00
Raise awareness of clients and the public on rational use of antimicrobials and adherence to treatment and professional advice through health education and training	Develop job aids for professionals to improve adherence to counselling in human and animal health care	Number of job aids developed	2021–2025	3	MOH, MOA	Academia	29 000.00
	Integrate antimicrobial resistance and rational medicine use into existing health education activities in waiting areas both in public and private facilities (education and mentoring)	Percentage of facilities integrating rational medicine use, antimicrobial resistance prevention and containment in their health education	2021–2025	80%	MOH, MOA	Health facilities, health and agriculture extension workers	105 000.00

Improve awareness on the risk of leftover antimicrobials, pesticides, insecticides and heavy metal contaminants in the environment	Advocate for the implementation of the policy on safe disposal of antimicrobials, pesticides, insecticides and heavy metals at the community level	Implemented policy framework and guidelines on safe disposal of antimicrobials, pesticides, insecticides and heavy metals at the community level	2022	1	EFCCC	MOH, MOA, VDFACA, EFDA	33 000.00
	Develop and disseminate awareness-raising materials on environmental waste management for farmers, human and animal health facilities, farms and food handlers	Number of awareness-raising materials developed	2021–2025	15	MOH, EFDA, MOA, VDFACA, EFCCC	Civil society, academia	27 200.00
	Improve adherence to proper disposal of unfit-for-use antimicrobials from farms, human and animal health facilities and other hazardous wastes through sensitization workshops	Number of events organized	2022–2025	15	EFDA, VDFACA, EFCCC	Civil society, academia	157 500.00
Initiative 1.2: Education and training on antimicrobial resistance for human, animal, plant and environmental professionals at public and private institutions							
Incorporate antimicrobial resistance in course contents of technical and vocational education and training (TVET), undergraduate and post-graduate curricula	Advocacy to incorporate antimicrobial resistance courses in TVET, undergraduate and graduate curriculum	Number of advocacy sessions conducted	2021–2023	5	MOH, MOA, EFCCC and their regional counterparts	MOSHE, MOE, academia	54 500.00
	Incorporate antimicrobial resistance in course contents of TVET, undergraduate and postgraduate curriculum of human, animal and environment professionals	Antimicrobial resistance incorporated into the curriculum	2024–2025	1	MOSHE, MOE	MOH, MOA, EFCCC, academia	

Develop and implement regular and need based pre–graduation and in-service training and continuous professional development programmes on antimicrobial use, resistance and stewardship and infection prevention and control, including for health and agriculture extension workers	Conduct training on responsible prescribing, dispensing, use, and administration practices for human and animal health care professionals including for health and agriculture extension workers	Number of trainings provided per year	2021–2025	15 per sector	MOH, MOA	Academia health facilities, EFCCC	115 625.00
	Facilitate and provide a pre-graduation training on antimicrobial use, resistance and stewardship and infection prevention and control for human and animal health professionals	Percentage of higher education institutions providing pre-graduation training on antimicrobial use, resistance and stewardship and infection prevention and control	2022–2025	100%	Academia, MOH, MOA, EFCCC, MOSHE	MOE, professional associations	1 000 000.00
	Incorporate antimicrobial use, resistance and stewardship and infection prevention and control modules and trainings for human and veterinary professionals, including for health and agriculture extension workers	Number of professional associations that have incorporated antimicrobial resistance prevention and containment in their continued professional development training	2021–2022	1 per professional association	MOH, MOA, professional associations	Academia	27 125.00

Initiative 1.3: Empower the media (public and private) and engage civil society organizations on antimicrobial resistance prevention and containment							
Capacitate media and civil society on antimicrobial resistance to ensure their engagement in educating the public	Provide trainings on antimicrobial resistance for media professionals (print and electronic)	Number of trainings provided per year	2021–2025	10	MOH, MOA, EFCCC and their regional counterparts	Media, civil society	40 625.00
	Conduct advocacy workshops on antimicrobial resistance for civil society groups	Number of workshops provided	2021–2022, 2023–2024	2	MOH, MOA, EFCCC	Media, civil society	15 000.00
	Disseminate information on antimicrobial resistance to the general public through media and civil society	Number of media and civil society sessions on antimicrobial resistance	2021–2025	50	Media, civil society	MOH, MOA, EFCCC, Ethiopian Broadcasting Corporation	14 750.00
Initiative 1.4: Advocacy and communication on antimicrobial resistance with policymakers and decision-makers							
Advocate antimicrobial resistance as a national and global priority with pertinent policymakers and decision-makers to mainstream antimicrobial resistance prevention and containment	Conduct advocacy workshops	Number of advocacy workshops	2021–2025	3	National and regional Advisory Committees	MOH, MOA, EFCCC	18 900.00
	Develop policy briefing and disseminate them	Number of policy briefs disseminated	2021–2025	3	National and regional Advisory Committees	MOH, MOA, EFCCC	6 750.00
Total							**2 642 355.56**

4.2 OBJECTIVE TWO: STRENGTHEN THE KNOWLEDGE AND EVIDENCE ON ANTIMICROBIAL USE AND RESISTANCE THROUGH SURVEILLANCE AND RESEARCH

Table 10 Detailed operational plan for objective two

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
nitiative 2.1: Establish and strengthen surveillance on antimicrobial resistance priority pathogens in human and animal health, feed and food safety, plant and the environment							
Establish and strengthen **antimicrobial resistance surveillance systems to detect and report antimicrobial resistance and disseminate information to facilitate evidence-based decision-making at all levels in all sectors.**	Develop joint plan to establish surveillance system on antimicrobial resistance	Availability of joint plan	2021	1	EPHI, National Animal Health, Diagnostic and Investigation Center (NAHDIC), EEFRI VDFACA	MOH, MOA AHRI, EFDA, EFCCC, National Veterinary Institute (NVI), stakeholders in the regional state, private diagnostic labs	1200.00
	Establish and expand antimicrobial resistance sentinel sites	Number of antimicrobial resistance sentinel sites	2021–2025	30	EPHI, NAHDIC, EEFRI	EPSA, private pharmaceutical suppliers	3 299 700.00
	Establish and strengthen programmatic antimicrobial resistance surveillance system for human and animal health	Number of programmatic antimicrobial resistance surveillance systems	2021–2025	5	EPHI, NAHDIC	MOH, WHO	4 924 000.00
	Organize an antimicrobial resistance data and information dissemination platform and review meeting	Annual review meeting conducted	2021–2025	5	MOH, MOA, EFCCC and their agencies	Research institutes, development partners, media	270 000.00
	Establish an antimicrobial resistance database and generate reports among the human, animal and plant health, food safety and environment sectors	Established national antimicrobial resistance database	2021–2022	1	MOH, MOA, EFCCC	Development partners	500 000.00

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
Establish multi-institutional networks to collate and channel surveillance reports and case studies on antimicrobial resistance and informed policymaking and decision-making	Create One Health antimicrobial resistance surveillance and research platforms	Platform created	2021	1	EPHI, NAHDIC, AHRI, EEFRI	MOH, MOA, EFCCC, development partners, academia	81 000.00
		Number of platform meetings conducted	2022–2025	5			
	Generate and disseminate integrated antimicrobial resistance surveillance reports from all sectors	Number of joint reports and research articles disseminated	2021–2025	5	EPHI, NAHDIC, AHRI, EEFRI	MOH, MOA, EFCCC, development partners	65 000.00
	Prepare policy briefs	Written policy briefs	2021–2025	2	EPHI, NAHDIC, AHRI, EEFRI	MOH, MOA, EFCCC, development partners	2700.00
Establish a real-time patient- and population-based antimicrobial resistance surveillance system	Conduct real-time patient- (human and animal) and population-based antimicrobial resistance surveillance	Number of real-time surveillance reports produced	2021–2025	2	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC	108 000.00
	Monitor antimicrobial resistance trends to demonstrate the extent of the problem in human, animal and plant health, food safety and the environment	Number of survey reports conducted	2021–2025	5	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC	27 000.00

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
Strengthen and maintain a national bio-repository on antimicrobial resistance priority organisms, strains and genes	Develop and disseminate a national bio-repository guidelines	Developed and disseminated biorepository guidelines	2022–2023	1	EBI, EPHI, NAHDIC, EEFRI AHRI, Animal Products, Veterinary Drug and Feed-Quality Assessment Center (APVDF-QAC)	MOH, MOA, EFCCC, development partners, WHO	13 500.00
	Strengthen the existing national bio-repository (bio-bank) centre	Center strengthened	2023–2025	1	EBI, EPHI, NAHDIC, EEFRI, AHRI, APVDF-QAC	MOH, MOA, EFCCC, development partners WHO	2 000 000.00
Establish an alert system on emerging and re-emerging antimicrobial resistance issues that have public and animal health emergency importance	Develop protocols and guidelines for notifying of an antimicrobial resistance infection outbreak	Protocol and guidelines developed	2022	1	EPHI, NAHDIC	MOH, MOA, EFCCC	6000.00
	Generate alert report	Generated alert reports	2021–2025	Continuous	EPHI, NAHDIC, AHRI, APVDF- QAC	MOH, MOA, EFCCC	

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
Initiative 2.2: Build up the capacity for a quality management system of laboratories for human, animal and plant health, feed and food safety and environment testing at national, regional and facility levels							
Standardize microbiology laboratory methodologies and techniques, including advanced detection methods	Conduct assessment of gaps in sample collection, shipment, biosafety, biosecurity and laboratory skills and knowledge	Assessment reports	2021–2023	2	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, diagnostic laboratories, academia, partners	63 000.00
	Prepare a laboratory implementation plan based on the identified gaps (sample collection, transport, submission, processing and confirmatory testing, training, consumables and equipment)	Implementation plan executed	2022	1	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, development partners	
	Develop and review a laboratory sample referral system	Number of networked laboratories	2022	1	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, development partners	12 180.00
	Develop and disseminate a national harmonized reference manual or guidelines on antimicrobial resistance-related tests	Availability of harmonized manual	2021–2022	1	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, Ethiopian Standards Agency (ESA), health facilities, laboratories development partners	21 120.00
	Develop and conduct internal quality control	Number of antimicrobial resistance sites implementing internal quality control	2021–2025	30	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, development partners	NA
	Involve antimicrobial resistance surveillance sites in external quality assurance schemes	Number of antimicrobial resistance sites participating in external quality assurance schemes (three times per year)	2021–2024	30	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, development partners	506 250.00
	Facilitate external quality-assurance schemes proficiency testing panel production	Number of external quality assurance schemes panel production	2025	2	EPHI, NAHDIC	MOH, MOA, development partners	1 297 662.00
	Procure American-type culture collection strains	Uninterrupted internal quality control and confirmatory tests	2021–2025	Continuous	EPHI, NAHDIC, Ethiopian Environment and Forest Research Institute (EEFRI)	MOH, MOA, EFCCC, development partners	501 000.00

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
	Establish a microbiology media preparation centre	Centre established	2022–2025	3	EPHI, NADHIC, AHRI, EEFRI, regional laboratories	MOH, MOA, EFCCC, development partners	500 000.00
	Implement a quality management system	Number of antimicrobial resistance sites implementing a laboratory quality-management system	2021–2025	30	Surveillance sites, EPHI, NAHDIC, EFCCC, EEFRI	MOH, MOA, EFCCC, development partners	135 000.00
	Ensure involvement of antimicrobial resistance surveillance laboratories in an accreditation system	Number of accredited laboratories	2021–2025	10	Surveillance sites, EPHI, NAHDIC, EFCCC, EEFRI	MOH, MOA, EFCCC, development partners	
Establish and strengthen laboratory facilities and equipment maintenance and calibration centre	Conduct a feasibility study for strengthening the national calibration and metrology centre	Feasibility study conducted	2022	1	EPHI, NAHDIC, EEFRI, National Metrology Institute of Ethiopia	MOH, MOA, EFCCC, development partners	3000.00
	Strengthen in-country equipment maintenance and calibration services at the national level	Avail of maintenance and calibration services at the national level	2021–2025	5	EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC, development partners	90 000.00

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
Build up the capacity of human resources for specimen management, conducting culture, identification and antimicrobial sensitivity tests and reporting in relation to humans, animals, the environment and feed and food processing, using phenotypic and molecular methods	Develop training materials and provide training for professionals working at sentinel sites	Training provided	2021–2025	2	EPHI, NAHDIC, EEFRI	Surveillance sites, development partners	45 000.00
Strengthen the laboratory information management systems	Assess the existing laboratory information system	Assessment report	2022	1	EPHI, NAHDIC, EEFRI, health facilities, laboratories	MOH, MOA, EFCCC, development partners	6 300.00
	Establish a standardized laboratory information system	Number of facilities with standardized laboratory information system	2021–2025	15			21 000.00

Initiative 2.3: Basic and operational research							
Conduct basic and operational research on antimicrobial use, consumption and resistance	Identify priority operational research areas	Identified operational research areas	2022 and 2024	2	MOH, MOA, EPHI, AHRI, NAHDIC, EFCCC, EEFRI, academia	Professional associations, EFDA, VDFACA	
	Conduct research on prioritized areas (including burden and impact of antimicrobial resistance) and determining risk factors and drivers of resistance	Number of research studies conducted	2022–2025	11	EPHI, NAHDIC, EEFRI, AHRI, academia, APVDF-QAC, professional associations	MOH, MOA, EFCCC	212 520.00
	Conduct systematic review and meta-analysis of national studies on antimicrobial use, resistance and consumption and antimicrobial residue levels	Systematic review and meta-analysis conducted	2023–2024	1	EPHI, AHRI, NAHDIC, EFDA, VDFACA, EEFRI	MOH, MOA, EFCCC, development partners	7500.00
Introduce innovative technologies and research for infection and antimicrobial resistance rapid diagnostic tests and methods	Assess innovative technologies and methods to introduce innovative rapid diagnostic techniques	Assessment report	2022	Once	Surveillance sites, EPHI, NAHDIC, AHRI, EEFRI, academia	MOH, MOA, EFCCC, development partners	30 000.00
	Adopt new diagnostic tools, equipment, kits and point-of-care devices and techniques (field-applicable rapid tests)	Number of point-of-care tests introduced	2021–2025	Continuous			720 000.00

Research on diagnostics and treatment alternatives for infections that can be treated with antimicrobials	Conduct research to introduce new and improved vaccines for humans and animals (pneumococcal vaccine)	Number research studies produced	2021–2025	2	EPHI, NAHDIC, EEFRI, NVI AHRI, academia, APVDF-QAC	MOH, MOA, EFCCC, professional associations	23 500.00
	Conduct research to identify rapid or best diagnostic methods and/or metrics to improve rational use of antimicrobials	Number of research studies produced	2021–2025	6	EPHI, NAHDIC, AHRI, academia affiliated with referral hospitals	MOH, MOA, EPHI, NAHDIC, EFCCC, AHRI, APVDF-QAC professional associations	100 000.00
	Undertake joint vaccination assessment to identify gaps on selected human and animal diseases	Joint vaccination coverage assessment undertaken	2023	1	MOA, EPHI, AHRI	MOH, NVI, NAHDIC, their regional and city administration counterparts, health facilities	7500.00
Develop an AMR index to communicate gaps in antimicrobial effectiveness and help aggregate data on resistance to assess trends over time and across locations	Identify key stakeholders	Stakeholders identified	2021–2025	1	MOH, MOA, EFCCC	EEFRI, professional associations, EPHI, NAHDIC, AHRI, APVDF-QAC, academia	NA
	Gather and disseminate AMR index	AMR index available	2021–2025	1	EPHI, NAHDIC, EFCCC	MOH, MOA	4500.00

Initiative 2.4: Establish and strengthen surveillance and research on antimicrobial contaminants and residues and the drivers of antimicrobial resistance in the environment, plant, food and feed sectors							
Establish and strengthen surveillance and research of antimicrobial residues, effluents and waste in the environment, plant and food sectors	Establish national antimicrobial residue surveillance system for environment, plant and food safety	System established	2022	1	EFDA, VDFACA, EEFRI	MOH, MOA, EFCCC, EPHI, NAHDIC, AHRI	7500.00
	Conduct research and surveillance on antimicrobial residues in food, effluents and waste	Number of research report produced	2021–2025	5	VDFACA, EFDA academia AHRI, EEFRI	MOH, MOA, EFCCC, EPHI	45 000.00
	Monitor the level of antimicrobial residues, based on the surveillance and research findings in food, manufacturing plants, health facilities, other institutions, individual households, waste from animals and slaughter houses	Number of monitoring activities performed	2023–2025	3	VDFACA, EFDA, AHRI, EEFRI	MOH, MOA, EFCCC, EPHI, academia	22 500.00
	Identify priority foodborne pathogenic indicator bacterial species in animal, plant and aquatic origins	Data generated and reported	2022–2023	1	AHRI, EPHI, NAHDIC, EEFRI	MOH, MOA, EFCCC	20 000.00
Total							**15 034 132.00**

4.3 OBJECTIVE THREE: ENHANCE INFECTION PREVENTION AND CONTROL THROUGH EFFECTIVE ENVIRONMENTAL HEALTH, INFECTION PREVENTION AND BIO-RISK MANAGEMENT IN HUMAN, ANIMAL AND PLANT HEALTH CARE

Table 11: Detailed operational plan for objective three

Initiative 3.1: Strengthen and promote infection prevention and control programmes for human, animal and plant health and the environment							
Strategic interventions	**Activities**	**Indicator**	**Time of implementation**	**Frequency (within 5 years)**	**Lead implementer**	**Collaborators**	**Indicative budget (US$)**
Coordinate multisector collaboration to limit the emergence, re-emergence and spread of antimicrobial resistance and multiple-drug resistant organisms in humans, animals, plants and the environment	Establish and strengthen multisector task force on infection prevention and control and hygiene	Multisector task force established at each level	2021–2022	13	MOH, MOA, EFCCC	Facilities, academia, development partners	65 000.00
	Develop guidelines for herd health packages, such as disease prevention and control, good husbandry practices, bio-risk management, effluents and manure, and waste disposal management	Guidelines developed	2022	3	MOH, MOA, EFCCC	Health, agriculture and environment bureaus, universities, facilities, development partners	68 400.00
	Organize platforms to identify, share and reward best practices on infection prevention and control	Number of events organized to share and reward best practices on infection prevention and control	2021–2025	5	MOH, MOA, EFCCC	Academia, research institutes, professional associations	35 000.00

Set and enforce standards on infection prevention and control practices as per One Health approach	Develop institutional infection prevention and control policies and standard protocols and monitoring tools, including herd disease prevention and control, good husbandry practices, bio-risk management and effluents, manure and waste disposal management	Developed infection prevention and control policies, protocols and tools	2021–2022	3	MOH, MOA, EFCCC	Health, agriculture and environment bureaus, facilities	68 400.00
	Enforce adherence to infection prevention and control policies and standards	Percentage of facilities adhering to the standards	2022–2025	80 %	MOH, MOA and their regional counterparts	Facilities	7500.00
Develop protocols and guidelines for infection outbreak detection and case management due to antimicrobial resistance and multiple-drug resistant strains	Develop case management protocols and guidelines for infection outbreaks due to antimicrobial resistance and multiple-drug resistant strains	Developed protocols and guidelines	2021	1	MOH, MOA and their regional counterparts	EFCCC, facilities	6500.00
	Print, disseminate and distribute outbreak detection and case management protocols and guidelines	Printed and disseminated protocols and guidelines	2022	1	MOH, MOA, and their regional counterparts	EFCCC, facilities	5000.00

Initiative 3.2: Strengthen infection prevention and control practices in public and veterinary health facilities							
Ensure implementation of safe infection prevention and control practices in human and veterinary health facilities	Establish and strengthen a functional infection prevention and control committee at the human and animal health facility level	Percentage of facilities with functional infection prevention and control committee	2021–2025	100%	Regional bureaus, human and animal health facilities	MOH, MOA, development partners	100 000.00
	Promote the availability of infection prevention and control materials, supplies and equipment, including safe and adequate water supply in health facilities	Percentage of facilities with required infection prevention and control supplies	2021–2025	80%	Health facilities, MOH, MOA and their regional counterparts	Ministry of Water Irrigation and Energy, suppliers	50 000.00
	Monitor the infection prevention and control practices at targeted facilities	Number of facilities monitored	2021–2025	200	MOH, MOA and their regional counterparts	EFCCC, health facilities, development partners	25 000.00
	Conduct in-service trainings on infection prevention and control	Number of trainings provided	2021–2025	15	MOH, MOA, and their regional counter parts, academia, professional associations	EFCCC, health facilities, development partners	200 000.00

Prevent and monitor health care-associated infections at human and veterinary health facilities	Conduct health care-associated infections survey at the health facility level	Number of surveys conducted	2021	1	MOH, MOA and their regional counterparts	Health facilities, development partners	12 250.00
	Implement health care-associated infection prevention measures	Percentage of health facilities with health care-associated infection prevention measures	2021–2025	100%	Health facilities	MOH and regional counterparts, WHO, development partners	87 500.00
		Percentage reduction of health care-associated infections	2024	10% reduction from baseline	Health facilities	MOH and regional counterparts, WHO, development partners	12 250.00
	Implement clinic-acquired infection prevention measures in animal health facilities	Percentage of health facilities with health care-associated infections prevention plan	2021–2025	50%	MOA, regional agriculture bureaus, animal health facilities	Development partners	
Strengthen prevention of zoonotic diseases	Assess prevalence and risk factors of zoonotic diseases	Surveys conducted	2021	1	MOH, MOA, EFCCC	Health, agriculture and environment bureaus, universities	34 200.00
	Develop integrated zoonotic disease prevention and control action plan	Action plan developed	2022	1	MOH, MOA, EFCCC	Health, agriculture and environment bureaus, universities	11 400.00
	Design and implement collaborative evidence-based interventions	Number of interventions	2022–2023	4	MOH, MOA, EFCCC	Health, agriculture and environment bureaus, universities	22 800.00
	Integrate zoonotic disease prevention through the One Health approach at region and facility levels	Percentage of facilities and regions practising the One Health approach	2021–2025	100%	MOH, MOA, EFCCC	Health, agriculture and environment bureaus, universities	45 000.00

Initiative 3.3: Strengthen good animal husbandry practices							
Promote bio-risk **management and good husbandry practices**	Prepare necessary regulations and legislation related to intensive and extensive farms	Legislation prepared and endorsed	2021–2023	1	MOA	Regional counterparts, facilities, development partners	15 000.00
	Conduct situation analysis in the food value chain (meat, milk, honey) for prioritized five species, agro-ecology (low, mid and high land)	Situation analysis conducted	2021	1	MOA	Regional counterparts, facilities, development partners	34 200.00
	Conduct assessment of knowledge, attitudes, behaviour and practices on good husbandry practice	Assessment done on knowledge, attitudes, behaviour and practices	2021	1	MOA, private sector, individual farmers	Regional agriculture bureaus, facilities, development partners	34 200.00
	Develop bio-risk guidelines for animal feed processing and poultry, dairy and beef production, food handlers and traders	Guidelines developed	2022	1	MOA, EFDA	Regions, facilities, development partners, private sector, farmers	22 800.00
	Implement biosecurity guidelines in selected farm production systems	Number of production systems implementing biosecurity guidelines	2022–2025	3	MOA	Regions, facilities, development partners, private sector, farmers	35 600.00
	Improve awareness on good animal feed production (harvesting, distribution and storage) and cleanliness of the yard	Number of training sessions	2021–2025	5	MOA	Regions, facilities, development partners, private sector, farmers	87 500.00
	Promote integrated legal obligations regarding animal welfare in the annual action plan	Integrated legal obligation regarding animal welfare in the annual action plan	2021–2025	5	MOA	Regions, facilities, development partners, private sector, farmers	34 700.00
	Promote and disseminate selective breeding (disease resistant breeds)	Types of disease-resistant breeds disseminated	2021–2025	5	MOA	Regions, facilities, development partners, private sector, farmers	84 900.00

Integrate **antimicrobial resistance prevention and containment activities with veterinary outreach services and vaccination acc**ess	Improve vaccination service coverage, supply and cold chain management	Percentage coverage	2021–2025	80%	MOA	Regions, facilities, development partners	42 400.00
	Improve outreach services	Percentage coverage	2021–2025	80%	Animal health workers, community animal health workers	Regions, facilities, development partners	30 300.00
	Conduct staff capacity-building	Number of trained trainers	2021–2025	200	MOA	Regions, facilities, development partners	49 000.00
Initiative 3.4: Promote personal hygiene and strengthen water, sanitation and hygiene (WASH) services at the community level							
Promote personal **and environmental hygiene and san**itation	Support and enforce human and animal health facilities to provide functional handwashing and bathing facility for staff and patients	Percentage of health facilities having functional bathing facility for staff and patients	2021–2025	100%	Health facilities	MOH, regional health bureaus, WHO	10 500.00
	Support facilities to prepare and dispense alcohol-based hand sanitizer	Percentage of facilities supported	2021–2025	100%	MOH, MOA, EFCCC and their regional counterparts	Health facilities, development partners	10 500.00

Promote, implement a**nd enforce proper waste management at the community leve**l	Promote and enforce safe human excreta disposal and functional improved latrines in communities	Percentage of community settings with functional improved toilets with handwashing provision	2021–2025	60%	MOH, MOA, EFCCC and their regional counterparts	UNICEF, FAO, WHO, health facilities, community leaders	15 500.00
	Promote and enforce functional seepage pits, septic tanks and oxidation pond connected with a sewer line in health facilities	Percentage of health facilities with functional and proper liquid waste management	2021–2025	100%	MOH, Ministry of Water Irrigation and Energy	Regional health bureaus, Women Support Association, WHO, health facilities	10 500.00
	Promote and enforce to have functional incinerator, refuse pits and solid waste collection bins	Percentage of health facilities with functional and proper solid waste management	2021–2025	100%	MOH, Ministry of Urban Development and Housing	Regional health bureaus, WHO, health facilities	10 500.00
	Promote and enforce hazardous waste management in health facilities	Percentage of health facilities with functional and proper hazardous waste management	2021–2025	100%	MOH, Ministry of Urban Development and Housing	Regional health bureaus, WHO, health facilities	10 500.00
Encourage and promote safe **water supply and sanitation services for human**s and animals	Build up the capacity of health and agricultural extension workers to encourage and promote clean home environments, school compounds and animal housing	Number of capacity enhancements provided for health and agricultural extension workers	2021–2025	10	MOH, MOA	EFCCC, regional health bureaus, regional agriculture bureaus, WHO, FAO	31 500.00

Initiative 3.5: Strengthen information system for infection prevention and control management							
Develop a multisector infection prevention and control information and communication management system	Develop and adopt an infection prevention and control information communication and management database	Database in place	2021–2022	1	MOH, MOA, EFCCC	Regional labs, regional health bureaus, health facilities, development partners	28 900.00
	Integrate notification of antimicrobial resistance and multiple drug-resistant infections into existing reporting systems	Number of reports produced	2021–2025	5	MOH (EPHI, AHRI), MOA (NAHDIC, VDFACA)	Regional labs, health facilities, development partners	12 600.00
Generate and disseminate evidence-based information to improve infection prevention and control practices and decision-making processes	Conduct and disseminate operational research on infection prevention and control practices	Number operational research studies conducted	2021–2025	3	MOH (EPHI and AHRI) MOA (NAHDIC)	Regional labs, regional health bureaus, health facilities, development partners	37 500.00
	Disseminate and use the information for decision-making	Number of compiled information reports disseminated	2021–2025	5	MOH, MOA, EFCCC	Health, agriculture and environment bureaus	
Total							**1 526 023.30**

4.4 OBJECTIVE FOUR: OPTIMIZE THE USE OF ANTIMICROBIALS IN HUMAN, ANIMAL AND PLANT HEALTH CARE

Table 12: Detailed operational plan for objective four

Initiative 4.1: Improve access to quality antimicrobials and laboratory supplies in the human and animal health sectors							
Strategic interventions	**Activities**	**Indicator**	**Time of implementation**	**Frequency (within 5 years)**	**Lead implementer**	**Collaborators**	**Indicative budget (US$)**
Ensure an effective supply chain management of quality essential antimicrobials and laboratory supplies	Assess prioritization of essential antimicrobials and laboratory supplies in the government and non-government procurement list for human and animal health sectors	Assessment reports	2021 and 2024	2	MOH, MOA, EPSA, EPHI, NAHDIC, EHIA, AISCO	Development partners, EFDA, VDFACA	25 000.00
	Advocate inclusion of priority antimicrobials and laboratory supplies in the Ethiopian Pharmaceuticals Supply Agency (EPSA) and the Agriculture Inputs Supply Corporation (AISCO) long-term procurement agreements and/or non-government suppliers	Antimicrobial and laboratory supplies included in suppliers' long-term procurement agreements	2021–2025	Continuous	MOH, MOA, EPSA, AISCO	Private manufacturers, importers, distributors	17 500.00
Promote local production of quality antimicrobials and laboratory supplies for human and animal	Undertake a baseline assessment of local manufacturing capacity	Assessment report	2021	1	MOH, MOA, MOTI, Ethiopian Investment Commission (EIC)	EFDA, VDFACA	5250.00
	Advocate capacity enhancement of local manufacturers	Number of advocacy campaigns conducted	2021–2025	3	MOTI, MOH, MOA, EIC		7200.00

Initiative 4.2: Ensure optimal prescribing, dispensing and use of antimicrobials in the human health sector							
Integrate antimicrobial stewardship into the Hospitals Services Transformation Guideline and the Ethiopian Health Center Reform Implementation Guideline	Conduct workshop for policymakers and decision-makers at all levels	Number of advocacy campaigns conducted	2021	2	MOH, regional health bureaus	Health facilities, development partners	14 000.00
	Inclusion of antimicrobial stewardship into the Hospitals Services Transformation Guideline and the Ethiopian Health Center Reform Implementation Guideline	Antimicrobial stewardship included in the Hospitals Services Transformation Guideline and the Ethiopian Health Center Reform Implementation Guideline	2022	1	MOH, regional health bureaus	Health facilities	6250.00
Ensure implementation of **antimicrobial stewardship in health care facilities**	Ensure antimicrobial stewardship as one of health care facility managements' quality improvement parameters	Number of facilities with plan, dedicated budget and personnel for antimicrobial stewardship	2021–2025	150		WHO, development partners	33 000.00
	Streamline antimicrobial stewardship into the existing pharmacy services (clinical pharmacy and the Drug Information Services)	Number of facilities with integrated Antimicrobial Stewardship Programme with clinical pharmacy services and the Drug Information Services	2021– 2025	150	Health care facilities	MOH, regional health bureaus, development partners, WHO	NA
	Provide training on antimicrobial stewardship for the Antimicrobial Stewardship and the Drug and Therapeutic Committees and other professionals	Number of training sessions	2021–2025	17	MOH, regional health bureaus, EPHI, EFDA	Health care facilities, academia, WHO, development partners, professional associations	210 000.00
	Monitor implementation of functional antimicrobial stewardship at health care facilities	Number of health facilities that have implemented functional antimicrobial stewardship	2021–2025	150	MOH, regional health bureaus		50 000.00

Ensure the availability and **monitor compliance with updated and evidence-based guidelines, policies, ma**nuals and formularies for prescribing and dispensing practices	Review existing antimicrobial stewardship guidelines, prescribing and dispensing manuals, formularies and standard treatment guidelines and the WHO Essential Medicines List with the AWaRe classification of antibiotics	Availability of updated evidence-based standard treatment guidelines, antimicrobial stewardship policy, prescribing and dispensing manuals, formularies and the WHO Essential Medicines List	2021	1	MOH, regional health bureaus, EFDA, health facilities	WHO, development partners, academia, professional associations	18 000.00
	Avail of and monitor compliance with evidence-based standard treatment guidelines and antimicrobial stewardship guidelines, prescribing and dispensing manuals, formularies and the WHO Essential Medicines List with the aware classification of antibiotics		2021–2025	Continuous	MOH, regional health bureaus, EFDA, health facilities	WHO, development partners, academia, professional associations	80 000.00
Strengthen antimicrobial use and consumption surveillance for action to improve health care outcome at the health facility and national levels	Conduct regular antimicrobial use and consumption surveillance at the health facility level	Percentage of health facilities conducting antimicrobial use and consumption surveillance	2021–2025	Yearly per health facility level	Health facilities	MOH, regional health bureaus, WHO, development partners	63 000.00
	Conduct antimicrobial use and consumption surveillance at the national level	Number of antimicrobial use and consumption surveillance reports	2021–2025	5	MOH, regional health bureaus	Facilities, WHO, development partners	125 000.00
	Disseminate and ensure use of the evidence generated for improving health care outcomes, policymaking and decision-making process	Number of health care facilities utilized the antimicrobial use and consumption surveillance data for action	2021–2025	Continuous	MOH, regional health bureaus, health facilities	WHO, development partners	

Improve communication and team practices among health care providers	Organize multidisciplinary events (seminars, trainings, consultative meetings, morning sessions) on antimicrobial use and resistance	Number of events per year	2022–2025	6	Health facilities	MOH, regional health bureaus, academia	240 000.00
	Develop and disseminate up-to-date and unbiased scientific information on antimicrobial use and resistance	Number of materials disseminated (information and education communication materials, journal clubs, etc.) per year	2021–2025	6	Health facilities	MOH, regional health bureaus, academia	15 000.00
Initiative 4.3: Ensure optimal prescribing, dispensing and use of antimicrobials in the animal health sector							
Develop guidelines relevant to the prudent use of antimicrobials	Develop prescription guidelines	Developed guideline	2021	1	MOA, VDFACA and its counterparts	FAO, OIE, veterinarian associations	20 000.00
	Review veterinary drug formulary	Updated formulary	2021	1	MOA, VDFACA and its counterparts	FAO, OIE, associations	18 000.00
	Dissemination of prescription guidelines, veterinary standard treatment guidelines and formulary	Percentage availability of prescription guideline, veterinary standard treatment guidelines and formularies at veterinary facilities	2021–2025	90%	MOA, VDFACA and its counterparts	FAO, OIE, associations	2000.00
Develop and promote implementation of antimicrobial stewardship in veterinary services	Develop antimicrobial stewardship guidelines for animal health facilities	Developed guidelines	2021	1	MOA, regional agriculture bureaus, veterinary clinics	NAHDIC, VDFACA, academia	20 000.00
	Implement antimicrobial stewardship in selected animal health facilities	Number of health facilities implementing antimicrobial stewardship	2021–2025	15	MOA, regional agriculture bureaus, veterinary clinics	NAHDIC, VDFACA, academia	21 000.00

Strengthen the diagnostic capacity of veterinary health services to promote rational antimicrobial use	Equip the laboratory diagnostic testing in animal health facilities with materials and procedures	Number of laboratory facilities equipped with diagnostic testing materials and procedures	2021–2025	50	MOA, regional agriculture bureaus, veterinary clinics, VDFACA, NAHDIC	Academia, FAO, OIE	1 250 000.00
	Build up the capacity of human resources for quality laboratory diagnostic testing	Number of professionals trained	2021–2025	150	MOA, regional agriculture bureaus, Veterinary clinics, VDFACA, NAHDIC	Academia, FAO, OIE	100 000.00
Strengthen antimicrobial use and consumption surveying for veterinary health services	Conduct regular antimicrobial use and consumption surveys at national and animal health facility levels	Number of surveys conducted	2021–2025	5	MOA, regional agriculture bureaus, VDFACA, NAHDIC	Veterinary clinics	75 000.00
	Use and disseminate survey data on antimicrobial use and consumption for policymaking and decision-making	Number of policy briefs disseminated	2021–2025	3	MOA, regional agriculture bureaus, VDFACA	NAHDIC, veterinary clinics	
Strengthen professional, farmers field school and animal owner communications to optimize antimicrobial use and consumption	Organize multidisciplinary events (trainings, farmers monthly meetings, vaccine campaigns, etc.) to empower animal owners on recording of animal history, disease trends and antimicrobial use and consumption	Number of events	2021–2025	5 per region	MOA, regional agriculture bureaus, VDFACA, professional associations	Farmers associations, unions, community animal health workers	96 000.00
	Ensure counselling of clients (animal owners) on adherence, withdrawal period of antimicrobials and antimicrobial resistance	Number of counselled animal owners	2021–2025	Continuous	Veterinary clinics	MOA, regional agriculture bureaus, VDFACA	1200.00

Initiative 4.4: Strengthen diagnostic stewardship at the health care facility level							
Build up capacity and standardize diagnostic laboratories	Undertake baseline assessment on microbiology laboratory services	Assessment report	2021	1	EPHI, MOH, MOA, regional health bureaus, regional agriculture bureaus	Health facilities	31 500.00
	Develop diagnostic stewardship guidelines	Guidelines developed	2022	1	EPHI, MOH, MOA	Regional health bureaus, regional agriculture bureaus, health facilities, WHO, FAO, OIE, CDC, United Nations Environment Programme, development partners	6500.00
	Provide trainings on diagnostic stewardship for health care professionals	Number of training sessions conducted	2022–2025	5	EPHI, MOH, MOA, regional health bureaus, regional agriculture bureaus	WHO, FAO, OIE, CDC, UNEP Development partners	60 000.00
	Organize experience-sharing visits local and abroad among laboratories	Number of experience-sharing visits conducted	2022–2025	5			38 000.00
Ensure generation and utilization of antibiogram data at the human health care facility level	Generate, review and disseminate facility-specific antibiogram data	Number of health facilities generating antibiogram data	2021–2025	30	Health facilities, MOH, regional health bureaus	WHO, development partners	
	Ensure use of antibiogram data at the health care facility level on a regular basis	Number of facilities using antibiogram data	2021–2025	30	Health facilities, MOH, regional health bureaus		
Ensure prescribing practices of antimicrobials based on laboratory diagnostic results	Promote real-time utilization of microbiological and other diagnostic results for prescribing practices	Number of consultative meetings conducted	2021–2025	2 events per facility per year	MOH, regional health bureaus, health facilities		0

Initiative 4.5: Strengthen the regulatory system in the human, animal, food and feed production and the environment sectors							
Review, develop and enforce legislation on the prudent use of antimicrobials and laboratory supplies	Develop, update and enforce legal frameworks for antimicrobials and laboratory supply use	Developed and updated human and animal health legal frameworks	2021 and 2022	1	EFDA, VDFACA and their counterparts	MOH, MOA, regional health bureaus, regional agriculture bureaus	15 300.00
	Restrict and ban non-therapeutic use of antimicrobials in animal production and food production	List of restricted and banned antimicrobials	2021–2022	1	MOA, VDFACA and their counterparts	FAO, OIE	10 500.00
Strengthen pre- and post-market surveillance and control of antimicrobials and laboratory and infection prevention and control supplies	Review and develop systems and guidelines for market surveillance and control	Developed system for market surveillance	2021 and 2022	2	EFDA, VDFACA and their counterparts	FAO, OIE, WHO, development partners	14 000.00
	Conduct market surveillance and control	Number of market surveillance report	2021–2025	4	EFDA, VDFACA, and their counterparts	FAO, OIE	92 750.00
Build up capacity of regulatory bodies to ensure availability and use of quality antimicrobials, laboratory and infection prevention and control supplies	Assess the existing capacity of the regulatory bodies towards ensuring the availability and utilization of quality-assured antimicrobials, laboratory commodities and infection prevention and control supplies	Assessment reports	2021	2	EFDA, VDFACA	Regional counterparts of EFDA, VDFACA	31 500.00
	Enhance capacity of human resources through needs-based training	Number of trainings provided	2021–2025	5	EFDA, VDFACA and their regional counterparts	Development partners	52 500.00
Regulate food and feed preparation processing and dispensary centres to enhance food and feed hygiene and safety	Conduct regular inspection at all levels	Regular inspections conducted	2021–2025	Continuous	EFDA, VDFACA and their regional counterparts	Development partners	150 000.00
	Conduct hazard analysis of critical control points	Number of facilities conducting hazard analysis of critical control points	2021–2025	5	EFDA, VDFACA, MOA, MOH, EPHI	Development partners	

Ensure proper disposal of unfit-for-use antimicrobials and laboratory supplies	Establish and strengthen disposal facilities	Number of disposal facilities	2021–2025	12	MOH, MOA, EFDA, VDFACA, EFCCC, EPSA and their counterparts	Health facilities	NA
	Ensure proper disposal of unfit-for-use antimicrobials and laboratory supplies	Percentage of unfit-for-use antimicrobials and residues properly disposed	2021–2025	Continuous	MOH, MOA, EFDA, VDFACA and their counterparts, health facilities	Health facilities	NA
Establish standards for waste discharge and treatment from manufacturing and food processing plants and human and animal health care settings	Develop and promote guidelines for waste disposal, discharge and treatment	Guideline available	2022	1	MOH, MOA, EFCCC	Development partners	18 000.00
	Monitor waste disposal and discharge practices at manufacturing and food processing plants and human and animal health care settings	Improved practice of waste disposal, discharge and treatment	2022–2025	Continuous	EFDA, VDFACA, EFCCC	Development partners	0
Establish predicted no-effect environmental concentration values for resistance selection	Establish standard for minimum selective concentration and predicted no-effect concentration values	Availability of the predicted no-effect concentration standards	2023	1	MOH, MOA, EFCCC	Development partners	0
	Promote and monitor the established predicted no-effect concentration values	Low level of environmental health risks	2024–2025	Continuous	MOH, MOA, EFCCC	Development partners	0
Total							**2 980 450.00**

4.5 OBJECTIVE FIVE: STRENGTHEN AND ESTABLISH PARTNERSHIPS, ALLIANCES, GOVERNANCE AND RESOURCE MOBILIZATION AT ALL LEVELS

Table 13: Detailed operational plan for objective five

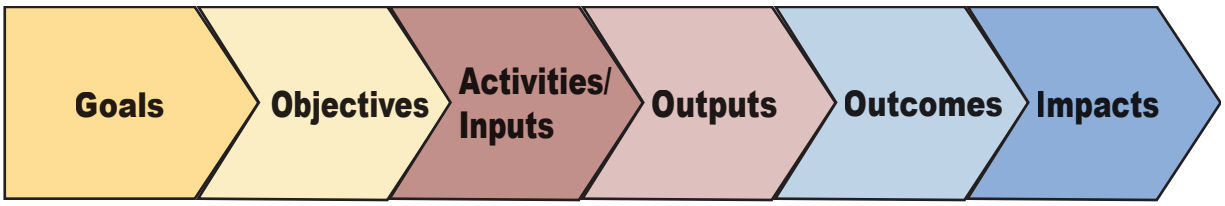
Initiative: 5.1: Strengthen and establish partnerships, alliances, governance and resource mobilizations at all levels

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
Strengthen the governance structure and collaboration of national and regional antimicrobial resistance stakeholders	Establish and strengthen a multi-institution and multidisciplinary inter-ministerial committees, AMR Advisory Committees and thematic working groups at national and regional levels	Number of functional inter-ministerial committees, AMR Advisory Committees and thematic working groups	2021 and 2022	92	MOH, MOA, EFCCC and their regional counterparts, institutions	Development partners, academia, associations	17 000.00
	Strengthen AMR secretariat at the national level (human resources, materials, finances, structures, etc.)	Functional and multidisciplinary AMR secretariat put in place	2021–2025	1	MOH, MOA, EFCCC	Development partners, WHO	
	Establish and strengthen AMR team and focal points for human, animal, plant, water, sanitation, hygiene and wastewater management at different levels	Number of AMR teams or focal points put in place	2021–2022	39	MOH, MOA, EFCCC and their regional counterparts, institutions	UNICEF, WHO, CDC, development partners, academia, associations	10 000.00
	Organize annual joint review meetings on the implementation of the national antimicrobial resistance operational plan	Number of review meetings conducted	2021–2025	65	MOH, MOA, EFCCC, Advisory Committees, thematic working groups	Development partners, academia, associations	52 500.00

Strengthen collaboration with multilateral and bilateral organizations engaging in antimicrobial resistance prevention and containment	Create platforms (networking, coordination, information and resource exchange mechanism) with all multilateral and bilateral antimicrobial resistance stakeholders	Number of coordination meetings conducted	2021–2025	5	MOH, MOA, EFCCC	Development partners, Advisory Committees, thematic working groups, academia, associations	10 000.00
	Share information, knowledge and reports on antimicrobial resistance with international collaborators	Number of antimicrobial resistance research outputs, guidelines and surveillance, including Tripartite AMR Country Self-Assessment Survey reports shared	2021–2025	5	AMR secretariat, MOH, MOA, EFCCC, EPHI, NAHDIC, EFRI	Development partners, academia, associations	0
Promote public–private partnerships on antimicrobial resistance prevention and containment	Develop public–private partnership framework on antimicrobial resistance prevention and containment	Framework developed	2021/22	1	MOH, MOA, EFCCC, MOF	Development partners, academia, associations	15 400.00
	Conduct regular advocacy platforms to engage the private sector on antimicrobial resistance prevention and containment	Number of advocacy platforms conducted	2021–2025	10	MOH, MOA, EFCCC and agencies under them, private organizations in the health sector	Development partners, academia, associations	38 500.00
Initiative 5.2: Strengthen leadership							
Ensure leadership, ownership and commitment for sustainable **implementation of antimicrobial resistance strategic plan at all sectors**	Incorporate antimicrobial resistance prevention and containment activities in the annual institutional plan and national strategic health plan	Number of institutions that have incorporated antimicrobial resistance into their annual plan	2021–2025	189	MOH, MOA, EFCCC and their regional counterparts, all stakeholders	National Planning Commission, development partners	
	Allocate resources for the sustainable implementation of antimicrobial resistance activities	Number of institutions that have allocated resources	2021–2025	189	MOH, MOA, EFCCC and their regional counterparts, all stakeholders	Ministry of Finance and regional counterparts, development partners	0
	Conduct annual institutional antimicrobial resistance performance review meetings at the national level	Number of sectors that have conducted performance reviews	2021–2025	15	MOH, MOA, EFCCC, all stakeholders	Development partners	63 000.00

Initiative 5.3: Resource mobilization							
Ensure availability of sustainable resources	Develop resource mobilization strategies	Resource mobilization strategy developed	2021	1	AMR secretariat MOH, MOA, EFCCC	Development partners, MOF, academia, associations	15 080.00
	Generate evidence on the return of investment in antimicrobial resistance prevention and containment	Number of evidence reports generated	2024	1	MOH, MOA, EFCCC	Development partners, academia, associations	20 000.00
Ensure resource mobilization to encourage innovations on the development of new antimicrobials, vaccines, diagnostics, novel therapies and/or alternatives	Mobilize resources for the development of new antimicrobials, vaccines, diagnostics, novel therapies and/or alternatives	Amount of resources mobilized and allocated for innovations	2021–2025	100%	MOH, MOA	EFCCC, development partners, academia, associations	12 100.00
	Design incentive-based mechanisms to motivate sectors in the development of new antimicrobials, vaccines, diagnostics, novel therapies and/or alternatives	Incentive mechanisms in place	2021–2025	1	MOH MOA EFCCC	Development partners, academia associations, private sector	10 000.00
Total							**246 580.00**
Grand total for objectives one–five in US$							**22 429 540.86**

5. MONITORING AND EVALUATION FRAMEWORK



5. MONITORING AND EVALUATION FRAMEWORK

Implementation of the antimicrobial resistance prevention and containment interventions must be monitored regularly to enable a better understanding of the scope of the problem throughout the country as well as to measure any progress. Such monitoring requires the collection, collation, analysis and management of data from the human, animal, plant and environment sectors. Monitoring and evaluation help to extract relevant information from ongoing activities that can be used for programme fine-tuning, reorientation and future planning.

The role of monitoring and evaluation is to provide a strategic link with the relevant stakeholders to ensure that strategies are effective in responding to the antimicrobial resistance threats in the country. Additionally, it enables problems to be detected early, thereby reducing the likelihood of major cost overruns or time delays and related health outcomes.

A monitoring and evaluation system needs to be in place to ensure that results are reported in a timely and efficient manner. In addition, the system supports the establishment of transparent feedback loops with implementing agencies, stakeholders and the public.

The monitoring and evaluation framework of the third strategic plan will include:

Standard reporting systems (reporting template, line of communication, frequency of reporting).

Routine and periodic monitoring mechanisms, such as supportive supervision and regular review meetings.

Baseline, midterm and terminal evaluations (based on the key performance indicators stipulated in table 15).

The logic model for the antimicrobial resistance prevention and containment monitoring and evaluation framework is presented in figure 2.

5.1 LOGIC MODEL FOR THE NATIONAL ANTIMICROBIAL RESISTANCE PREVENTION AND CONTAINMENT STRATEGIC PLAN

Figure 2 Logic model for the National Antimicrobial Resistance Prevention and Containment Strategic Plan

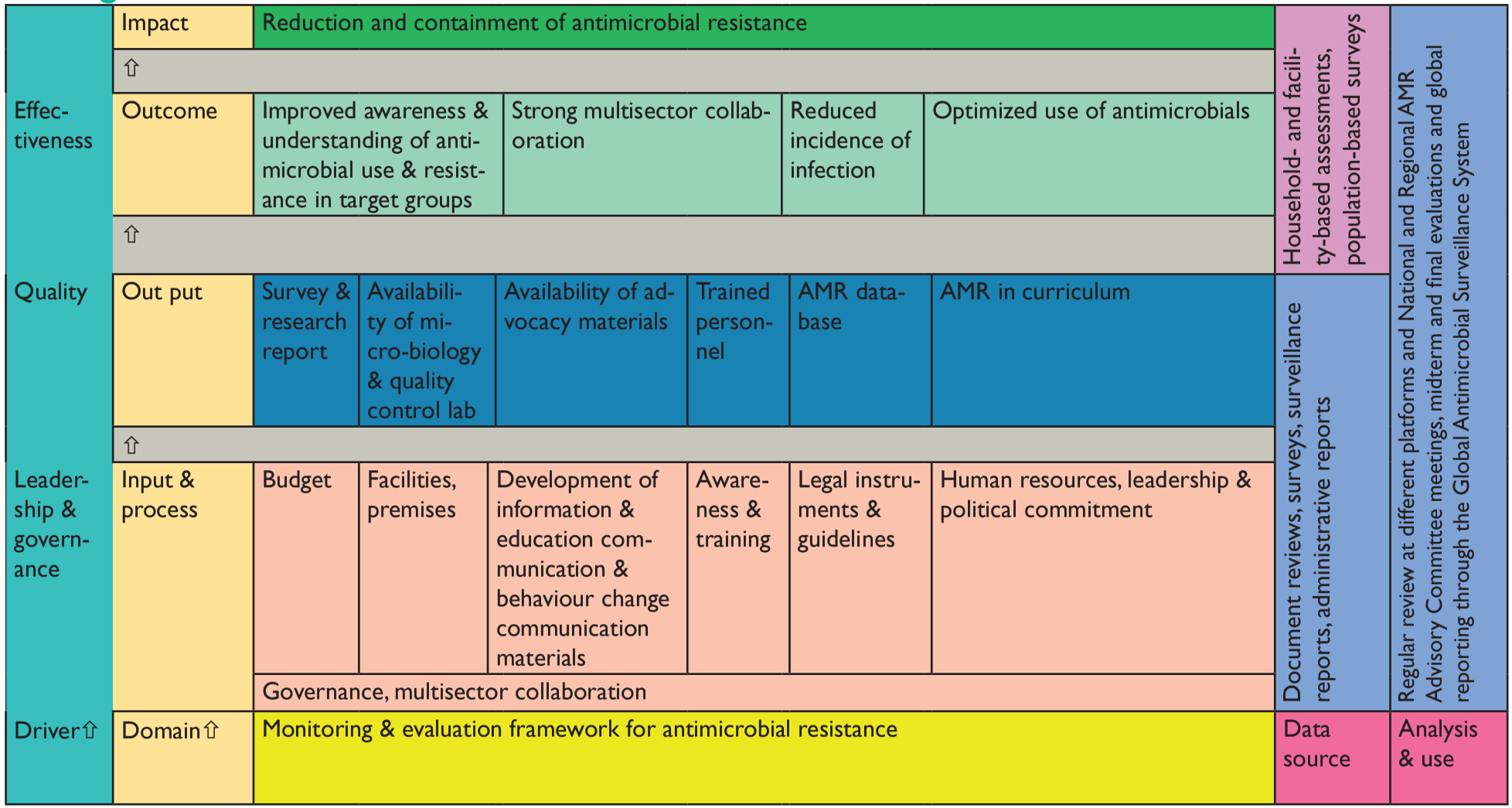


Figure 6: Logic model for the National Antimicrobial Resistance Prevention and Containment Strategic Plan

5.2 MONITORING AND EVALUATION PLAN

Table 14 Monitoring and evaluation operation plan

Strategic interventions	Activities	Indicator	Time of implementation	Frequency (within 5 years)	Lead implementer	Collaborators	Indicative budget (US$)
Develop and implement monitoring and evaluation (M&E) guidelines	Develop M&E guidelines with standard reporting template	M&E guidelines developed	2021	1	AMR secretariat	MOA, EFCCC	15 000.00
	Submit regular implementation reports at all levels	Number of timely reports	2021–2025	Quarterly	MOH, MOA, EFCCC and their regional counterparts	Development partners	NA
	Provide feedback	Timely feedback	2021–2025	Quarterly	AMR secretariat	MOH, MOA, EFCCC and their regional counterparts, development partners	NA
Establish and strengthen routine and periodic monitoring mechanisms	Organize integrated supportive supervision at all levels	Number of supervision report	2021–2025	Biannual	MOH, MOA, EFCCC and their regional counterparts	Development partners	120 000.00
	Conduct an annual review meeting	Number of review meetings conducted	2021–2025	Annual	MOH, MOA, EFCCC and their regional counterparts	Development partners	150 000.00
Evaluation	Baseline assessment	Assessment report	2021	1	MOH, MOA, EFCCC, partners	Respective regional counterparts	15 000.00
	Midterm evaluation	Evaluation report	2023	1	MOH, MOA, EFCCC and their regional counterparts, partners	Academia	25 000.00
	Terminal evaluation	Evaluation report	2025	1		Academia	40 000.00
Total							365 000.00

5.3 KEY PERFORMANCE INDICATORS

Core indicators have been selected to evaluate whether activities in the coming years are executed as planned and outcomes achieved as anticipated. They will also provide learning on how to improve future activities. Using the following guiding principles, 36 key performance indicators were selected for the monitoring and evaluation of the National Antimicrobial Resistance Prevention and Containment Strategic Plan.

- Relevance: significance of the indicators that measure each component of the plan.
- Feasibility: in terms of cost, time, data collection and capturing the burden.
- Sensitivity: change over two to three years of the reporting period.
- Consistency with international standards.

Table 15 Key performance indicators

Indicator	Type	Baseline 2020	Yearly target (2021–2025)					Data source	Periodicity	Level of data collection
			Y1	Y2	Y3	Y4	Y5			
Objective one: Improve awareness and understanding of antimicrobial resistance through effective behaviour change communication, education and training										
Number of dissemination events for IEC and BCC materials in the human, animal and environment sectors (1.1)	Output	2	4	6	8	10	12	Institutional activities and event reports	Annual	Institution (three sectors)
Awareness and understanding level increased on antimicrobial resistance among humans, animals and environment health professionals (1.1)	Outcome	NA			5% from the baseline		10%	Surveys	2–3 years	Population
Number of media spots disseminated to the public (1.1)	Output	2	4	6	8	10	12	Institutional reports	Annual	Institution (three sectors)
Number of antimicrobial trainings for media professionals (1.3)	Output	1	4	6	8	10	12	Institutional reports	Annual	Institution (three sectors)

Indicator	Type	Baseline 2020	Yearly target (2021–2025)					Data source	Periodicity	Level of data collection
			Y1	Y2	Y3	Y4	Y5			
Number of advocacy workshops created on antimicrobial resistance for policymakers (1.4)	Output	0	1	2	3	4	5	Institutional reports	Annual	Institution (three sectors)
Objective two: Strengthen the knowledge and evidence on antimicrobial use and resistance through surveillance and research										
Number of antimicrobial resistance surveillance sentinel sites employed to detect and report antimicrobial resistance, in human and animal health sectors (2.1)	Output	H–9 A–1	H–12 A–1	H–16 A–2	H–19 A–3	H–22 A–4	H–25 A–5	Admin reports	Routine	Institution
Percentage of bloodstream infections due to methicillin-resistant staphylococcus aureus and extended spectrum beta-lactamase E. coli among patients seeking care and blood sampled (2.1)	Outcome	32.5% for methicillin-resistant staphylococcus aureus, 50% extended spectrum beta-lactamase E. coli					10%	Published surveillance reports	5 years	Institution
Number of human, animal and environment labs with a standard quality management system (2.2)	Outcome	H–2 A–1 E–0	9 – –	12 – –	16 – –	19 – –	H–25 A–2 E–1	Admin reports	Routine	Institution
Number of research studies conducted on prioritized antimicrobial resistance areas (2.3)	Output	NA		2	4	7	10	Published literature	Annual	NA

Indicator	Type	Baseline 2020	Yearly target (2021–2025) Y1	Y2	Y3	Y4	Y5	Data source	Periodicity	Level of data collection
Objective three: Enhance infection prevention and control through effective environmental health, infection prevention and bio-risk management in human, animal and plant health care										
Percentage of facilities adhered with updated infection prevention and control policies, standard protocols and guidelines in human and animal health care (3.1)	Outcome	NA	5%	20%	40%	60%	80%	Survey reports	Annual	Institution
Decreased rate of health care-associated infections (3.2)	Outcome	39.6%		5%			10%	Survey reports	3–5 years	Institution
Percentage of facilities having biosecurity guidelines for animal feed processing, poultry, dairy and beef production (3.3)	Output	0			30%		50%	Survey reports	2–3 years	Institution
Objective four: Optimize the use of antimicrobials in human, animal and plant health care										
Percentage of essential antimicrobials and lab supplies included in the Government's long-term procurement list (4.1)	Output	–		100%	100%	100%	100%	Survey reports	2–3 years	Institution
Number of hazard analysis critical control point inspections conducted on food preparation and dispensing centres (4.4)	Output	–	1	2	3	4	5	Inspection reports	Routine	Institution

Indicator	Type	Baseline 2020	Yearly target (2021–2025)					Data source	Periodicity	Level of data collection
			Y1	Y2	Y3	Y4	Y5			
Number of health care facilities implementing antimicrobial stewardship (4.2)	Output	30	60	75	90	100	150	Facilities reports	Routine	Institution
Availability of updated veterinary standard treatment guidelines at veterinary health facilities (4.3)	Output	0	25%	50%	80%	90%	100%	Admin reports	Routine	Institution
Percentage of adherence to standard treatment guidelines in hospitals (4.2)	Outcome	NA		32			60	Survey reports	2–3 years	Health facilities
Number of hospitals conducting hazard analysis critical control point prevalence survey (4.2)	Output	0	10	20	40	60	90	Survey reports	Annual	Health facilities
Number of guidelines on prudent use of antimicrobials in animal health sector and food production (4.3)	Output	0	2					Admin reports	Annual	Institution
Number of hospitals that generate antibiogram data (4.4)	Output	9	12	15	20	25	30	Survey reports	Routine	Health facilities
Percentage of health facilities complying with the Rational Medicine Use Directive (4.5)	Outcome	NA			60		75	Survey reports	3–5 years	Health facilities

Indicator	Type	Baseline 2020	Yearly target (2021–2025)					Data source	Periodicity	Level of data collection
			Y1	Y2	Y3	Y4	Y5			
Percentage of adherence to waste management standards in manufacturing and food processing plants (4.5)	Outcome				50		70	Survey reports	3–5 years	Manufacturers
Number of trainings provided for animal owners on withdrawal period and maximum residue limit	Output	NA	5	10	15	20	25	Admin reports	Annual	Institution
Objective five: Strengthen and establish partnerships, alliances, governance and resource mobilizations at all levels										
Number of advocacy workshops conducted to engage the private sector on antimicrobial resistance prevention and containment (5.1)	Output	0	2	4	6	8	10	Admin reports	Annual	Institution
Number of institutions that have incorporated antimicrobial resistance prevention and containment into their approved annual plan (5.2)	Input	7	17	25			189	Survey reports	Annual	Institution
Number of identified innovative financing mechanisms for antimicrobial resistance prevention and containment (5.3)	Outcome	0		1		2		Document reviews	2–3 years	Institution
Generated evidence that shows return on investment in antimicrobial resistance prevention and containment in selected institutions (5.3)	Output	0			1		2	Study reports	2–3 years	Institution

6. RISKS AND MITIGATION

6. RISKS AND MITIGATION

During the implementation of the National Antimicrobial Resistance Prevention and Containment Strategy, the sectors may encounter risks that impede achievement of results. The following table articulates the risks identified through the SWOT analysis and stakeholder analysis and strategies to address or mitigate them.

S. No	Risk	Mitigation strategy
1	COVID-19 and its impacts on the health system (human and animal) and the environment	The MOH, MOA and EFCCC in close collaboration with the Government and different ministries will actively work on the prevention and control of COVID-19. As a priority public health concern, its control will be enhanced through implementation of appropriate and effective public health measures. In line with the COVID-19 controls, the MOH, the MOA, the EFCCC and other stakeholders will implement the National Antimicrobial Resistance Prevention and Containment strategy by integrating it into COVID-19 activities.
2	Occurrence of emerging and re-emerging microbial diseases (human and animal)	The MOH and MOA will strengthen the public health (human and animal) emergency management system by improving the capacity for emergency preparedness, prevention, early detection and response of emerging and re-emerging diseases.
3	Inadequate financial resources and sudden reduction of donor funds (low predictability of external funding due to world economic recession)	The antimicrobial prevention and containment strategy will follow efforts to address the financial gaps. Implementation of innovative domestic financing strategies to mobilize adequate finance domestically will be implemented. Public–private partnerships are to be strengthened.
4	Weak intersectional collaboration	The MOH, MOA and EFCCC will work closely with the Government and other stakeholders to collaborate in addressing the implementation of antimicrobial resistance prevention and containment.
5	Inadequate private sector involvement	The MOH, MOA and EFCCC will work with other government ministries and agencies, civil society organizations and the private sector to attract investment on antimicrobial resistance prevention and containment and strengthen public–private partnerships.

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ANNEX

TERMS OF REFERENCES FOR ANTIMICROBIAL RESISTANCE MULTISECTOR GOVERNANCE STRUCTURE

1.TERMS OF REFERENCE NATIONAL INTERMINISTERIAL COMMITTEE FORANTIMICROBIAL RESISTANCE PREVENTION AND CONTAINMENT

Introduction

Antimicrobials include antibiotics, antifungals, antivirals and anti-protozoal. They are critical to human, animal and plant health and the environment and to a country's development and security. Despite the innovation of many antimicrobials in the world, the emergence of drug-resistant bacterial strains has become a top global public health agenda priority. Antimicrobials used and misused for human and animal health care can be found in food as residues and also are excreted unchanged into the environment (water and soil) as contaminants creating selection pressure on microorganisms.

Antimicrobial resistance occurs when microorganisms change in a way that reduces or eliminates the effectiveness of antimicrobials that were used to cure or prevent infections. By so doing, the microorganisms continue to survive and multiply, with their presence causing more harm. In human and animal health, it implies that life-threatening infections that were previously manageable are poised to be untreatable because of antimicrobial resistance. This will lead to high morbidity and mortality in human diseases, reduction in agricultural output and related livelihood and economy-wide impacts. It will increase poverty and render achievement of the Sustainable Development Goals difficult if not impossible. If nothing is done to stem these threats, it could force up to 24 million people into extreme poverty by 2030. By 2050 the global economy may lose more than $100 trillion dollars annually because of antimicrobial resistance and the reduction in GDP by an estimated global average of 3.8% high for low-income countries. More people will go into poverty due to antimicrobial resistance.

Resistant microorganisms have no borders, making it truly a global problem that requires One Health solutions. Coordinated action is required to minimize the emergence and spread of antimicrobial resistance. Members of the public, of the scientific and medical communities, of the national and regional authorities as well as the international community can and should contribute to the solutions.

One of the major objectives of the Global Health Security Agenda is to accelerate progress towards a world safe and secure from infectious disease threats. The Global Health Security Agenda has developed 11 "action packages" that are implemented under three titles: Prevent, Detect and Respond. The action packages concept was developed to facilitate regional and global collaboration towards specific Global Health Security Agenda objectives and targets. Antimicrobial resistance is one of the 11 action packages requiring national multisector and international collaboration.

Tackling the global spread of antimicrobial resistance is also a high priority agenda for the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO) and the World Organisation for Animal Health (OIE) and their member countries. WHO, FAO and OIE launched a Global Strategy and Plan of Action for Containment of Antimicrobial Resistance that follows the One-Health approach. Countries have developed national strategies and action plans so that they can prevent and manage antimicrobial resistance across multiple sectors.

In line with the WHO Global Strategy and Plan of Action, Ethiopia has committed to develop a National Action Plan on Antimicrobial Resistance and mobilize the necessary resources. Under the coordination and leadership of the Ethiopian Food and Drug Authority, a National Antimicrobial Resistance Advisory Committee composed of multiple stakeholders has been established to oversee the country's antimicrobial resistance prevention and containment activities.

Recognizing that bringing antimicrobial resistance under control requires consolidated, concerted action by multiple stakeholders, the Ministry of Health, in collaboration with the Ministry of Agriculture and the Ethiopian Forestry, Environment and Climate change Commission, has taken the initiative leveraging on the gains already made by strengthening and restructuring the country's efforts to contain and prevent antimicrobial resistance. A federal multisector governance mechanism is to be established to serve as the central intervention around which all the antimicrobial resistance-related activities can be effectively coordinated in each of the relevant sectors. This will ensure a systematic and comprehensive approach that would be broad enough to address all five strategic objectives of the antimicrobial resistance action plan, prioritizing activities in a step-wise approach.

The antimicrobial resistance governance mechanism for Ethiopia will comprise a high-level National Inter-Ministerial Committee, the national antimicrobial resistance focal point (AMR secretariat), the National Antimicrobial Resistance Advisory Committee and multisector technical working groups that will address the objectives of the national action plan.

Given the ultimate goal of antimicrobial resistance containment efforts that are geared to improve health outcomes, the National Interministerial Committee will be formed to provide necessary political commitment and support and avail of financial and human resources for national antimicrobial resistance containment and prevention efforts.

Objective

The main objective of the National Interministerial Committee is to provide necessary political commitment and authority for the coordination and implementation of country's antimicrobial resistance containment and prevention efforts.

Roles and responsibilities

- **Political support**: As antimicrobial resistance has an impact on all human and veterinary medical activities as well as on the environment, which justifies a multisector approach based on the One Health concept, advocacy on the risk of antibiotic resistance and to the proper use of antibiotics as a public health priority, the National Interministerial Committee will sustain political decisions and support to control antimicrobial resistance.

- **Leadership**: The National Interministerial Committee will set joint leadership with other relevant ministries that might require oversight from a specified authority.

- **Policy direction**: The National Interministerial Committee will set strategic and policy directions that support implementation of the antimicrobial resistance prevention and containment activities.

- **Dedicated funds**: The availability of dedicated funds will increase the operational effectiveness of the program. Hence, the National Interministerial Committee will solicit and secure funds to ensure political "ownership" and increase the likelihood of programme sustainability.

- **Authority to act**: The National Interministerial Committee will give sufficient authority to ensure that its decisions and plans are implemented.

- **Coordination and collaboration:** Addressing the growing threat of antimicrobial resistance is a shared responsibility that requires multisector collaboration. The National Interministerial Committee will:

- Work with other government offices, domestic and international partners on reducing the public
- health risks and impacts of antimicrobial resistance.
- Support and collaboratively evaluate the performance of regional state and city administrations in cascaded implementation of the national strategy and plan of action on antimicrobial resistance prevention and containment.

Membership

The National Interministerial Committee will have the following members:

1. Ministry of Health – Chair
2. Ministry of Agriculture – Co-chair
3. Ministry of Water, Irrigation and Energy –member
4. Ministry of Education – member
5. Ministry of Science and Higher Education –member
6. Ministry of Innovation and Technology –member
7. Ministry of Finance –member
8. Ministry of Women, Children and Youth –member

The secretary of the National Interministerial Committee will be an adviser to the Minister of Health.

Meetings

- The National Interministerial Committee will meet biannually, using the existing platforms that accommodated all its members. Extraordinary meetings can be arranged when necessary.

Accountability

- The National Interministerial Committee will be accountable to the Council of Ministers.

Working procedure

- The National Interministerial Committee will have a chair and co-chair, members and secretary.
- The meeting agenda would be prepared by chair of the National Antimicrobial Resistance Advisory Committee and be communicated to the organizers via email and phone at least two weeks before the meeting date.
- The National Interministerial Committee will communicate action points (reports and recommendations) and correspondence, reports and decisions regularly to the Council of Ministers and member organizations.
- Members of National Antimicrobial Resistance Advisory Committee will attend the Inter-Ministerial Committee meetings.

Terms of service

- Membership is for unlimited period, except for ministers who are leaving or shifted from the former organization where they are represented.

2. TERMS OF REFERENCE NATIONAL ADVISORY COMMITTE FOR ANTIMICROBIAL RESISTANCE PREVENTION AND CONTAINMENT

Introduction

Resistance to the effects of antimicrobial drugs is a serious problem in the world. Antimicrobial resistance occurs naturally over time, usually through genetic changes. However, the misuse and overuse of antimicrobials is accelerating this process. Antimicrobial resistance costs lives and money and threatens our ability to treat infections in humans and animals. Drug resistance has become a global public health crisis. Because of its effect on food production, economy and security, antimicrobial resistance is also considered a threat to health, national security and the economy. If nothing is done to stem this crisis, it could force up to 24 million people into extreme poverty by 2030.

Coordinated action is required to minimize the emergence and spread of antimicrobial resistance. Members of the public, of the scientific and medical communities, local and national authorities as well as the international community can and should contribute to the solutions. Several efforts have been made to curb the multidimensional challenges of antimicrobial resistance. Tackling the global spread of antimicrobial resistance is a high priority for the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and their member countries. The three organizations launched the Global Strategy and Plan of Action for Containment of Antimicrobial Resistance. Countries are developing a national action plan to prevent and manage antimicrobial resistance across multiple sectors following the One Health approach.

The effective control of infectious diseases in Ethiopia is compromised by the increasing trends of microorganisms' resistance to the antimicrobials use in human and animal health care system. The emergence and spread of resistant strains have called for swift and concerted efforts of various agencies. The task needs to be overseen by high-level officials of the Ministry of Health, the Ministry of Agriculture and the Forestry, Environment and Climate Change Commission because the outcomes of the overall activities will affect the quality of health services of human, animal and plant as well as food production and economy in the country.

In line with the WHO Global Strategy and Plan of Action, Ethiopia has developed a national plan on antimicrobial resistance and mobilized the necessary resources. Under the coordination and leadership of the Ethiopian Food and Drug Authority, a national advisory committee composed of multiple stakeholders has been established to oversee the country's antimicrobial resistance prevention and containment activities.

Recognizing that bringing antimicrobial resistance under control requires consolidated, concerted action by multiple stakeholders, the Ministry of Health, the Ministry of Agriculture and the Ethiopian Forestry, Environment and Climate Change Commission are leveraging the gains already made by strengthening and restructuring the country's efforts to contain and prevent antimicrobial resistance. Having a national multisector governance mechanism will serve as the central intervention around which all the antimicrobial resistance-related activities can be effectively coordinated in each of the relevant sectors. This will ensure a systematic and comprehensive approach. The scope should be broad enough to address all five objectives of the Global Strategy, prioritizing activities in a step-wise approach.

The governance mechanism will encompass a high-level National Interministerial Committee, an antimicrobial resistance focal point (the AMR secretariat), the National Antimicrobial Resistance Advisory Committee and multisector technical working groups that will address the respective strategic objectives of the national action plan.

In accordance with the governance framework, the National Antimicrobial Resistance Advisory Committee involving a wide range of partners will be reorganized to enhance multisector collaborations in addressing the risk of antimicrobial resistance and minimize its impact on human and animal health in the country.

Objective

The main objective of the National Antimicrobial Resistance Advisory Committee is to oversee and coordinate all antimicrobial resistance-related activities in all sectors to ensure systematic and comprehensive approaches accorded with defined antimicrobial resistance-related goals and with the global action plan for antimicrobial resistance. The scope should be broad enough to address all five strategic objectives of the national action plan, prioritizing activities in a step-wise approach.

Roles and responsibilities

- Plan and set an overall direction for antimicrobial resistance control and prevention in Ethiopia and ensure that major goals and timelines are achieved.
- Provide platform for programme planning and implementation through a supporting structure comprising of technical working groups for individual strategic objectives.
- Facilitate and coordinate efforts to contain and reduce the threat of antimicrobial resistance at all levels.
- Collaborate with internal and external agencies and organizations.
- Provide a structure for information-sharing to mutually reinforce activities among sectors.
- Ensure adequate integration of antimicrobial resistance containment efforts into the existing health system, public health and disease-specific programmes, animal health and food production sector and other environmental initiatives.
- Advocate for prevention and containment of antimicrobial resistance.
- Monitor and evaluate the existing technical working groups and their respective activities in relation to the national action plan.
- Collaboratively work with and support regional and city administration Antimicrobial Resistance Advisory Committees.
- Coordinate joint monitoring and evaluation of implementation and results and achievements of the National Antimicrobial Resistance Prevention and Containment Strategy and Plan of Action.

Membership

The National Antimicrobial Resistance Advisory Committee is to be composed of officially delegated members representing the relevant sectors, notably human health, animal health, agriculture and the environment. Representatives should be given sufficient authority by their institutions to make decisions. Hence, the following institutions are members of the National Antimicrobial Resistance Advisory Committee.

	Organization	Remark
Government organizations		
1	Ministry of Health, Medical Service Director General	Chair
2	Veterinary Drug and Feed Administration and Control Authority	Co-chair
3	Ministry of Agriculture, Veterinary Public Health Directorate	
4	Ministry of Agriculture, Plant Health Directorate	
5	Ministry of Health, Clinical Service Directorate	
6	Ministry of Health, Deliverology Unit	
7	Water, Environment, Forestry and Climate Change Commission	
8	Ministry of Science and Higher Education	
9	Ethiopian Food and Drug Authority	
10	Ethiopian Public Health Institute	
11	Armaour Hansen Research Institute	
12	Ethiopian Pharmaceutical Supply Agency	
13	National Animal Health Diagnostic and Investigation Centre	
14	National Veterinary Institute	
15	Communication and Broadcast Authority, Ministry of Health, Public Relations Directorate	
16	Ministry of Health, Pharmaceuticals and Medical Equipment Directorate	Secretary
Representatives from professional associations – executive directors		
1	Ethiopian Medical Association	
2	Ethiopian Veterinary Association	
3	Ethiopian Pharmacy Association	
4	Ethiopian Public Health Association	
5	Ethiopian Nurse Association	
6	Ethiopian Medical Laboratory Association	
7	Ethiopian Private Health Facilities Employers Association	
Representatives from international organizations – focal persons		
1	World Health Organization	
2	Food and Agriculture Organization of the United Nations	
3	United States Agency for International Development	
4	Africa Centres for Disease Control and Prevention	
Representatives from development partners – executive directors and focal persons		
1	USAID Global Health Supply Chain Program's Procurement and Supply Management	
2	USAID Medicine, Technology and Pharmaceutical Service	
3	United States Pharmacopeia	

Meetings

The National Antimicrobial Resistance Advisory Committee will have a regular meeting schedule every two months. Extraordinary meetings can be arranged when necessary.

Accountability

The National Antimicrobial Resistance Advisory Committee is accountable to the National Interministerial Committee.

Working procedure

- The National Antimicrobial Resistance Advisory Committee will have a permanent chair and co-chair, member and secretary.
- The venue will be at the Ministry of Health's meeting hall, unless members are informed to the contrary. The secretariat shall notify members of the venue of the meetings when communicating the agenda.
- Meeting agenda would be prepared jointly by the chairperson and secretary and be communicated to members via email and phone at least seven days before the meeting date.
- The quorum shall be the chairman, co-chairman, secretary and representatives from 50% plus one of the members.
- Minutes will be recorded by secretary and officially distributed to members through email within a week time after meetings occur. The minutes should be kept by the secretary and copy should be maintained in records at the Ministry of Health and offices for further references.
- All members should attend all meetings regularly in person or send a delegate, when necessary.
- Absenteeism without notifying the chair (co-chair) or secretary is unacceptable.
- If a member is absent for more than three consecutive meetings, an official reminder will be sent to them with a copy to their office.
- If a member is leaving their organization, the organization is required to designate a successor.
- The National Antimicrobial Resistance Advisory Committee will communicate action points (correspondence, reports and decisions) regularly to member organizations.

Terms of service

- Membership is for unlimited period, except for persons who are leaving their organization.

3. TERMS OF REFERENCE NATIONAL ANTIMICROBIAL RESISTANCE PREVENTION AND CONTAINMENT TECHNICAL WORKING GROUPS

Introduction

During the past century, discoveries of microorganisms as causes of infections and antibiotics as effective therapeutic agents have contributed to significant gains in public health in many parts of the world.

Antimicrobials, which includes antibiotics, antifungals, antivirals and anti-protozoal, are critical to human, animal and plant health, the environment, national development and security. Despite the innovation of many antimicrobials in the world, the emergence of drug-resistant bacterial strains has become high on the global public health agenda. Antimicrobials used and misused by humans and animals can be found in food as residues and also are excreted unchanged to the environment (water and soil) as contaminants, creating selection pressure on microorganisms. Antimicrobial resistance occurs when microorganisms change, which reduces or eliminates the effectiveness of the antimicrobials that were used to cure or prevent infections. By so doing, the microorganisms continue to survive and multiply, even in their presence, causing more harm. In human and animal health, it implies that life-threatening infections that were previously manageable are poised to be untreatable. Antimicrobial resistance leads to high morbidity and mortality in human diseases, reduction in agricultural output and related livelihood and economy-wide impacts. It contributes to poverty and to making achievement of the Sustainable Development Goals difficult if not impossible. Without action now, the global economy may lose more than $100 trillion dollars annually by 2050 due to antimicrobial resistance and associated GDP reductions by a global average of 3.8%, which is high for low-income countries. Many people may fall back into poverty due to antimicrobial resistance. Resistant microorganisms have no borders, making it truly a global problem that requires One Health solutions.

Tackling the global spread of antimicrobial resistance is a high priority for the World Health Organization (WHO), the Food and Agriculture Organization of the United Nations and the World Organization for Animal Health and their member countries. In collaboration, the three organizations launched the Global Strategy and Plan of Action for Containment of Antimicrobial Resistance. Countries have developed national strategies and action plans so that they can better prevent and manage antimicrobial resistance across multiple sectors. In line with the WHO Global Strategy and Plan of Action, Ethiopia has developed a national plan of action on antimicrobial resistance and mobilized the necessary resources. The second five-year (2015–2020) strategy to prevent and contain antimicrobial resistance and respective action plan was developed in 2015 with five objectives:

- Raise awareness and understanding and improve education on antimicrobial use, resistance prevention and containment through effective communication and training.
- Strengthen the knowledge and evidence on antimicrobial use and resistance through One Health surveillance and research.
- Improve infection prevention and contain the spread of resistant microorganisms across human and animal communities and health care settings through individual and environmental sanitation, hygiene and infection prevention measures.
- Optimize the use of antimicrobials in human and animal health through effective stewardship practices.
- Strengthen and establish federal alliances and partnerships, management and governance arrangements and resource mobilization for the prevention and containment of antimicrobial resistance at all levels.

Recognizing that bringing antimicrobial resistance under control requires consolidated, concerted action by multiple stakeholders, the Ministry of Health, in collaboration with the Ministry of Agriculture and the Forestry, Environment and Climate Change Commission, has taken the initiative to leverage the gains already made and to thus strengthen and restructure the country's efforts to contain and prevent antimicrobial resistance.

In accordance with the country's governance mechanism for the multisector national antimicrobial resistance prevention and containment activities, technical working groups are tasked to provide technical oversight and guidance to implement and monitor the five objectives of the national action plan. The technical working groups are mandated to provide technical input and conduct situation analyses under the guidance of the National Antimicrobial Resistance Advisory Committee.

The terms of reference of the technical working group were established by the National Antimicrobial Resistance Advisory Committee, providing specific scope, roles and responsibilities. The groups will be task-specific and focused on areas that the coordinating group has determined to be of particular focus for the country. Depending on the purpose, scope and tasks of the technical working group, membership may come from any of the relevant technical specialties. These may include experts from such areas as infectious diseases, microbiology, infection prevention and control, social health, food and drug regulation, surveillance system expertise, environment and others. The terms of reference should guide the function of the national antimicrobial resistance prevention and containment technical working groups.

Objective

The objective of establishing a technical working group is to have an active technical role in the implementation of the National Antimicrobial Resistance Prevention and Containment Action Plan. Each technical working group, as a team of experts, will be proactive in providing technical input, conducting situation analyses, monitoring and evaluating and recommending revision of the national action plan.

Roles and responsibilities

The roles and responsibilities of each technical working group may depend on the scope of implementation of the strategic objectives and action plans. However, each technical working group will have the following roles and responsibilities in common.

- Operationalize the national action plan under their respective strategic objectives.
- Prepare annual work plan as per the national action plan.
- Collaborate with the National Antimicrobial Resistance Advisory Committee in formulation and revision of the national action plan.
- Report to the National Antimicrobial Resistance Advisory Committee on the progress to the implementation of the respective strategic objective.
- Provide updates of ongoing activities and provide technical advice to the National Antimicrobial Resistance Advisory Committee or to the national antimicrobial resistance focal point (the AMR secretariat).
- Work closely with relevant sectors in the implementation of the respective strategic objective to identify challenges, gaps and opportunities.
- Ensure regular data collection and documentation.
- Develop monitoring tools for the performance of implementation of the respective strategic objective.
- Undertake supportive supervision to assess the implementation process.

- Coordinate and participate in selected activities, and build a sustained partnership between implementing sectors.

Membership

Under the leadership of the chairperson of each technical working group who would be an assigned member of the National Antimicrobial Resistance Advisory Committee representing the relevant sectors to the specific activities, membership of technical working groups will comprise relevant technical specialties from relevant sector organizations, partners and associations. Each technical working group shall comprise representatives of the following member organizations.

Technical working group members

Technical working groups	Member organizations
Technical working group for education and awareness	• · Ministry of Health, Public Relations Directorate – Chair • · Ministry of Agriculture, Public Relations Directorate • · Ministry of Education, Public Relations Directorate • · Ethiopian Food and Drug Authority, Public Relations Directorate • ·Veterinary Drug and Feed Administration and Control Authority, Public Relations Directorate • · Environment, Forestry and Climate Change Commission, Public Relations Directorate • · Ministry of Health, Planning, Monitoring and Evaluation Directrate • · Ministry of Health, Clinical Service Directorate • · Ethiopian Medical Association • · Ethiopian Veterinary Association • · Ethiopian Pharmacy Association • · Ethiopian Public Health Association • · Ethiopian Nurse Association • · Ethiopian Medical Laboratory Association • · Private Health Facility Association • ·World Health Organization • · Food and Agriculture Organization of the United Nations • · USAID Global Health Supply Chain Program's Procurement and Supply Management • · USAID Medicine, Technology and Pharmaceutical Service

Technical working group for infection prevention and hygiene	• · Ministry of Health, Clinical Service Directorate – Chair • · Ministry of Health, Quality Directorate • · Ministry of Health, Hygiene and Environmental Health Directorate • · Ministry of Health, Disease Prevention and Control Directorate • · Ministry of Agriculture, Veterinary Public Health Directorate • · Ministry of Agriculture, Plant Health Directorate • · Ministry of Water, Irrigation and Energy • · Environment, Forest and Climate Change Commission • · Ethiopian Food and Drug Authority • ·Veterinary Drug and Feed Administration and Control Authority • · Ethiopian Pharmaceutical Supply Agency • · Ethiopian Nurse Association • ·Africa Centres for Disease Control and Prevention • · Food and Agriculture Organization of the United Nations • · Infectious Disease Detection and Surveillance Project • · United Nations Children's Fund • · USAID Medicine, Technology and Pharmaceutical Service • ·World Health Organization
Technical working group for surveillance and research	• · Ethiopian Public Health Institute – Chair • ·Armaour Hansen Research Institute • · Ethiopian Food and Drug Authority • ·Veterinary Drug and Feed Administration and Control Authority • · Ethiopian Pharmaceutical Supply Agency • · National Animal Health Diagnostic and Investigation Centre • · National Veterinary Institute • ·Addis Ababa University • · St Paul Hospital Millennium Medical College • · Infectious Disease Detection and Surveillance Project • · Ethiopian Medical Laboratory Association • ·Africa Centres for Disease Control and Prevention • ·World Health Organization • · Food and Agriculture Organization of the United Nations

Technical working group for antimicrobial stewardship	• · Ministry of Health, Planning, Monitoring and Evaluation Directorate Chair • · Ethiopian Food and Drug Authority • · Ministry of Health, Clinical Service Directorate • · Pharmaceuticals Supply Agency • · Ethiopian Public Health Institute • ·Armaour Hanssen Research Institute • ·Tikur Anbessa Specialized Hospital • · St Paul Millennium Medical College Hospital • · St Peter Hospital • · Zewditu Memorial Hospital • · Ethiopian Medical Association • · Ethiopian Pharmacy Association • ·World Health Organization • · Food and Agriculture Organization of the United Nations • · USAID Global Health Supply Chain Program's Procurement and Supply Management • · USAID Medicine, Technology and Pharmaceutical Service
Technical working group for resource mobilization for antimicrobial resistance	• · Ministry of Health, Resource Mobilization Directorate – Chair • · Ministry of Agriculture, Resource Mobilization Directorate • · Ministry of Education, Resource Mobilization Directorate • · Environment, Forest and Climate Commission, Resource Mobilization Directorate

Technical working group for regulations and pharmacovigilance	• · Ethiopian Food and Drug Authority – Chair • · Ethiopian Food and Drug Authority, Product Safety Directorate • · Ethiopian Food and Drug Authority, Medicines Registration and Licensing Directorate • · Ethiopian Food and Drug Authority, Medicines Facility Inspection Directorate • ·Veterinary Drug and Feed Administration and Control Authority • · National Animal Health, Diagnostic and Investigation Centre • · Ministry of Health, Planning, Monitoring and Evaluation Directorate • · Ministry of Health Regulatory • ·Addis Ababa Regulatory (Food, Medicine and Healthcare Administration and Control Authority) • · Customs Authority and Commission • · Ethiopian Public Health Association • ·World Health Organization • · United States Agency for International Development • · United States Pharmacopeia, Pharmaceutical Quality Management • · USAID Medicine, Technology and Pharmaceutical Service • · USAID Global Health Supply Chain Program- Procurement and Supply Management • · Ethiopian Pharmacy Association

Accountability

All antimicrobial resistance technical working groups are accountable to the National Antimicrobial Resistance Advisory Committee.

Working procedure

- Each technical working group shall have a chair and co-chair, member and secretary.
- Each technical working group shall have a regular meeting schedule every month on Friday of the third week of the month starting at 9 a.m. Extraordinary meetings can be arranged when necessary.
- The meeting agenda will be prepared jointly by the chairperson and secretary and be communicated to members via email and phone at least three days before the meeting date.
- The venue for the technical working group meetings would will be the meeting halls of chairs of each technical working group, unless members are informed to the contrary. The secretariat shall notify members of the venue of the meetings when communicating the agenda.
- Minutes will be recorded by the secretary and officially distributed to members through email within a week after each meeting. The minutes should be kept by the secretary, and a copy should be maintained in the records for further reference.
- At each meeting, minutes of the previous meeting will be endorsed, progress on the decision of previous meetings reported, emerging concerns discussed and recommendations forwarded for high-level decision and action.
- For a meeting that entails a decision, the quorum shall be 50% plus one of the technical working group members, including the chairperson and secretary. The decision will be made on a consensus of the members. If consensus is not reached, the decision shall be made by majority vote. In case of a tie, the chairperson has the deciding vote.
- All members should attend all meetings regularly in person or send a delegate, when necessary.
- If a member is leaving their organization, the organization is required to immediately assign and update their successor.

Each technical working group shall regularly communicate action points (correspondence, reports, decisions and recommendations to the multisector National Antimicrobial Resistance Advisory Committee and respective member organizations.

Terms of service

Membership to the technical working groups is for an unlimited period unless required otherwise by the federal governance mechanism or the federal antimicrobial resistance strategy and action plan.

4. STAKEHOLDER ANALYSIS

Stakeholders	SO1	SO2	SO3	SO4	SO5
National Antimicrobial Resistance Advisory Committee, One Health Steering Committee	X				
Academia				X	
Animal Products, Veterinary Drug and Feed-Quality Assessment Center		X			
Armauer Hansen Research Institute		X			X
Civil society organizations	X				
Community, patients, animal owners, clients	X				
Development partners (local and international)	X	X	X	X	X
Ethiopian Environment and Forest Research Institute		X			
Ethiopian Food and Drug Authority and its regional counterparts	X	X	X	X	X
Environment, Forestry and Climate Change Commission and its regional counterparts	X	X	X	X	X
Ethiopian Public Health Institute and its regional counterparts	X	X	X	X	X
Ethiopian Pharmaceutical Supply Agency		X		X	X
Health Facilities (public and private, human and animal)	X	X	X	X	X
Farm owners	X				
Farmer-based associations	X				
Human, veterinary and environmental health professionals		X		X	
International organizations (World Health Organization, Food and Agriculture Organization of the United Nations, World Organisation for Animal Health)	X	X	X	X	X
Livestock owners		X			
Media (public and private, print and electronic, owners and professionals)	X				X
Ministry of Agriculture and its regional counterparts	X	X	X	X	X
Ministry of Education	X		X		X
Ministry of Finance	X				X
Ministry of Health and its regional counterparts	X	X	X	X	X
Ministry of Science and Higher Education	X	X			X
Ministry of Urban Development and Housing			X		
Ministry of Water, Irrigation and Electricity			X		
National Animal Health Diagnostic and Investigation Center and its regional counterparts		X	X	X	
National Vaccine Institute		X			
Public relation offices of government institutions	X				
Professional associations (health, agriculture, veterinarian, environment)	X	X	X	X	X
Regional bureaus of health, agriculture and environment	X	X	X	X	X
Technical and vocational education training	X		X		
University and research institutions	X	X	X	X	X
Veterinary Drugs and Feed Administration and Control Authority and its regional Counterparts	X	X	X	X	X
Water and sewerage authorities			X		

5. SUMMARY OF ROLES AND RESPONSIBILITIES OF ANTIMICROBIAL RESISTANCE GOVERNANCE

Interministerial Committee

The Interministerial Committee oversees and implementation of the national strategy, which includes:

- policy direction;
- approval of the national strategic plan;
- approval of budget;
- mobilizing and allocating resources;
- ensuring sector implementation of the national strategic plan; and
- regularly monitoring and evaluating implementation and achievements.

National AMR secretariat

- Links the national strategic plan at the national and regional state and city administration levels.
- Coordinates cascaded implementation of the national strategic plan at all levels.
- Ensures continuous national, regional state and city administration and international engagement.
- Collects, compiles, prepares and disseminates reports on the implementation and achievements to all stakeholders.
- Coordinates regular review meeting and monitoring and evaluation platform.
- Engages AMR Advisory Committees and the technical working groups.

National Antimicrobial Resistance Advisory Committee

- Mobilizes human and financial resource to support implementation of the national strategy.
- Submits regular reports and budget proposal on the implementation of the National strategic plan.
- Collaborates and coordinates with the regional state and city administration Antimicrobial Resistance Advisory Committees.
- Regularly reviews, monitors and evaluates cascade implementation of the national AMR strategic plan.
- Oversees and supports the technical working groups.

Regional Antimicrobial Resistance Advisory Committees

- Mobilize human and financial resources to support implementation of the national strategy.
- Submit regular status reports and budgets proposal on the implementation of the regional AMR strategic plan.
- Collaborate with the National Antimicrobial Resistance Advisory Committee.

- Oversee and support the regional technical working groups.
- Regularly review, monitor and evaluate the cascade implementation of the regional strategic plan.

Technical working groups

- Ensure cascaded planning and implementation of the national strategic plan by sector.
- Prepare regular status reports and budget proposal on the implementation of the national strategic plan to the National Antimicrobial Resistance Advisory Committee.
- Regularly review the cascade implementation of the national strategic plan.
- Stakeholders
- Cascade and implement the national strategic plan.
- Submit regular reports and allocate budgets on the implementation of the national strategic plan.
- Regularly review, monitor and evaluate cascade implementation of the national strategic plan.

6. CONTRIBUTORS

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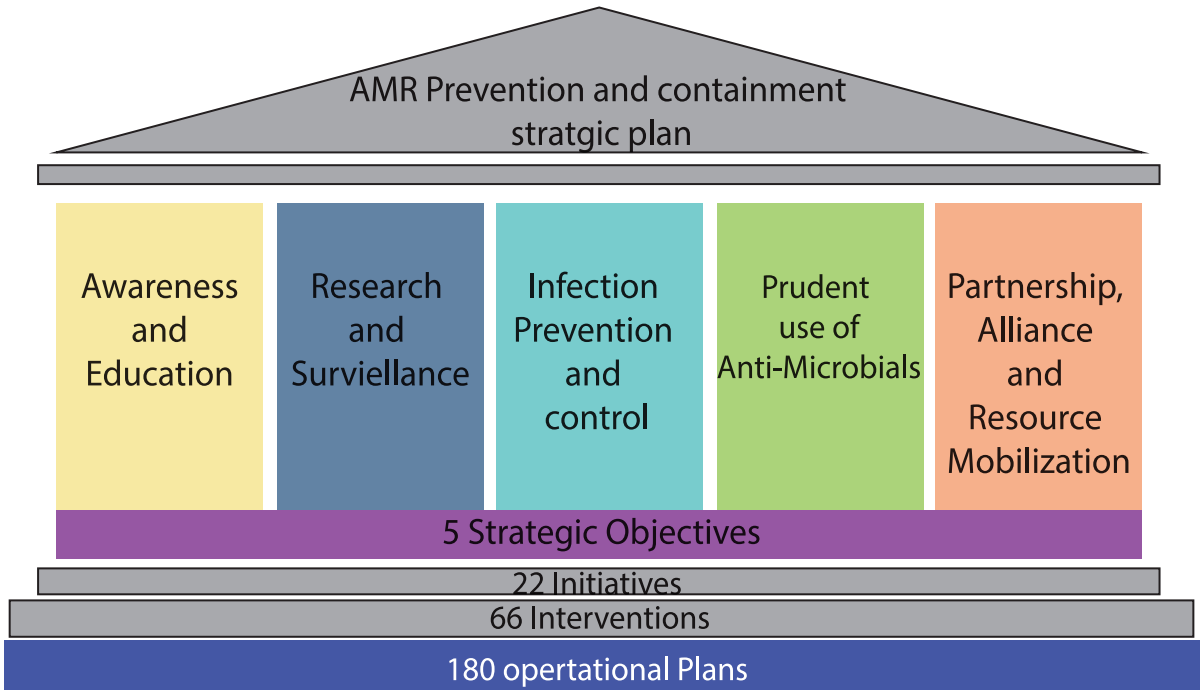
AMR Prevention and containment stratgic plan
Awareness and Education
Research and Surviellance
Infection Prevention and control
Prudent use of Anti-Microbials
Partnership, Alliance and Resource Mobilization
5 Strategic Objectives
22 Initiatives
66 Interventions
180 opertational Plans