



NATIONAL ACTION PLAN ON ANTIMICROBIAL RESISTANCE CONTAINMENT FOR TIMOR-LESTE

2022-2026



Foreword



Timor-Leste developed and implemented its first National Action Plan for Antimicrobial Resistance Containment for Timor-Leste (NAP-AMR) 2016 -2020. Much progress has been made in the areas of advocacy and awareness-raising, surveillance, infection prevention, and control and antimicrobial stewardship programs, for both human and animal health sectors.

The National Action Plan for Antimicrobial Resistance Containment (NAP-AMR) 2022-2026 has been developed and updated based on earlier progress, global and regional strategies, and experiences, which will be implemented in the next five years. This is a collective effort of all the relevant government departments from ministries of health, agriculture and fishery, environment and others, as well as partners and stakeholders. It has been through an extensive consultative process of workshops, meetings, and individual discussions, most of which have to be conducted online during the COVID-19 pandemic.

We would like to thank all the government officers, experts and consultants who have been actively involved and participated in the consultations and writing-ups of this document. We would like particularly to thank the World Health Organization Country Office for Timor-Leste, WHO Regional Office for Southeast Asia (WHO SEARO), and Menzies School of Health Research Australia, which has been provided all the financial and technical support during the process of developing this action plan.

Dili, 04/04/2022



dr. Odete Maria Freitas Belo, MPH
Minister of Health

Foreword



Ministry of Agriculture and Fisheries (MoAF) has a commitment to support Timor-Leste to address the challenges related to global and national public health which come from antimicrobial resistance. However, through this wonderful opportunity, I would also like to request for contribution from the private and public sectors to contribute and to eliminate the global data which stated that globally, from now until the year 2050, the number of deaths caused by antimicrobial resistance will, more or less, reach 10 million deaths.

MoAF through relevant Directorates such as the National Directorate of Veterinary, with their collaboration with international agencies, especially with Menzies, have already conducted many studies in the animal health sector.

As the Minister of Agriculture and Fisheries, I would like to elevate and continue supporting what the productive sectors have done and their action to respond to the sustainability of Timor-Leste. In addition, MoAF, under One-Health, has developed and updated Timor-Leste's National Action Plan on Antimicrobial Resistance 2022-2026.

Ministry of Agriculture and Fisheries (MoAF) is also implementing the international standard of use of antibiotics responsibly placed by the World Organization for Animal Health (OIE), Food and Agriculture Organization (FAO), and World Health Organization (WHO)

Dili, 04/04/2022

Eng. Pedro dos Reis
Ministru Agrikultura no Peskas



Foreword



Antimicrobial resistance (AMR) is one of the biggest threats to global health, food security, and development today. It can affect anyone, of any age, in any country. Though antibiotic resistance may occur naturally but misuse of antibiotics in humans and animals coupled with poor infection prevention and control is accelerating the process as it is rising to dangerously high levels in all parts of the world.

With assistance from WHO and in collaboration with other partners, the Ministry of Health (MOH) developed and implemented its first National Action Plan for Antimicrobial Resistance Containment for Timor-Leste 2016 -2020 (NAP-AMR 2016 - 2020). Progress has been made in several areas, notably in advocacy, education and communication, surveillance of antimicrobial resistance in health care settings, and infection prevention and control etc.

Based on the progress and experiences accumulated during the past five years, MOH and Ministry of Agriculture and Fishery (MOAF) joined hands again and with technical assistance from WHO and partners, developed and updated the National Action Plan for Antimicrobial Resistance Containment for Timor-Leste 2022 – 2026 (NAP-AMR 2022-2026). This lays out the blueprint for multisectoral actions to reduce and contain the AMR in the country.

I believe the NAP outlines in sufficient details the strategic approaches and activities and will be used as strategic tool to prepare and respond to some the challenges by strengthening the health system while addressing issues related to animal welfare and food security and keeping focus on ensuring quality services.

WHO Country Office for Timor Leste considers it a matter of great privilege for extending technical support for development of updated National Action Plan 2022-26 and as a trusted and reliable partner, I assure continued support of WHO in implementing and monitoring this plan in the next five years.

I look forward to successful collective implementation of the action plan for containing AMR.

Dili, 4 / 4 / 2022

A blue ink signature of Dr. Arvind Mathur is written over a circular stamp. The stamp features the WHO logo and the text 'WHO REPRESENTATIVE' and 'TIMOR-LESTE'.

Dr. Arvind Mathur
WHO Representative

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List of Abbreviations and Acronyms

ADETIL	Associação Dentista de Timor-Leste (English: Timor-Leste Dentist Association)
AETL	Associação Enfremeiros de Timor-Leste (English: Timor-Leste Nurse Association)
AIFAESA	Autoridade de Inspeção e Fiscalização de Atividade Economia, Sanitaria e Alimentar (English: Authority for Inspection and Supervision for Economic, Sanitation and Food Activities)
AMC	Antimicrobial Consumption
AMR	Antimicrobial Resistance
AMS	Antimicrobial Stewardship
AMTL	Associação Medico de Timor-Leste (English: Timor-Leste Medical Association)
AMU	Antimicrobial Use
AMVTL	Associação Medico Veterinario de Timor-Leste (English: Timor-Leste Veterinary Medical Association)
ANAS	Autoridade Nacional Agua e Saneamento (English: National Authority for Water and Sanitation)
ASFARTIL	Associação Farmacista de Timor-Leste (English: Timor-Leste Pharmacist Association)
AST	Antimicrobial Susceptibility Testing
DNFM	Direção Nacional Farmaceutica e Medicamentos (English: NDPM: National Directorate of Pharmacy and Medicines)
DNSF	Direção Nacional Saude na Familia (English: National Directorate of Family Health)
EML	Essential Medicine List
EPR	Extended Producer Responsibility
EQAS	External Quality Assurance Scheme
FAO	Food and Agriculture Organization
FDCH	Fundo de Desenvolvimento do Capital Humano (English: Human Capital Development Fund)
GGQS	Gabinete de Garantia de Qualidade em Saúde (English: Cabinet of Quality Control)
GLASS	Global AMR Surveillance System
HNGV	Hospital Nacional Guido Valadares (English: Guido Valadares National Hospital)
HR	Hospital Referral (English: Referral Hospital)
IEC	Information Education and Communication
INS	Instituto Nacional de Saude (English: National Institute of Health)
IP	Impresa Publica (English: Public Institution)
IPC	Infection Prevention Control
JEE	Joint External Evaluation
KAP	Knowledge Attitude and Practice

LNS	Laboratorio Nacional de Saude (English: National Laboratory for Health, Tetun: Labnas: Laboratoriu Nasional Saude)
M&E	Monitoring and Evaluation
MAP	Ministerio de Agricultura e Pescas (English: Ministry of Agriculture and Fisheries-MoAF)
MdS	Ministerio de Saude (English: Ministry of Health-MoH)
MEJD	Ministerio de EducaçãO Juventude e Desporto=Ministry of Education, Youth and Sport)
MoEA	Ministry of Economic Affairs
MSHR	Menzies School of Health Research
NAP	National Action Plan
NAPHS	National Action Plan on Health Security
NMSC	National Multisectoral Committee
NRA	National Drug Regulatory Authority
NRL	National Reference Laboratory
SAMES	Serviço AutónoMO de Medicamentos e Equipamentos de Saúde (English: Autonomous Medicine and Health Equipment Service)
SECOMS	Secretario Estado ComunicaçãO Social (English: Secretary State for Social Communication)
SEMA	Secretario Estado Meio Ambiente (English: Secretary State for Environmental)
SERVE	Serviço de Registo e VerificaçãO Empresarial (English: Business Registration and Verification Service)
SOP	Standard Operating Procedure
STG	Standard Treatment Guideline
TGA	Therapeutic Good Administration
TWG	Technical Working Group
UN	United Nations
UNTL	Universidade Nacional Timor Lorosa'e (English: Timor Lorosa'e National University)
VDL	Veterinary Diagnostic Laboratory
WAAW	World Antibiotic Awareness Week
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

Executive Summary

The threat posed by antimicrobial resistance (AMR) to public health as well as global health security has been reiterated in numerous World Health Assembly (WHA) resolutions. AMR is also prioritized under the Global Health Security Agenda (GHS) and, in Timor-Leste the National Health Sector Strategic Plan 2020-2030 has placed AMR as a public health priority, following the progress made since implementing the first National Action Plan for Antimicrobial Resistance Containment for Timor-Leste (NAP-AMR) 2016 -2020.

The updated NAP-AMR 2022-2026, thus, has established based on earlier progress, global and regional strategies and experiences, which will be implemented in the next five years. The vision for NAP-AMR is reduction in mortality, morbidity and economic impact of antimicrobial resistance. The mission is to establish policies and national multisectoral mechanisms that support an effective, sustained, collaborated and coordinated AMR management system both at the national and the sub-national level. It has the following five strategic priorities which are well aligned with Global AMR Action Plan:

1. Improve awareness and understanding of AMR through effective communication, education and training;
2. Strengthen knowledge and evidence through surveillance;
3. Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures;
4. Optimize the use of antimicrobial agents in human, animal, plant health and food and regulate access to high-quality antimicrobial agents;
5. Promote integrated governance and coordination for AMR activities and research, while also strengthening collaborations at international, national and sub-national levels.

Under strategic priorities, specific activities/actions, timelines, implementing partners and expected outputs have been outlined for implementation. An M&E framework has been developed, with indicators for input/process, output and outcome for each focus area.

The development of the NAP-AMR 2022-26 followed an extensive consultative process, under the leadership of the MOH and MOAF with substantive support from partners, particularly WHO and Menzies School of Health Research Australia.

A national multisectoral AMR team was established by the MoH in collaboration with MoAF, comprising of members from different department, technical experts, WHO, international experts and external consultant (ANNEXURE-1). A broad outline for the revised NAP-AMR along with a detailed plan of activities were prepared and shared with national AMR team. A thorough Situation Analysis and a SWOT analysis (to assess country's strengths, weaknesses, external opportunities and threats for AMR), was conducted keeping in mind the capacity and priority of the country. It was decided that for each activity, all the three sectors-human, animal and environment, will be depicted.

Drafts of each strategic priority were shared with the national AMR multisectoral team for their inputs and feedback. Furthermore, workshops were conducted to discuss the activities, outputs/outcomes and monitoring framework for all strategic priorities. The final draft of the NAP-AMR 2022-26 was compiled and submitted to the national AMR team, with collective inputs from all the key stakeholders. In line with the strategic priorities of GAP-AMR, the revised national operational plan, also has five strategic priorities, with clear objectives and activities for all the three sectors, to be completed under defined timelines. The development of NAP AMR 2022-2027 shows the commitment from the Government of Timor Leste and the development partners towards resource allocation for continuous implementation of key strategic approaches in addressing AMR challenges in Timor Leste.

The NAP-AMR 2022-2026 is built on the learnings and challenges from the first NAP-AMR 2017-2020, and is aligned with the 5 strategic priorities of the Global action plan, and seeks to strengthen the multisectoral coordination between various stakeholders, to address the issues related to AMR in the next five years.

1. Introduction

What is an antimicrobial?

An antimicrobial is a natural, semi-synthetic or synthetic substance that is capable of killing or inhibiting the growth of microorganisms (e.g., bacteria, virus, parasites, fungi). The term antimicrobial will be used throughout this document to refer to: antibiotics, antivirals, antifungals, and antiparasitics.

What is antimicrobial resistance and how does it develop?

Antimicrobial resistance simply means that the antimicrobial drugs that used to be effective against a particular microbe no longer work because the microbe's biological makeup has changed; it has become resistant to the treatment. The problem can occur naturally, or when an infection is treated with an antimicrobial which kills only some of the microbes. Those that can resist the treatment survive and multiply. Over time, more and more of the resistant microbes remain in our environment, eventually leading to the emergence of new strains of disease causing microbes that are partially or fully resistant to antimicrobial treatment.

How does antimicrobial resistance spread?

Antimicrobial resistant microbes move and spread in the same way that all infectious disease causing microbes do; through direct contact (person, animal, and environment), contaminated food or water, or contact with body fluids. Resistant microbes are generally found where antimicrobial use is higher and disease conditions more common.

Why is antimicrobial resistance (AMR) a problem?

Antimicrobial Resistance (AMR) is a problem because:

- **AMR kills:** Infections caused by resistant microorganisms often fail to respond to the standard treatment, resulting in prolonged illness, higher health care expenditures, and a greater risk of death.
- **AMR hampers the control of infectious diseases:** AMR reduces the effectiveness of treatment; thus patients remain infectious for a longer time, increasing the risk of spreading resistant microorganisms to others.
- **AMR increases the costs of health care:** When infections become resistant to first-line drugs, more expensive therapies are used, longer duration of illness and treatment increases health care costs as well as the economic burden on families and societies.
- **AMR jeopardizes health-care gains to society:** The achievements of modern medicine are put at risk by AMR. Without effective antimicrobials for prevention and treatment of infections, the success of organ transplantation, cancer chemotherapy and major surgery would be compromised.
- **AMR threatens health security, and damages trade and economies:** The growth of global trade and travel allows resistant microorganisms to be spread rapidly to distant countries and continents through humans and food.

1.1 AMR affecting human, animal and environmental health

Although the development of AMR is both evolutionary and inevitable, it is accelerated by many interrelated factors spanning across human, animal and the environment health. Factors that contribute steep rise in development of AMR in humans are irrational prescription of antibiotics by medical practitioners, failure to complete the prescribed antibiotic dosage by patients, self-medical practices among population, over the counter sale of antibiotics by pharmacies and inadequate knowledge of infection prevention control (IPC) and antimicrobials in the community.

In the animal health sector, antimicrobial agents have been used for disease treatment, disease prevention and growth promotion. The use of antimicrobials in food producing animals has received specific attention due to high levels of use for disease prevention and growth promotion, together with inappropriate use. In many developing countries, antimicrobial use levels have risen due to farm intensification and demand for animal protein associated with rising incomes.

In the environment, inappropriate management and release of biomedical waste is the key factor responsible for development and spread of antimicrobial resistance. For instance, antibiotics (expired/unused) disposed-off from households/communities, effluents from hospitals/healthcare facilities, and wastes from agricultural and poultry farms, when released in water bodies or dumped in soil, become an integral part of food chain entering all life forms from plants to animals. Also, use of animal waste (from antibiotic-fed animals) as manure or fertilizers in farms, can act as a source of introducing antibiotics and antibiotic-resistant genes (ARG) in the environment. Further, metabolized or unmetabolized antibiotic consumed by humans and animals also make its way to the soil and water bodies. Since the effluent or sewage treatment plants are not tuned to address resistant bacteria or antibiotic residue, therefore even the treated water may contain antibiotics or ARG, which gets deposited on the surface of water, seeps into ground water or spreads laterally until it meets a stream or other water body.

1.2 Call for Collaborative Actions to control AMR

It is therefore imperative to undertake collaborative efforts from all three sectors - human, animal and environmental, to slow AMR spread. One such global collective effort to control AMR is the “One-Health approach”- suggested by the UN Tripartite collaboration between-WHO (World Health Organization), FAO (Food and Agriculture Organization of the United Nations) and the OIE (Office International des Epizooties, World Organization for Animal Health). In the year 2015, this tripartite has endorsed the Global Action Plan on AMR, outlining five strategic objectives emphasizing the need for multi-sectoral involvement to address the issue of AMR, that was eventually accepted by SEAR members states following series of events (3).

Note: AMR mainly concerns with antibacterial resistance which are commonly designated as antibiotics. Hence, in the document the term “antimicrobials” and “antibiotics” are interchangeably used.

2. Situation in Timor-Leste

All medicines including antibiotics are imported into the country. Antimicrobial prescribing in Government health facilities is based on the Essential Medicines List (2015), but there is nothing in place to regulate the sale of antibiotics at private retail pharmacies. Empiric antibiotic guidelines were developed for HNGV in 2016. Retrospective analyses of antimicrobial consumption have been carried out, to better understand the distribution of antimicrobials through Government health services (4), and point prevalence surveys have been conducted in each of the referral hospitals, to evaluate antimicrobial prescribing rates and appropriateness. In 2021, an antimicrobial stewardship committee was formed at HNGV.

In Timor-Leste, subsistence farming is common and commercial farming is limited to few small poultry farms. Almost every household owns livestock, most commonly chickens and pigs. In an unpublished survey conducted in 2020 targeting smallholder pig farmers in Timor-Leste, only 3.6% of farmers reported that their pigs had ever received antibiotics. Importation of antibiotics for the animal sector is coordinated through the National Directorate Veterinary (NDV) Services. Presently there is no advisory or regulations for use of antibiotics in treatment of animals, or as growth promoters or in pre-mix feed for poultry farms or aquaculture. However, quarantine regulations do not allow the import of animal feed that contains growth promoters. An antimicrobial use monitoring system has been developed, using import data as a proxy for actual usage in animals. Antimicrobial use data has been submitted annually to OIE in the past few years. The methodology and results from the AMU monitoring system were published in a peer-reviewed journal in 2021, showing very low usage of veterinary antimicrobials in Timor-Leste, compared to other countries (5).

At present, the management of waste from healthcare settings, animal farms, households and pharmaceutical industries is very poor. A large amount of all types of wastes, goes untreated or is dumped in the soil or water bodies. Effluent or sewage treatment systems are not tuned to address resistant bacteria or antibiotic residue, therefore, even the treated water may contain antibiotics or ARG. The Secretary of State for Environment under Ministry of Economic Affairs currently doesn't have the mandate for AMR related work. This is proposed to be primarily handled by Department of Environment Health under MOH for the time being.

Presently in Timor-Leste, there is no pharmaceutical industry or any other industry that uses antibiotics. Hence, industry effluent with antibiotics is not the source of environment pollution. Use of antibiotics in agriculture is not well known, however, policy makers and regulators still need to be cautious as the pesticides containing antibiotics pollute the soil and water bodies.

2.1 Progress for implementation of NAP AMR (2017-2020)

In 2017 and 2018, Timor-Leste, along with the rest Member States of WHO-South East Asia Region, developed its National Action Plan on AMR. The NAP-AMR 2017-20 was developed in alignment with the five strategic priorities of 2015 GAP-AMR (6).

Both MoH and MoAF have worked in collaboration with other UN agencies, particularly WHO and partners like Menzies School of Health Research for conducting various activities under NAP-AMR 2017-2020 like organizing of National level awareness campaigns on AMR targeting health professionals and general population; organizing hygiene and sanitation awareness campaigns at community level; and celebrating World Antibiotic Awareness week in 2018 and 2020 with active support from NMSC.

Information, education, and communication (IEC) materials have been developed specifically for Timor-Leste, based on qualitative data from 2018 focusing public awareness and knowledge about antibiotics and AMR. In addition, training sessions for livestock and veterinary technicians (including undergraduates) on antimicrobial resistance, focused on the impact of strategies for addressing AMR in Timor-Leste, have been delivered.

Since 2018, a robust clinical microbiology service has been established at Laboratório Nacional da Saúde (LNS), which provides consistent diagnostic services for Hospital Nacional Guido Valadares (HNGV) and other Government health facilities. It also provides ongoing passive surveillance of AMR based on clinical isolates, with AMR surveillance data entered into the GLASS system for the first time in 2021. This work builds on earlier data from studies that established baseline rates of AMR for key organisms causing skin and urine infections (7, 8). The most recent antibiogram from LNS for clinical isolates from HNGV indicates high rates of MRSA and ESBL producing Gram Negative infections, emphasizing the need for work to reduce the impact of AMR in Timor-Leste. AMR testing is not available in other laboratories in Timor-Leste, but work is underway to improve specimen transport to enable improved access to diagnostic microbiology and AMR testing from the five referral hospitals outside of Dili.

Active surveillance for AMR on animals has so far focused on poultry, targeting *E.coli* and *Salmonella spp.* Laboratory strengthening activities are ongoing at the Veterinary Diagnostic Laboratory (VDL) to increase capacity testing and surveillance of AMR. Environmental surveillance for evidence of AMR in the environment has not been established in Timor-Leste to date.

A National Multisectoral Committee with two focal point, namely National Directorate of Pharmaceutical and Medicine, Ministry of Health (MoH) and National Directorate of Veterinary, Ministry of Agriculture and Fisheries (MoAF), has been established in Timor Leste, that is responsible for coordinating AMR activities and tasks in health, animal, aquaculture, food production and environment sectors.

2.2 Governance and players

Addressing the growing threat of antimicrobial resistance is a shared responsibility. The Government of Timor-Leste's role in protecting the health of Timorese people against disease threats of national concern is essential to this multi-sector collaboration. The Government's role

includes promoting health, preventing and controlling disease, brokering knowledge and facilitating innovation, tracking and monitoring disease threats, ensuring the safety of antimicrobial products and all foods sold and prepared in the country, along with collaboration with international partners.

Fighting the spread of antimicrobial resistance depends on the involvement and collaboration of multiple jurisdictions, levels (local, national and international) and sectors (e.g. public health, private, and agricultural sectors). With the establishment of the multi-sectoral committee, the Government of Timor-Leste is committed to working with all jurisdictions in addressing the problem.

Major active players for AMR that share responsibilities are:

Ministry of Health is and will continue to take lead in coordinating related departments/centres under the ministry of health, other related ministries and line agencies in bringing all together for the cause of preventing and combating the spread of antimicrobial resistance. In this context, it has recently formed a high level steering committee and alliance with the participation of most of the stakeholders in the field including public, private and non-state participants. The coordination through the Ministry of Health will be mainly focused towards bringing all together in harmonizing the guidelines/protocols/regulatory frameworks taking into consideration rational use of antibiotics in all settings. Ministry will continue organizing annual meetings of the steering committees and alliances separately in view of reviewing the progress and bottlenecks and coordinate in promulgation of directives/acts as necessary.

The National Health Laboratory (NHL) acts, in coordination of the National Directorate of Public Health under the Ministry of Health, as a focal point in AMR and leads the laboratory based AMR surveillance. It works with domestic and international partners in areas of surveillance, laboratory analysis, infectious disease outbreaks confirmation, awareness and public health guidance development together with the Department of Epidemiology Surveillance and the National Directorate of Disease Control Division. Outbreaks related to foodborne diseases will be investigated by the epidemiology surveillance officials and laboratory support for disease diagnosis will be provided by NHL. NHL will continue its existing laboratory based AMR surveillance as well as the supporting laboratory services, in support of efforts to combat AMR. This will include regular indicator based timely monitoring, review and required adjustments (e.g. incorporating additional data sources and new technologies).

The National Directorate of Pharmacy and Medicines, under the Ministry of Health, oversees regulation and licensing, pharmacovigilance and market authorization. Its capacity in regulating the strict prescription based sale of medicines, i.e. restricting over the counter availability of antibiotics, needs to be strengthened

National Directorate of Veterinary (NDV) under the Ministry of Agriculture and Fisheries, will be responsible for development / revision of the related treatment/case management protocols,

standard guidelines related to livestock, taking into consideration rational use of antibiotics, particularly discouraging the use of low doses of antibiotics in animal feeds as growth promoters.

Health Research Cabinet and the Academia: The National Health Institute, alongside the wider academic institutions will support Govt. of Timor-Leste in conducting research for generating evidences for policy changes as and when required.

3. Vision, Mission and Goals

Vision - Reduction in mortality, morbidity and economic impact of antimicrobial resistance

Mission - Establish policies and national multisectoral mechanisms that support an effective, sustained, collaborated and coordinated AMR management system both at the national and the sub-national level

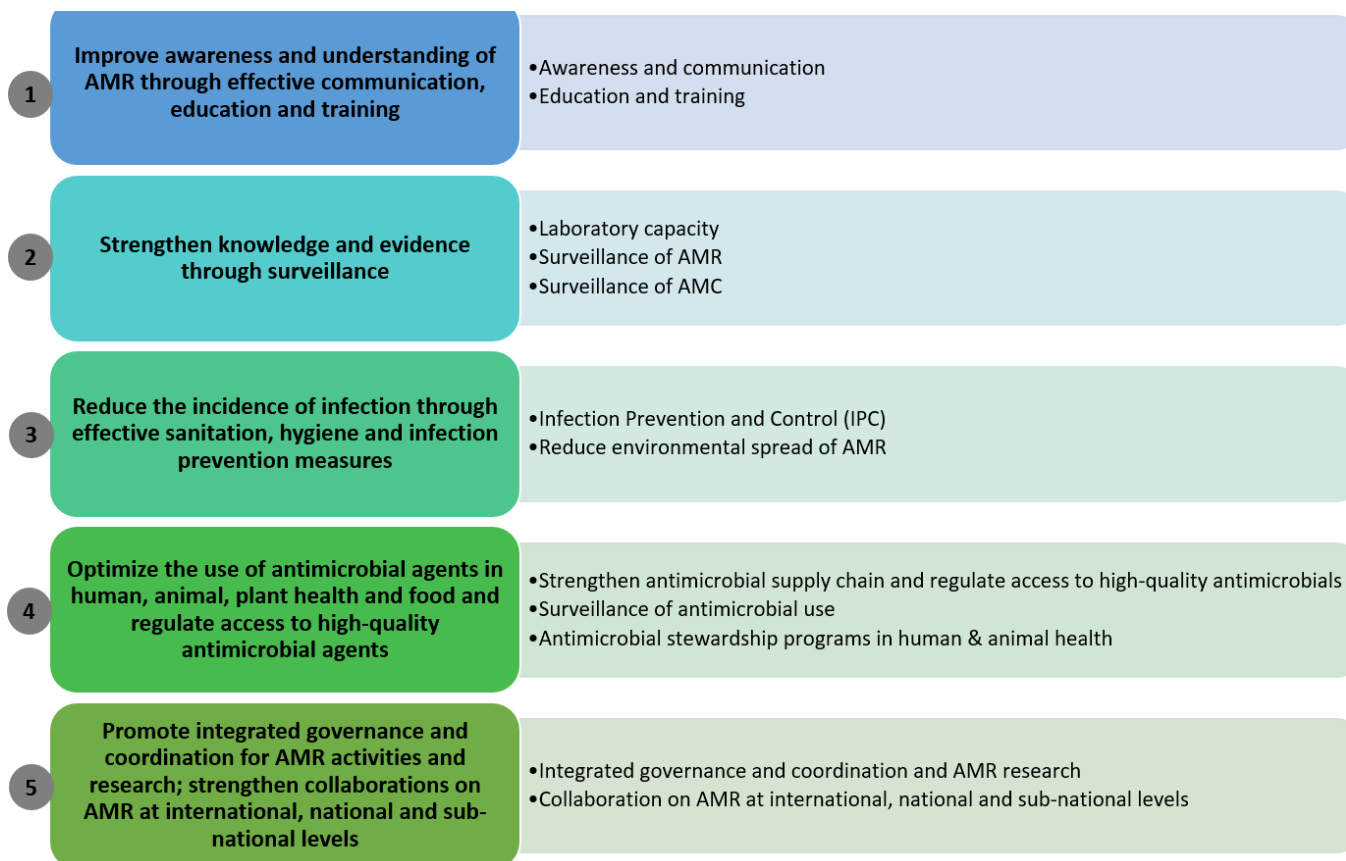
Goals - By the year 2026:

- i. 50% increase over baseline score on awareness/ understanding of appropriate use of antibiotics and AMR in general population, by effective IEC;
- ii. The National Reference Laboratory for human and animal sector to routinely conduct AMR surveillance for common organism defined by WHO and the data to be submitted to GLASS;
- iii. Surveillance of antimicrobial consumption to be set up as per WHO methodology and the data to be submitted to GLASS annually;
- iv. 30% increase in availability of antibiotics as per EML in facilities;
- v. 60% of total antibiotic consumption at country level for the Access group of antibiotics;
- vi. 30% increase in routine vaccine coverage for human and animal sector.

Strategic Priorities

The NAP-AMR outlines the five strategic priorities (SPs)* and activities (aligned with the Global Action Plan on AMR) planned to be implemented between 2022 and 2026 to tackle the public health challenge of AMR in Timor-Leste (Figure 1).

Figure 1: The strategic priorities and focus areas



***Note:** In strategic priority 2 under surveillance, both AMR and AMC are included, as data for both are to be submitted to the WHO platform called GLASS. In strategic priority 5, considering the capacity of the country, new innovations for antibiotic, vaccine or diagnostic agents are not included but collaboration with international and national level is included to ensure action and implementation of documented activities for the containment of AM

SP 1. Improve awareness and understanding of AMR through effective communication, education and training

SP 1.A Awareness and communication

Objective 1.1.: Developing strategies to improve the awareness among general public on appropriate use of antibiotic, antimicrobial resistance, infection prevention, antibiotic residue in food, labelling of food derived from animals and for professionals of the One Health approach using evidence-based and locally contextualized information, education and communication (IEC) materials

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
1.1.1 Assess awareness and knowledge through knowledge, attitude and practices (KAP) and behavioral studies in different professional groups (human, Veterinary, environment), farmers, food sector and the general public for AMR, appropriate use of antimicrobials and infection prevention control (IPC)	H						Directorate MoH, MoAF, Secretary of State for Environment	District departments of MoH and MoAF, Office of Secretary of Environment, Menzies School of Health Research, WHO, FAO, OIE, Faculty of Medicine and Health Science, UNTL	Baseline/trends in KAP and behavior of different stakeholders on AMR, IPC, Water, sanitation and hygiene (WASH), antimicrobial use generated
	A								
	E								
1.1.2 Identify, consolidate and evaluate existing communication/ information resources/products on AMR/awareness for various sectors/stakeholder groups	H						Directorate of MoH, MoAF, MoEA, Directorate of Public Health	Ministry of Information (Mol), Department of Health promotion and Communication (DoHP&C), community engagement, National Directorate of Family Health, WHO and other UN agencies	Consolidated and evaluated the available IEC material for their usefulness and areas to be improved upon
	A								
	E								
1.1.3. Develop a detailed communication plan/strategy including social media, mass	H							Mol, DoHP&C, AMR Nodal officers, Office of	A detailed national plan with

media programs based on the data obtained from KAP and behavior studies targeting different audiences in human, animal, plant and environmental health practices, and the general public for AMR, WASH and appropriate use of antimicrobials	A					Directorate MoH, MoAF, MoEA, Directorate of Public Health	Secretary of Environment (Sec. Env.), various professional associations, WHO and other UN agencies like FAO, OIE, UNDP	implementation policy for each municipality developed. Variety of IEC material developed for target specific audience
	E							
1.1.4. Implement the communication plan using group-specific programs and scientifically developed IEC material such as animation video, posters, pamphlets, booklets etc. in local language for AMR awareness, WASH and appropriate use of antimicrobials for various groups of sectors and stakeholders as developed in the communication plan	H					MoH, MoAF, MoEA, Directorate of Public Health	Mol, DoHP&C, Sec. Env., AMR Nodal officers, various professional associations, WHO and other UN agencies	Cross cutting, comprehensive and sustained awareness and communication program implemented with iterative process for continuous improvement
	A							
	E							
1.1.5. Awareness of consumers on antibiotic residues in food, AMR and labelling of food from animals raised with/without routine use of antibiotics (as per communication plan developed under 1.14)	H					MoH, MoAF, Department of Nutrition (Do Nutrition)	DoNutrition, AIFAESA, Mol, DoHP&C, AMR Nodal officers, National logistic, Quarantine services, FAO, OIE and other UN agencies	Sensitization and continuous awareness of public for use of antibiotics in poultry, aquaculture and food hygiene
	A							
	E							
1.1.6. Awareness campaigns on importance of environmental sector (water bodies and soil) as a reservoir of antibiotics and need actions for containment AMR across all stakeholders (as per communication plan developed under 1.14)	H					Sec Environment in collaboration with MoH, MoAF	Sec. Env., Mol, DoHP&C, AMR Nodal officers, various professional associations, WHO and other UN agencies	Continuous awareness of public and other key stakeholders for importance of environment for AMR containment
	A							
	E							
1.1.7. Engage farmer association for continuous farmer awareness on aspects	H						Farmer association, drug regulator, food	Sensitization and continuous awareness

such as judicious antibiotic use and antibiotic-laden feed and feed additives (as per communication plan developed under 1.14)	A						MoAF, MoEA, MoH	department for animals, DoNutrition, AIFAESA, MoI, DoHP&C, AMR Nodal officers, Veterinarians association (AMVTL), FAO and other UN agencies	of farmers and other key stakeholders in the area of livestock production, poultry, aquaculture and food hygiene
	E								
1.1.8. Organize awareness raising events to celebrate World Antibiotic Awareness Week (WAAW)	H						MoH, MoAF, MoEA,	MoI, DoHP&C, Sec. Env., AMR Nodal officers, various professional associations, WHO and other UN agencies	Tailored education material and awareness of all stakeholders on AMR, IPC, WASH, appropriate use of antimicrobial agents
	A								
	E								

Objective 1.2.: To improve the awareness among school children and various colleges of diploma and degree courses of various sectors about appropriate use of antibiotics, infection prevention and antimicrobial resistance using tailored education material and using already existing platforms for schools and colleges

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
1.2.1 Assess awareness and knowledge through knowledge, attitude and practices (KAP) and behavioral studies in a few schools and colleges of different courses to get a baseline information for AMR and appropriate use of antibiotics	Schools						MoH, MoAF, MoEA, Ministry of Education, Ministry of Higher Education, UTNL	School Associations, School health program, Various departments of Colleges, Sec. State of youth, WHO, other UN and other international agencies, JICA, KOICA	Baseline data in KAP and behavior of school children and college students AMR, IPC, antimicrobial use generated
	Colleges – Diploma and degree								

1.2.2 Formulate evidence-based IEC material on appropriate use of antibiotics, infection prevention and AMR for schools and diploma and degree colleges and develop strategy to implement the awareness program	Schools						MoH, MoAF, MoEA, Ministry of Education, Ministry of Higher Education, UTNL	Mol, DoHP&C, Sec. Env., IPC team, Manzies School of Health Research, departments of Colleges, WHO, other UN and other international agencies, JICA, KOICA	Comprehensive and target-specific IEC material developed with strategy to implement the program
	Colleges – Diploma and Degree								
1.2.3 Implement the awareness program in all schools and colleges with target-specific IEC material developed	Schools and Colleges – Diploma and Degree						MoH, MoAF, MoEA, Ministry of Education, Ministry of Higher Education, UTNL	Mol, DoHP&C, Sec. Env., IPC team, departments of Colleges, UN and other international agencies, JICA, KOICA	Awareness and communication program implemented with iterative process for continuous improvement
1.2.4 Develop and integrate educational resources on antibiotic use, infection prevention and AMR into school curriculum	All schools						Ministry of Education, MoH, MoAF, MoEA	School associations, School health program, UN and other international agencies, JICA, KOICA	Locally contextualized, education material on AMR developed
1.2.5 Develop module and conduct Training of Trainers (TOT) for school teachers on the AMR course included	All schools						Ministry of Education, MoH, MoAF, MoEA,	School associations, School health program, professional associations, JICA, KOICA	TOT module for teachers developed and training conducted
1.2.6 Implement the educational resources on antibiotic use, infection prevention and AMR into school curriculum in the entire nation	All schools						Ministry of Education	School associations, School health program, WHO, other UN and other international agencies, JICA, KOICA	Integrated and implemented the developed course on AMR in school curricula with iterative

									process for continuous improvement
1.2.7. Celebrate World Antibiotic Awareness Week in schools and colleges	Schools						Ministry of Education, MoH, MoAF, Ministry of Higher Education, UTNL	School associations, School health program, Various departments of Colleges, Sec. State of youth, WHO and other UN agencies, JICA, KOICA	Tailored education material and awareness for school and college students with various events organized on different aspects of AMR
	Colleges – Diploma and Degree								

SP 1.B Education and training

Objective 1.3: Improve knowledge and capacity of all professionals and key stakeholders regarding AMR and related topics on appropriate use of antimicrobials of professional education and training

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
1.3.1 Conduct assessment of various curricula (degree/diploma) to determine the current extent of appropriate use of antibiotics, AMR, antimicrobial stewardship program, IPC, one-health approach – human (doctors, dental, midwife, nurses, pharmacy, nutrition), Animal – Veterinarian, para-veterinarian, Fisheries, Agriculture, etc, Environment (Science for biomedical laboratory course, etc) for containment of AMR	H						MoH, Ministry of Higher Education, MoAF	UNTL and other universities, Faculty of Agriculture, Faculty of Medicine and Health Science, Faculty for Veterinary, Fishery course, and others	Baseline data generated on the presence of AMR and related topic as core components of curricula for various professional and allied courses
	A								
	E								

										international agencies like FAO, OIE, UNDP		
1.3.2 Develop module and conduct Training of Trainers (TOT) for faculty of professional and allied courses including veterinary lab and biomedical lab	H									MoH, Ministry of Higher Education, MoAF, UNTL, Faculty of Agriculture	Faculty of Medicine and Health Science, Faculty for Veterinary, Fishery course, all professional associations, WHO, other UN and international agencies	TOT module developed and training for teachers conducted
	A											
	E											
1.3.3 Integrate and implement the developed educational resources on AMR specific for each professional and allied course	H									MoH, Ministry of Higher Education, MoAF, UNTL, Faculty of Agriculture	Faculty of Medicine and Health Science, Faculty for Veterinary, Fishery course	Integrated and implemented the developed course on AMR in all professional and allied courses curricula with iterative process for continuous improvement
	A											
	E											

Objective 1.4: Develop accredited continuing professional development (CPD) and in-service training modules on appropriate use of antibiotics, IPC, AMR and antimicrobial stewardship

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
1.4.1 Regulation to make CPD on AMR, antimicrobial use (AMU) and antimicrobial stewardship (AMS) as a requirement for licensing and renewal of licensing for	H						MoH MoAF	Professional Associations, Gabinetelisensiamentu, INS hoGabinetePolitika no kooperasaun	A policy is developed to have a CPD on AMR for licensing and renewal of professional license
	A								
	E								

practicing for all health professionals including pharmacists (Policy)									
1.4.2 Engage professional bodies – associations and departments from higher education in developing capacity of all professionals for AMR containment and to develop module for licensing and renewal of license for professional	H						MoH	Various associations- AMTL, APTL, AETL, ASFARTIL, ADETIL. AMVTL, WHO and other UN agencies	CPD on AMR and related topic for professional and modules developed for licensing and renewal of licensing for all professionals
	A						MoAF		
	E						MoEA		
1.4.3. Develop resources and basic module for regular in-service training of different professionals and allied service to clear the exam at the time of induction in service for all sectors	H						MoH	Department for training in respective ministry/departments	Basic module on AMR and related topic developed for all fresh recruitments to professionals' services
	A						MoAF		
	E						MoEA		
1.4.4. Develop resources and advance module for regular in-service training of different professionals and allied service	H						MoH	Department for training in respective ministry/departments	Advance module on AMR and related topic developed for all in-service professionals
	A						MoAF		
	E						MoEA		
1.4.5. Conduct regular training of drug regulators, procurement officials, custom officials, distributors, sellers for approved drugs including antimicrobial agents	H						MoH	Concerned departments, NRA, procurement, Gabinette of Quality Control, pharmacist association, WHO and other UN agencies	Regular training conducted for drug regulators, procurement officials, custom officials, distributors, sellers
	A						MoAF		
	E								
1.4.6. Conduct regular training for animal health inspectors, plant health inspectors, environmental health inspectors, other	H						MoH	All concerned departments for training, biosecurity,	Regular training conducted for animal health inspectors,
	A						MoAF		

extended workers at all districts level on appropriate use of antibiotics, biosecurity, hygiene, good farm and waste management practices	E						MoEA	waste management, WHO and other UN agencies, national authority for certification	plant health inspectors, environmental health inspectors and extension staff
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SP 2. Strengthen knowledge and evidence through surveillance

Prioritization has been done for human health (represented as H), animal (represented as A), and environment (represented as E) sectors across all objectives and activities.

SP 2.A Laboratory capacity

Objective 2.1.: Designate and strengthen national reference laboratory each for AMR surveillance in human and animal sectors to also include food and environmental surveillance

Animals include food animals (including terrestrial livestock for meat, dairy, poultry and aquatic livestock such as fisheries), pets and other large animals. Food is primarily from animal sources includes honey, milk, eggs, meat, fish and sea food, but does not exclude agricultural produce such as cereals, fruits and vegetables.

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
2.1.1 Strengthening the Laboratório Nacional da Saúde (LNS) as the national reference laboratory for human health, and the Veterinary Diagnostic Laboratory (VDL) for animal health. Designate and strengthen Toxicology laboratory at LNS for surveillance in the food and environmental sector	H	█	█	█	█	█	MoH/LNS, MoAF/VDL	Menzies, WHO Sec. State of the Environment (Sec. Environment) and Department of Environment, MoH (DoE-MoH)	NRLs for human and animal strengthened. Facilitate upload of GLASS AMR data yearly by human sector Toxicological lab of NRL/VDL for food and environment sector strengthened
	A	█	█	█	█	█			
	E		█	█	█	█			
2.1.2 Develop and approve TOR, MOUs for labs especially for environment sector; Develop and approve standard operating procedures (SOPs) for collection, storage, transportation, processing and analyzing samples with	H	█					MoH/LNS, MoAF/VDL	Menzies/WHO, Sec of state Environment, DoE-MoH	SOPs developed for microbiology testing for AMR surveillance in all sectors, especially for the environment sector testing. Mapping of existing SOPs within human health sector and offer of
	A	█							
	E		█	█	█				

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
quality assurance for NRL and toxicology department at NHLs								revision and development strengthening of LNS
2.1.3 Conduct assessment and procure equipment and supplies for conducting AMR testing	H					MoH/LNS/SAMES, MoAF/VDL,	Department of Budget/Finance; Procurement division, NRLs, FAO, OIE, UNEP	Collaboration and funding from UN agencies or other partners. Necessary equipment and supplies in place in laboratories.
	A							
	E							
2.1.4 Develop/strengthen a biorepository facility for all the three sectors	H					MoH/LNS, MoAF/VDL,	NRLs, MSHR, designated lab for environment, Sec. Environment, WHO, UN Agencies	Biorepository facility strengthened for human and animal sector and developed for food and environmental sector
	A							
	E							
2.1.5 Strengthen laboratory capacity for detection of AMR determinants (antibiotic residues, resistant bacteria, genes) at various point sources such as waste from hospitals and labs for humans and animals, treatment plants (waste water, sewage and drinking water), animal farms, slaughter houses, meat and milk processing units, wet market shops	H					MoH/LNS, MoAF/VDL, ANASIP – (water testing laboratory)/MPW	MSHR, designated lab for environment, Sec. Environment, DoE-MoH, WHO, UN agencies	Strategic plan for capacity building of the Toxicology department at LNS to conduct AMR surveillance testing on environmental point sources
	A							
	E							

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
2.1.6 Establish and continue providing routine External Quality Assurance Scheme (EQAS) for all surveillance laboratories engaged in antimicrobial susceptibility testing (AST) and training of staff.	H	■	■	■	■	MoAF/ VDL,MoH/LNS	EQAsia, PPTC, PRIDA	Enable partners to continue conducting annual EQA for the Human and Animal sectors. Explore optionsfor regular Environmental EQA and implement if appropriate
	A	■	■	■	■			
		■	■	■	■			

Objective 2.2.: Establish an AMR laboratory network

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
2.2.1 Conduct a countrywide need assessment for Human and Animal laboratories in all municipalities	H	■				MoH/LNS, MoAF/VDL, MoEA	District departments of MoHand MoAF, Office of Secretary of Environment, MSHR	Gap analysis report and strategic plan to strengthen and develop laboratories in a phased manner in municipalities where regional and referral hospitals are located
	A	■						
	E							
2.2.2 Review current budget for AMR activities in all sectors and ensure budget lines are created and allocated appropriately for training, human resources, guidelines,	H	■	■	■	■	MoH/LNS, MoAF/VDL, MoEA, Ministry of Finance	Directorate of Public Health, AMR Nodal officers, DoE-MoH, WHO and other UN agencies like UNEP	Established annual financial support and plan for technical training, consumables,
	A	■	■	■	■			

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
infrastructure and consumables among all sectors.	E							facilities, and staff in microbiology laboratories for all sectors
2.2.3 Conduct assessment of current sample transport methods from municipalities to referral laboratories and identify areas for improvement.	H					MoH, MoAF,	Directorate of Public Health, Sec. Environment, DoE-MoH, AMR Nodal officers, MSHR	Assessment report with outlined methods to establish or strengthen existing sample transport systems for all sectors to the relevant referral microbiology laboratory.
	A							
	E							
2.2.4 Build capacity (human, material and infrastructure) in Human health network laboratories at the 5 referral hospitals to conduct AMR activities. Build capacity for animal and environmental laboratories.	H					MoH, MoAF, MoEA	AMR Nodal officers, Sec. Environment, UN agencies	Increase ability to conduct basic microbiology and AMR diagnostic testing at the referral hospitals.
	A							
	E							

SP 2.B Surveillance of AMR

Objective 2.3: Establish a national coordination structure for surveillance of AMR in humans, animals, food, and the environment

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			

2.3.1 Integrate AMR surveillance into the existing surveillance system within each sector- human, animal, plant, food and environment (policy)	H					MoH, MoAF, MoEA,	NRLs, MSHR, Sec. Environment, DoE- MoH, ,	AMR surveillance for all three sectors initiated and integrated
	A							
	E							
2.3.2 Establish standards and coordination mechanisms for (i) national surveillance of AMR – including surveillance standards at various healthcare levels, drug-bug combinations in a phased approach for strengthening AMR surveillance; animal surveillance for sample-bug-drug combinations as per FAO; (ii) surveillance in food animals and their products for sample-bug-drug combinations; surveillance in fisheries for sample-bug-drug combinations; (iii) surveillance in dairy products and food for sample-bug-drug combinations; develop and implement standards for antibiotic residue in food (from animals), and in waste	H					MoH, MoAF, MoEA; fisheries department, FSA	MSHR, Sec. Environment, DoE- MoH, Concerned agencies, AIFAESA	National AMR surveillance standards as per the UN/international agency developed and adopted for AMR surveillance in all the three sectors
	A							
	E							
2.3.3 Develop the standards and then sensitize the stakeholders for antibiotic residues in waste generated from farms, human care, veterinary care, fisheries and factories for implementation	H					MoH, MoAF, MoEA	All concerned departments, Sec. Environment, DoE- MoH, MSHR, all concerned laboratories, Faculty of Medicine and Health Science, Faculty for Veterinary, Fishery,	1Sensitization and implementation plan of stakeholders is done. 2.Standards for surveillance of antibiotic residues for all three sectors developed
	A							
	E							

							DoNutrition, UN agencies		
2.3.4 (i) Assessment of current surveillance practices and reports in each municipality (ii) Standardize data analysis and information management for AMR surveillance for all the three sectors at central level and at municipal level.	H						MoH, MoAF, MoEA, Office for liaison of all the municipalities	Directorate of Public Health, Sec. Environment, DoE-MoH, AMR Nodal officers, MSHR	1. Gap analysis report available. Regular (and timely) AMR surveillance from each municipality as the labs are being developed in the phased manner. Regular submission to GLASS/WHONET
	A								
	E								
2. 3. 5 Ensure intersectoral coordination among different stakeholders for surveillance of AMR by (1) Formalize 3-sector committee (2) conduct quarterly meeting for sharing surveillance data	H						MoH, MoAF, MoEA, Office for liaison of all the municipalities	Directorate of Public Health, AMR Nodal officers, MSHR, Sec. Environment, DoE-MoH	Quarterly meeting report; Technical annual report on surveillance among the 3 sectors
	A								
	E								
2.3.6 Coordinate and integrate the sector-specific surveillance systems into the national and international systems (i.e., GLASS)	H						MoH, MoAF, MoEA,	Sec. Environment, DoE-MoH. All concerned departments	Data uploaded into national and international system annually
	A								
	E								
2.3.7 Collate and analyze AMR surveillance data for sharing with stakeholders	H						MoH, MoAF, MoEA,	Directorate of Public Health, AMR Nodal officers, DoE-MoH	AMR surveillance information available for humans, animals, food and environment sector to all stakeholders
	A								
	E								

2.4.4. Integrate the AMC data with AMR surveillance data into useful information and make the information available on an online platform for relevant stakeholders	A					MoAF	Focal points/departments for AMR and AMC reporting for all sectors	AMR surveillance along with AMC data information available at a common platform for human and animal sectors
	E							
2.4.5. Develop and establish data collection for AMC surveillance in each municipality for human and animal sector	H					MoH	Focal points/department, Procurement agencies and nodal officer at each municipality for AMR	AMC data for each municipality collected.
	A					MoAF		
	E							
2.4.6. Reporting and publishing the annual data for AMC at national and municipal area for all sectors	H					MoH	Focal points/departments for AMC reporting for all sectors	AMC surveillance data published in public domain for relevant stakeholders
	A					MoAF		
	E					MoEA		

SP 3. Reduce the incidence of infection through effective water, sanitation, hygiene and infection prevention & control measures

SP 3.A Infection prevention and control (IPC)

Objective 3.1: Develop policy for registration/licensing of human and animal healthcare facilities and environmental sector to reduce AMR

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
3.1.1 Develop policy on registration/licensing of healthcare and veterinary facilities and farms, factories (feed manufacturing units, pharmaceutical manufacturers, wet markets, big slaughter houses, fish/meat/dairy processing units, poultry farms, aquaculture units, food processing units)	H					MoH, MoAF, MoEA, Ministry of Commerce and Industry	District departments of MoH and MoAF, Office of Secretary of Environment, DoNutrition, SERVE – MCI (ministeriocommercio e industria. AIFAESA MoEA (autorizasaun/licensing :lisencaactividade / operasaional no lisencaautorizasaun.), Law enforcement	Policy developed on registration/licensing of various human, animal, food and environment units involved in use of antimicrobial agents.
	A							
	E							
3.1.2 Policy on environment risk assessment in view of AMR including policy for expired/unused antimicrobials	H					MoH, MoAF, MoEA	District departments of MoH and MoAF, Office of Secretary of Environment, Office of drug procurement,	Policy developed for reducing AMR spread in the environment
	A							
	E							

Objective 3.2.: Establish a national coordinating structure for IPC, biosecurity, sanitary and phytosanitary measures

3.2.1 Define terms of reference and scope and establish National Coordination Unit for IPC for animal and human sector. Conduct situation analysis of sanitary and phytosanitary measures, biosecurity and IPC at all tiers of healthcare system	H	█				MoH, MoAF, MoEA, Directorate of Public Health	MSHR, WHO and other UN agencies, Environmental Health Department	IPC national coordination unit established and its scope defined. Gap analysis report of IPC at all levels of healthcare, food and agriculture determined
	A	█	█					
	E	█	█					
3.2.2 Based upon situation analysis develop/revise national guidelines and protocols for all the three sectors (ie, national IPC, water, sanitation, hygiene, biosafety, and phytosanitary guidelines for relevant stakeholders such as farms, factories and healthcare settings)	H	█	█			MoH, MoAF, MoEA, Directorate of Public Health	DoNutrition, hospital Infection Control Team, MSHR, housekeeping department & engineering department of hospitals and other facilities, WHO and other UN agencies	National guidelines on IPC, biosafety and phytosanitary developed and targets defined for human, animal and environment sector.
	A		█	█				
	E		█	█				
3.2.3 Implement the national plan on IPC, WASH, biosafety, and phytosanitary based upon risk and need based matrix	H	█	█	█	█	MoAF, MoH, MoEA,	DoNutrition, various professional associations, AMR nodal officer at all municipalities, housekeeping department & engineering department of hospitals and other facilities, ANAS I.P, community leaders (xfesukuetc)	National IPC plan for all sectors with M&E framework endorsed and implemented nationally in a phased manner.
	A	█	█	█	█			
	E				█			

3.2.4 Establish a standardized surveillance program on healthcare associated infections (HCAs) in a tiered network that utilizes uniform case definitions, methodologies, and reporting mechanisms	H	■	■	■	■	MoH, MoAF,	DoNutrition, MSHR, Hospital Infection Control Team, AMR nodal officers at all municipalities, WHO, Menzies,	National HAI surveillance established in identified facilities,
	A	■	■	■	■			
	E							
3.2.5 Adaptation and Advocacy of WHO Core Components and Minimum standards in IPC at national and facility levels to support gap assessment, implementation of IPC including HAI surveillance, built infrastructure, practice change, etc. Allows for IPC programs to be informed by infectious disease prevalence	H	■	■	■	■	MOH	MOH, health facilities, Quality Cabinets, WHO	Gap analysis report and implementation strategy for the national and facility IPC programs
	A							
	E							
3.2.6 Advocacy for hand hygiene-multi-modal WHO intervention “Five Moments for Hand Hygiene” to be adopted in all health facilities. Access to basic supplies and equipment needed to perform hand hygiene	H	■	■	■	■	MoAF, MoH, MoE, UN agency	Hospital Infection Control Team, ANAS I.P, NGO national and International, Water AID, WHO, UNICEF, Plan	Basic IPC control of hand hygiene is promoted in all healthcare facilities, adequate water supply in every health facility
	A							
	E							
3.2.7 Develop capacity- infrastructure and skilled human resources with adequate financial resources to implement the national IPC plan in human, animal	H	■	■	■	■	MoAF, MoH, MoEF	various professional associations, Hospital Infection Control Team, AMR nodal officer at all municipalities,	Training of staff and improvements of WASH infrastructure in all sectors
	A	■	■	■	■			

and food sector with environment sector on board	E							ANAS I.P (agua e sanimentu). housekeeping department & engineering department of hospitals	
3.2.8 Development and implementation of medical and infectious waste guidelines for human and animal sectors in the context of IPC	H						MOH, MoAF	CQAH Surveillance, Sanitary and Environmental Health Department, WHO, OIE	Guidelines developed and implemented for infectious waste management for human and animal sector
	A								
	E								

Objective 3.3: Strengthen infection prevention including hand hygiene, water sanitation in the community to reduce use of antimicrobials and limit the development and spread of AMR

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
3.3.1 Assess knowledge and practices of personal hygiene, IPC (with emphasis on hand hygiene) in various social groups; assess in community for veterinary setting and animal husbandry	H						MoH, MoAF, MoE	District departments of MoH and MoAF, Directorate of public health, UNICEF, WHO community leaders	Baseline data from community on Hygiene and IPC generated and in fifth year data generated after intervention programmes
	A								
	E								
3.3.2 Develop behavior change communication and social	H							Directorate of Public Health,	Campaigns for behavior change communication for

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
mobilization campaigns to promote IPC, emphasizing hand hygiene and motivation to sustain the habit of hand washing (with soap) Increase awareness in community for good production practices in veterinary settings, animal husbandry and food sector (proper hygiene/sanitation/practices of IPC)	A					MoH, MoAF, Ministeriokomunikasun	AMR Nodal officers, UNICEF, WHO community leaders	improving hygiene and IPC developed and implemented
	E							
3.3.3 Ensure engagement of mass media and new IT tools to implement sustained IPC campaigns that are socially and culturally acceptable in local context both for human and animal sector	H					MoH, MoAF, Ministeriokomunikasun, MoE, INS	Directorate of Public Health, AMR Nodal officers, MSHR, Department of information	Mass media and IT tools used for sustain and reaching out to all in the community for IPC and hygiene campaigns, develop mass media and new IT tools,
	A							
	E							
3.3.4 Review and strengthen national immunization program to expand the vaccine coverage in human and animal sector. Ensure and advocate for appropriate immunization for both human and animal sector	H					MoH, MoAF,	AMR Nodal officers, Department of information, UNICEF, WHO, FAO, OIE	Strengthening immunization programme for human and animal sector
	A							
	E							
3.3.5 Educate and train children about importance of hand	H					MoH, MoAF, MoE	AMR Nodal officers, Local	IPC practices with emphasis on hand hygiene for

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
hygiene, washing hands with soap and water at school; enhance awareness of IPC and hand hygiene amongst farmers and fishermen; train staff in villages for biosafety and biosecurity principles and practices	A						government at municipal and village level, Department of education, WHO UNICEF, CARE INTERNATIONAL. Community leaders	schools, farmers and villages implemented
	E							
3.3.6 Monitor water availability, accessibility for human consumption and for effective hand hygiene practices in the community	H					MoH, MoAF, MoEA, Ministry of public works	Municipal bodies, AMR Nodal officers, Plan international, water aid, WHO Unicef, ANAS I.P, BEE Timor-Leste E.P	Monitoring water supply, access and quality for the entire country
	A							
	E							

Objective 3.4: Strengthen biosecurity and sanitary measures in animal/plant health

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
3.4.1 Mapping of livestock/plant populations and biosecurity points	H					MoAF, MoEA	MSHR, Concerned agencies, FAO, OIE	Mapping of livestock and plant population started
	A							
	E							

3.4.2 Strengthen livestock census using new technologies and national database	H					MoAF, MoEA	MSHR, Concerned agencies, FAO, OIE	Updated livestock census
	A							
	E							
3.4.3 Develop new and strengthen existing biosecurity checkpoints and barriers	H					MoAF, MoEA	All concerned departments, MSHR	Biosecurity checkpoints and barriers identified
	A							
	E							

SP 3.B Reduce environmental spread of AMR

Objective 3.5: Reduce environmental contamination with antimicrobial residue, resistant pathogens and resistant genes and reduce incidence of infection through effective IPC

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
3.5.1 Identify environmental sources for contamination mainly from human and animal sector with antibiotic residue, antibiotic resistance gene (ARG) to prevent contamination of environment Conduct training for key focal points to identify environmental sources	H					MoH MoAF, MOEF	All concerned departments, UN agencies and other international organizations	Report on identified environmental sources for spread of AMR. All units/sectors identified concerning spread of AMR for the environment sector Capacity building workshop	
	A								
	E								
	H					MoH			

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
3.5.2 Establish national coordination unit for measuring antibiotic residue, antibiotic resistant genes in the environment sector	A					MoAF, MOEF	Sec. Environment, NHL, VDL, UN agencies and other international organizations	A national coordination unit is established to measure antibiotic residue and ARGs to control environment spread of AMR
	E							
3.5.3 Based on data registration of all facilities and environmental risk assessment develop guidelines for locating farms, factories, slaughter houses, wet markets, processing units, feed manufacturers, healthcare facilities, veterinary care facilities; ensuring compliance of existing/new guidelines	H					MoH MoAF, MoEF	Sec. Environment, Regulatory bodies, UN agencies and other international organizations	Guidelines for health facilities, farms and factories developed and for infrastructure at their location sites to reduce spread of AMR in the environment
	A							
	E							
3.5.4 Strengthen policy and implementation of proper bio-medical waste management including responsibility and guidelines for expired/unused antibiotics; Develop appropriate biosecurity guidelines and SOPs on waste management for farms,	H					MoH MoAF, MoEF	Municipal unit for sewage treatment, hospital Infection Control Team, housekeeping department & engineering department of hospitals and other facilities, Central supply	Revised policy and national plan to reduce environmental impact of AMR developed and implemented
	A							

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
feed manufacturers, slaughter houses, food processing units, health and veterinary care facilities, sewage treatment plants and good manufacturing practices (GMPs) for fish/meat/dairy processing units	E						sterilization department, Pollution control board, Fisheries department, UN agencies	
3.5.5 Define standards and monitor antibiotic residues and bacterial loads in effluents; disinfection at treatment plant to remove bacteria at various facilities of animal and human sector	H					MoH	Regulatory body, pollution control board, National coordination unit to reduce spread of AMR in the environment, UN agencies	A defined national plan for monitoring to reduce the spread of environmental contamination with antibiotic residue
	A					MoAF MoEA		
	E							
3.5.6 Adopt improved litter/manure management approaches such as biogas generation, proper composting for treatment of litter/manure under supervision	H					MoAF, MoE,	National coordination unit to reduce spread of AMR in the environment, UN and other international organizations	Actions and activities adopted to reduce contamination of environment with antibiotics and ARGs
	A							
	E							

SP 4. Optimize the use of antimicrobial agents in human, animal, plant health and food and regulated access to high-quality antimicrobial agents

SP 4.A Strengthen antimicrobial supply chain and regulated access to high-quality antimicrobials

Objective 4.1: Develop policies to strengthen the antimicrobial supply chain to optimize use of antimicrobial agents to reduce AMR

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
4.1.1 Review and update regulations/policies on import of antimicrobial agents.	H	■	■				MoH, MoAF, Custom Office	National drug regulatory authority (NRA)/I NDPM, Procurement Division for human, animal, agriculture, WHO and other UN agencies	Regulations and policies reviewed and updated for import of antimicrobial medicines for both human and animal sector
	A	■	■	■					
	E								
4.1.2 Develop Regulation/policy on appropriate labelling of antibiotics used in human animal and any food products	H	■	■	■			MoH, MoAF,	NRA, Procurement Division for human, animal, agriculture; National Directorate of Veterinary Services, SAMES I.P	Policy developed for appropriate labelling of antibiotics and for feed to be used for animal husbandry and food products.
	A	■	■	■					
	E								
4.1.3 Develop policy and national guidelines for sale of antimicrobial agents including restricted antimicrobials and antibiotic laden feeds/feed premix.	H	■	■				MoH, MoAF, NRA	National Directorate of Veterinary Services, National Directorate of Pharmaceutical and Medicine, Gabinetete of Quality Control, SAMES and AIFAESA.	Policy and National guidelines for selling antimicrobial agents' and antibiotic laden feed developed
	A	■	■						
	E								

4.1.4 Harmonization of policies/regulations/laws related to AMR containment between NRA, MoAF, food and Environment sector	H	■	■				MoEA, MoAF, MoH	NRA, National Directorate of Pharmaceutical and Medicine, National Directorate of Veterinary Services, Gabinette of Quality Control, AIFAESA, WHO and other UN agencies	Strengthen NRA for all sectors of one-health, specific policy in places for all areas; importation, dispensing, distribution and utilization
	A	■	■						
	E	■	■						
4.1.5 Develop Policy on restrict/phase out non-therapeutic use of antimicrobials as growth promoters and disease prevention in animals	H	■	■	■	■	■	MoAF, NRA-MoH	Farmer association, Gabinette of Quality Control, food department for animals, AIFAESA, AMVTL, WHO and other UN agencies	Policy developed to phase out/ban use of antimicrobials as growth promoters/non-therapeutic use in animals
	A	■	■	■	■	■			
	E								

Objective 4.2.: Ensure uninterrupted access to high-quality antimicrobial agents

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
4.2.1 Strengthen national drug regulatory authority and regulatory actions to ensure access to antimicrobials, in human, animal and plant health	H	■	■	■	■	■	MoH, MoAF	NRA, National Directorate of Veterinary Services, Gabinette of Quality Control, Sec. Environment	NRA strengthened and regulations developed for improving use and access and implemented,
	A	■	■	■	■	■			
	E	■	■	■	■	■			
	H	■	■				MoH, MoAF		

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
4.2.2 Enforce regulations to minimize substandard, spurious, falsely labelled and falsified antimicrobial agents	A	■	■				NRA, SAMES, Gabinette of Quality Control	NRA strengthened and regulations implemented
	E							
4.2.3 Review and update national essential medicine list as per WHO classification on Access, Watch and Reserve (AWaRe)	H	■				MoH,	NRA, Selectin Committee for medicines and Health Products, Gabinette of Quality Control, WHO	EML updated as per WHO guidelines
	A							
	E							
4.2.4 Develop guidelines for disposal of antimicrobial agents, human, animal, plant and industry waste	H	■	■			MoH, MoAF, MoEA	Sec. of Environment, Pollution Board, Coordination unit for reducing spread of environment AMR, UN agencies	Guidelines developed for disposal of antimicrobial agents, human, animal, plant and industry waste
	A	■	■					
	E	■	■					
4.2.5 Implement relevant Codex Alimentarius and OIE Terrestrial Animal Health Code guidelines on AMR and access to antimicrobial agents	H	■	■	■	■	MoAF, MoH, MoEA	various professional associations, Directorate of Veterinary Services, UN agencies	Relevant Codex Alimentarius and OIE guidelines on AMR and access to antimicrobial agents implemented
	A	■	■	■	■			
	E	■	■	■	■			

Objective 4.3: Multi-faceted stepwise approach to reduce over-the-counter sale of antimicrobial agents

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
4.3.1 Issue and distribute circulars to all pharmacies/outlets/agriculture shops not to dispense antimicrobials without prescription and regularly monitor	H	■	■	■	■	MoH, MoAF	NDPM, District departments of MoH and MoAF, Directorate of public health	Circulars issued and monitored dispensing of antimicrobials without prescription in all pharmacies/outlets
	A	■	■	■	■			
	E							
4.3.2 Implement and monitor sale of antimicrobial agents as per the national guidelines with centralized database of import, distribution and sales	H	■	■	■	■	MoH, MoAF, NRA	NDPM, GIAS (Health Inspectors) AMR Nodal officers, Local government at municipal and village level,	Antimicrobial agents supply chain is regularly monitored
	A	■	■	■	■			
	E							
4.3.3 (i) Conduct public awareness activities (e.g. leaflet, IEC materials) targeted at consumers and community, including social media (aligning with objective 1.1) to decrease over-the-counter (OTC) purchase of antibiotics (ii) Prepare training modules/IEC and conduct awareness/skill developments campaign for regulators, custom officials, distributors, pharmacists, licensees and pharmacy students	H	■	■	■	■	MoH, MoAF	Directorate of Public Health, AMR Nodal officers, Secretary State of Communication, WHO Ministry of education, Medical and Pharmacy professional organizations and associations,	1 Campaigns conducted for public awareness of not getting antibiotic without prescription 2 IEC material and training modules for awareness and skill development for all stakeholders for antibiotic supply chain implemented
	A	■	■	■	■			
	E							
	A	■	■	■	■			
	E							
	H		■	■	■			

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
4.3.4 Conduct centralized prescription audits/registers for sale and purchase of antimicrobials at pharmacies and other outlets	A					MoH, MoAF, NRA	NDPM, GIAS (Health Inspectors), Gabinette of Quality Control, AMR Nodal officers, Local government at municipal and village level, WHO and other UN agencies	Prescription audit and audits of registers are done to check OTC sale of antibiotics
	E							
4.3.5 Monitor for presence of antibiotics in feed used in veterinary sector, poultry and fisheries and aquaculture	H					MoAF, MoEA	NRA, Local government at districts, AMR Nodal officers	Regular monitoring of feed for antibiotics/checking of mixing of antibiotics in the animal feed
	A							
	E							

SP 4.B Surveillance of antimicrobial use

Objective 4.4: Establish and institutionalize the surveillance system for antimicrobial use (AMU) at all levels to foster optimal use of antimicrobial medicines

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
4.4.1 Organize national consultation workshop to establish technical working group, focal point and resources to implement yearly surveillance of antimicrobial use in	H					MoH MoAF, Ministry of agriculture	MSHR, All concerned departments, WHO and other UN agencies	National surveillance for antimicrobial use established for human and animal sector
	A							
	E							

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
human, and animal sector including primary care facilities								
4.4.2 Facilitate training workshops at health facility level training workshops at health facility level to develop capacity to measure antimicrobial use in different facilities/institutes in all districts	H					MoH MoAF	Gabinette of Quality Control, MSHR, AMR Nodal officers, various professional associations, INS, WHO and other UN agencies	Stakeholders' training conducted for methodology to be used for surveillance of antimicrobial use in all sectors
	A							
	E							
4.4.3 Continue functionality of existing committee to update national EML and STGs and facilitate dissemination and training	H					MoH, MoAF	Gabinette of Quality Control, AMR Nodal officers, various professional associations, WHO and other UN agencies	Committees to regularly update STGs and EMLs and disseminating the guidelines and conducting trainings
	A							
	E							
4.4.4 Ensure capacity development of hospitals/institutions for antibiotic audits and feedback to ensure optimal use in their facilities	H					MoH MoAF	Gabinette of Quality Control, INS, WHO and other UN agencies	Capacity building of hospitals/institutes for prescription audit and feedback mechanism established
	A							
	E							
4.4.5 Establish system to review audits and compliance with STGs and publish report yearly on surveillance of antimicrobial use	H					MoH	Gabinette of Quality Control, AMR Nodal officers, INS, WHO	Annual national AMU surveillance report published and disseminated yearly
	A					MoAF		
	E					MoEA		

Activity	Timeline (years)					Implementing Ministry/ Department	Partners and other UN agencies	Key output
	1	2	3	4	5			

Objective 4.5: Establish a monitoring system to ensure availability of required antimicrobial agents at all facilities of human and animal sector

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
4.5.1 Monitor availability of all categories of antimicrobials and formulations for all age groups for human, for animal sector, food industry and for plant pest	H						MoH MoAF, Ministry of agriculture	All concerned departments, healthcare facilities	Monitoring system developed for availability of all formulations of antimicrobial agents
	A								
	E								
4.5.2 Monitor stock outs of antimicrobial medicines for both human and animal sector	H						MoH MoAF	SAMES, DNFM, concerned departments, healthcare facilities	Monitoring of stock outs of antimicrobial in place and facilities can check availability at other facilities as per availability monitoring system
	A								
	E								
4.5.3 Consider inclusion of antimicrobial used in crops under the domain of drug control	H						MoH MoAF, MOEF	Ministry of agriculture, Gabinette of Quality Control	Guidelines for antimicrobial agents to be used in crops/plants/agriculture
	A								
	E								

SP 4.C Antimicrobial stewardship programmes in human and animal health sector

Objective 4.6: Establish antimicrobial stewardship programmes in human and animal healthcare facilities

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
4.6.1 Develop and define antimicrobial stewardship (AMS) subcommittees at the national tertiary hospital HNGV and an animal facility.	H	■	■				MoH, MoAF	Directorate of public health, National hospital for human and animal sector, Gabinete of Quality Control, WHO and other UN agencies	ToRs developed for AMS committee for human and animal sector healthcare facilities
	A	■	■						
	E								
4.6.2 Develop resources including guidelines to facilitate AMS programmes at above mentioned facilities and implement AMS training in a phased manner	H	■	■	■	■		MoH, MoAF,	Directorate of Public Health, AMR Nodal officers, Labnas	Resources and guideline developed and trainings conducted
	A	■	■	■	■				
	E								
4.6.3 Scale up and translate antimicrobial stewardship (AMS) program that set at the national tertiary hospital HNGV and animal facility to other referral hospitals and animal facility respectively	H	■	■	■	■		MoH, MoAF,	Directorate of Public Health, AMR Nodal officers, MS/Director of health facilities, WHO and other UN agencies	AMS programme replicated in referral hospitals and animal facilities.
	A			■	■				
	E								
4.6.4 Prepare institutional/referral and regional hospital antibiogram for empiric use of antimicrobials and formulate antibiotic policy based on institutional antibiograms, involve AMS committee of HNGV, Suai referral hospital and Baucau regional hospitals and of any animal facility	H		■	■	■		MoH, MoAF,	AMR Nodal officers, AMS teams, Labnas, Hospitals, WHO and other UN agencies	Local antibiograms developed and disseminated to the entire staff of individual facility
	A			■	■				
	E								
	H		■	■	■		MoH, MoAF		

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
4.6.5 Update national antibiotic guideline using latest hospital antibiograms data for human and animal sector wherever possible and for animal sector wherever possible	A					MoH, MoAF	AMS team, AMS subcommittee of hospitals, Labnas, WHO and other UN agencies	Antibiotic policy for hospitals developed
	E							
4.6.6 Develop a process of authorization of restricted antimicrobial agents in hospitals where AMS programme and guideline are available	H					MoH, MoAF	AMR Nodal officers, AMS teams, MS of hospitals	Ensure pre-authorization and de-escalation with respect to high-end antibiotics
	A							
	E							
4.6.7 Enforce Compliance to surgical prophylaxis for all hospitals	H					MoH, MoAF	AMR Nodal officers, AMS team, MS/Director of hospital	SoPs for Surgical prophylaxis and guidelines developed and disseminated at all referral and regional hospitals
	A							
	E							
4.6.8 Develop training modules for medical, veterinary, pharmacy, lab technology and nursing students in liaison with university curriculum	H					MoH, MoAF AMS committees	University for various courses, various professional association, INS	Training modules for various professional courses developed and implemented
	A							
	E							
4.6.9 Train clinical pharmacists/pharmacologists/suitable person for animal sector for AMS Programme, prescription audit, Drugs and Therapeutic Committee and other activities for AMS Programme	H					MoH, MoAF,	AMS team, MS of hospital, Dean of colleges, Pharmacists/Pharmacologists, INS, WHO and other UN agencies	Clinical pharmacists and pharmacologists and other concerned persons trained in various activities of AMSP
	A							
	E							

SP 5. Promote integrated governance and coordination for AMR activities and research; strengthen collaborations on AMR at international, national and sub-national levels

SP 5.A Integrated governance and coordination and AMR research

Objective 5.1.: Developing strategies to integrate governance and coordination and resource mobilization taking one-health approach to control antimicrobial resistance

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
5.1.1 Multisectoral (one-health) national AMR control existing team to form a program committee as an organizer of NAP-AMR through high-level political endorsed National Governance Team on AMR	H	█	█	█	█	█	MoH, MoAF, MoEA (Ministry of Economic Affairs)	Office of Secretary of Environment, cross-sector working group teams, Ministry of Finance	AMR control committee responsible in the implementation of NAP-AMR at national level is formed
	A	█	█	█	█	█			
	E	█	█	█	█	█			
5.1.2 Develop a synergy between cross-sectoral national and municipal level through AMR nodal officers in the NAP implementation by conducting policy advocacy and NAP-AMR regulation to all cross-sectoral municipalities government	H	█	█	█	█	█	MoH, MoAF, MoEA, Directorate of Public Health	AMR nodal officers, Officials/staff of animal sector, environment in each municipality, Ministry of Information (MoI), Department of Health promotion and Communication (DoHP&C)	National and municipal level AMR control committee in alignment and in collaboration for implementation of activities
	A	█	█	█	█	█			
	E	█	█	█	█	█			
5.1.3. Prepare a detailed plan with details of funding, human resources, infrastructure needed for implementing the prioritized activities under the operation plan of NAP-AMR	H	█	█				MoH, MoAF, MoEA, Ministry of Finance	FDCH, Directorate of Public Health, AMR Nodal officers, Office of Secretary of Environment	Resource mobilization plan developed and endorsed
	A	█	█						
	E	█	█						

Objective 5.2.: Identify priorities for basic and operational research for activities for all strategic priorities

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
5.2.1 Organize expert consultation to identify current gaps in knowledge and priority topics for research for all Strategic priorities of NAP-AMR	H						MoH, MoAF, MoEA	Directorate of Public Health Sec. Env., INS, AMR Nodal officers, various professional associations, national Institute of Health, FDCH, Government Research Authority, WHO and other UN agencies	Operational research agenda with priority areas of research on AMR identified
	A								
	E								
5.2.2 Coordinate basic research projects in human, animal, food and environmental sector and integrate the projects wherever possible for all the sectors	H						MoH, MoAF, MoEA	Institute of Health, FDCH, Government Research Authority, NHL, Do Nutrition, AIFAESA, AMR Nodal officers, Ministry of Finance, , UNTL and other universities, various professional associations, and professional colleges and donors	Evidence generated based AMR research in the country
	A								
	E								

SP 5.B Collaboration on AMR at international, national and sub-national levels

Objective 5.3: Strengthen international collaborations to promote activities in Timor-Leste to tackle AMR with donors and partners

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			
5.3.1 Review Timor-Leste's existing collaborations on AMR with all international agencies including UN agencies and identify priority areas as well as coordination mechanisms	H	■	■			MoH, MoAF, MoEA	Multi-sectoral team on NAP-AMR, multi-sectoral national AMR control program committee	Priority areas and coordination mechanisms for international collaboration with various agencies identified
	A	■	■					
	E	■	■					
5.3.2 Establish a forum on AMR for donors and partners to share yearly information and facilitate coordinated mobilization of resources for prioritized AMR activities	H			■	■	Multi-sectoral team on NAP-AMR, MoH, MoAF, MoEA	Multi-sectoral national AMR control program committee	A continuous coordination and information exchange platform between country and international donors and partners created
	A			■	■			
	E			■	■			
5.3.3 Collaborate with other countries in the region to combat AMR in various prioritized activities for Timor-Leste	H			■	■	Multi-sectoral team on NAP-AMR, MoH, MoAF, MoEA	Multi-sectoral national AMR control program committee, WHO and other UN agencies	International collaboration strengthened
	A			■	■			
	E			■	■			

Objective 5.4: Strengthen national collaborations to promote activities in Timor-Leste to tackle AMR with other national programmes

Activity	Timeline (years)					Implementing Ministry/ Department	Partners	Key output
	1	2	3	4	5			

5.4.1 Strengthen and coordinate AMR activities of NAP-AMR with activities already endorsed in National Action Plan on Health Security (NAPHS)	H					MoH MoAF, MoEA	Focal point for NAPHAS, Focal points for NAP-AMR	Integrate NAP-AMR activities with activities under NAPHS
	A							
	E							
5.4.2 Strengthen AMR activities and establish linkages with disease control programmes of the country like TB, HIV, malaria, etc and learn/share the best practices of disease control programmes	H					MoH MoAF MoEA	Focal point for NAPHAS, Focal points for NAP-AMR, National Directorate of Communicable and Non-communicable Diseases	Integrated AMR containment in alignment with disease control programme
	A							
	E							

Objective 5.5: Strengthen sub-national collaborations to promote activities in Timor-Leste to tackle AMR

Activity		Timeline (years)					Implementing Ministry/ Department	Partners	Key output
		1	2	3	4	5			
5.5.1 Convene municipal level advocacy meetings to priorities and implement activities at municipal level in phased manner at suitable/concerned municipalities	H					MoH MoAF, MoEA	Focal point for AMR, Nodal officers of each municipality, WHO, FAO, OIE	Prioritized activities of NAP-AMR started in different municipalities in phased manner	
	A								
	E								
5.5.2 Convene yearly stakeholder workshops for exchange of information, data presentation of activities done at	H					MoH MoAF MoEA	Focal point for AMR, Nodal officers of each municipality, WHO, FAO, OIE	Yearly workshops conducted to share/disseminate information and	
	A								

national and municipal level with all municipalities	E							findings on activities done for various strategic priorities at national and sub-national level
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Monitoring and Evaluation framework

Priority indicator	Input & Processes	Output (Results at program level)	Outcomes (Results at population level)	Target
1 A. Awareness and communication	Knowledge-attitude-practice (KAP) studies in all health sector – human and animal for both public and private sector	KAP and qualitative study done for identified target group	Understanding Level of knowledge, attitude & practices in target groups and its implications for antimicrobial use and misuse	For 100% health professionals’ knowledge on AMR and antibiotic use should be near
	IEC materials developed for relevant groups (public, farmers, students, professionals in health, agriculture and environment sectors)	AMR awareness campaign organized as per communication plan AMR-IEC material distributed in campaigns [eg. In schools and professional colleges), general population, healthcare providers, pharmacists, veterinarians (public and private sector), media at National, Municipalities and village level]	AMR awareness levels in target populations increased from baseline; (can be assessed through survey) IEC materials displayed in Health facilities/schools/colleges etc.	50% increase over baseline score/value for general population
1 B. Education and training	Training resources developed for professionals in health, veterinary, food, agriculture and environment	AMR module In place for CME/CPD for relevant professional groups	Improvement in KAP of health workers and veterinarians on AMR and antimicrobial use	Scores/knowledge near 100% for all in-service professionals
2A&B Laboratory & AMR surveillance	National integrated/ Coordinating Platform for AMR Surveillance for human, animal and	Surveillance system for AMR in human, animals, food and environment established	Reduced levels and trends of resistance for key pathogens in humans and animals	20% decrease in AMR

Priority indicator	Input & Processes	Output (Results at program level)	Outcomes (Results at population level)	Target
	<p>food and environment established with clear terms of reference</p> <p>Operational plan developed for AMR surveillance</p>	<p>SOPs established for AMR surveillance in human, Animal sector; training conducted for staff; initiated surveillance in aquaculture, food and environment;</p>	<p>AMR data received from all sectors and Regular reporting of AMR to GLASS</p>	
2C Surveillance of AMC	<p>National sentinel surveillance for AMC for human and animal sector established</p> <p>SOPs for data collection, analysis and reporting; training of focal points for human and animal sector done</p> <p>Mechanism established for measuring AMC data for each municipality area</p>	<p>National & municipal AMC data available and analyzed</p> <p>Surveillance system for AMC for human and animal sector</p> <p>Report on national AMC for human and animal sector</p>	<p>Trends and patterns of AMC for each class and individual antimicrobial agents over the period available</p> <p>Patterns and trends of AMC in different municipalities over period of time available</p>	<p>Reduction in consumption of Watch and Reserve group of antibiotics</p> <p>Access group of antibiotics to reach 60% of total antibiotic consumption at country level</p>

Priority indicator	Input & Processes	Output (Results at program level)	Outcomes (Results at population level)	Target
3 A. Infection prevention and control	<p>National coordination unit for IPC established and its scope defined</p> <p>National guidelines and protocols developed for all the three sectors</p>	<p>% Hospitals (human and animal) with functioning IPC committee & adequate IPC nurses</p> <p>Monitoring of hand hygiene across all facilities</p> <p>Number of health facilities with WASH Facilities</p> <p>Number of commercial farms compliant with infection prevention guidelines and good practices</p>	<p>Average hand hygiene compliance rates increased in hospitals and primary care centers</p> <p>Behavior changes and improved hygiene and IPC in community and facilities</p>	<p>Hand hygiene improved in hospitals and primary care facilities</p> <p>Improved access to quality of water in the health facilities</p> <p>20% increase in no. health facilities with functional water, sanitation and hygiene facilities</p>
3B. Reduce environmental spread of AMR	<p>National coordination platform for measuring antibiotic residue, ARG in the environment sector established and its scope defined</p>	<p>Laboratory identified with SOPs to measure antibiotic residues and ARGs from various human and animal facilities that can spread AMR in the environment</p> <p>Monitoring system in place</p>	<p>Actions and activities adopted in public and private facilities of human and animal sector to reduce contamination of environment with antibiotics and ARGs</p>	<p>Increase in knowledge and behavior change and actions amongst stakeholder to reduce environmental spread of AMR</p>
4 A. Strengthen antimicrobial supply chain	<p>Updating, strengthening of regulations/policies on import of antimicrobial agents</p>	<p>Implementation of national antimicrobial agents' sale Guidelines across country</p>	<p>Availability of antibiotics as per EML in various facilities</p>	<p>30% increase in availability of antibiotics as per EML in facilities</p>

Priority indicator	Input & Processes	Output (Results at program level)	Outcomes (Results at population level)	Target
and regulated access to quality antimicrobials	and harmonization policies/regulations/laws related to AMR containment between NRA, MoAF, food and Environment sector	<p>Revision of EML as per AWaRe category suggested by WHO</p> <p>Policy/legislation approved on restrict/phase out non-therapeutic use of antimicrobials as growth promoters and disease prevention in animals/animal foods including fisheries</p> <p>EML updated as per WHO guidelines</p> <p>Policy/legislation approved for banning for import/distributor/ sale of antibiotic laden feed premix</p> <p>Implementation of ban/restrictions on antimicrobial premixed feed in animal husbandry and aquaculture</p>	<p>Improvement in percentage of Access category of antibiotics and decrease in consumption of Watch and Reserve category of antibiotics</p> <p>Ban on incorporation of antibiotics in pre-mixed animal feeds</p>	Improvement in percentage of Access category of antibiotics and decrease in consumption of Watch and Reserve category of antibiotics
4.B & C. Surveillance of antimicrobial use and antimicrobial stewardship programmes	National nodal institution/hospital identified for antimicrobial stewardship with terms of reference (ToR) for multidisciplinary antimicrobial stewardship committees and teams	<p>Treatment guidelines (for National RHs) reviewed and updated as per the patterns of resistance</p> <p>Percentage of hospitals/clinics in animal sector following treatment guidelines</p>	<p>Trends of antibiotic use over period is available for human sector facilities</p> <p>Trends of antibiotic use over period is available for animal hospitals/clinics</p>	All the tertiary care hospitals have antimicrobial stewardship program

Priority indicator	Input & Processes	Output (Results at program level)	Outcomes (Results at population level)	Target
		Percent of facilities conducting prescription auditing in human and animal sector		
5 A. Integrated governance and coordination and AMR research	<p>National AMR coordinating and monitoring unit established</p> <p>Engaged experts for planning the basic AMR research priorities</p>	<p>National AMR forum established and functional</p> <p>Synergy between National and municipal stakeholders for AMR activities and research</p> <p>Integrate AMR with the IPC team of Regional Hospitals</p>	<p>Integrated AMR activities and research</p> <p>Percent fund utilization for AMR activities</p> <p>Published research results from AMR projects/studies</p>	<p>National and municipal level coordination and collaborated basic AMR research projects in prioritized areas</p>
5.B Collaboration on AMR at international, national and sub-national levels	<p>A forum on AMR for UN agencies, international donors and partners to facilitate coordinated mobilization of resources for prioritized AMR activities</p> <p>Implemented the prioritized activities at municipal level</p>	<p>Collaborations with different platforms at national international level</p> <p>Collaboration and integration with other national programs involve in similar activities</p> <p>Number of municipalities participating in the NAP-AMR activities</p>	<p>National Scientific seminar on AMR conducted</p> <p>Data/information from the forum to be reported to the National Coordination Unit Country for dissemination at appropriate levels</p> <p>AMR awareness, education, hand hygiene, vaccine coverage level increased in all municipalities</p>	<p>International collaboration technical and financial strengthened</p> <p>AMR monthly bulletin published and disseminated</p> <p>All municipalities are engaged in some of the NAP-AMR activities</p>

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Annexure 1: List of officers/experts consulted during different workshops and meetings

Name	Institution
Dr Alipio Lopes	National Director for Directorate of Pharmacy and Health Equipment, MoH
Dr Celeste FX Cham	Head of Pharmacovigilance and Control of Medicines Department, MoH
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Annexure 2: Major achievements, challenges and gaps for implementing NAP-AMR 2017-2020

1. Achievements

- 1.1 Developed and distributed locally contextualized targeted IEC material for improving awareness of general population and healthcare professionals for appropriate use of antibiotics.
- 1.2 Conducted public awareness survey for use of antibiotics, knowledge of antibiotics and knowledge of antibiotic resistance, in 13 municipalities.
- 1.3 Several training sessions conducted for livestock and veterinary technicians (including undergraduates) on antimicrobial resistance.
- 1.4 The surveillance of AMR and antimicrobial use in human and agriculture sector of the country began in 2019 with support of Fleming Fund Country Grant through Menzies School of Health Research, Darwin, Australia.
- 1.5 Studies have been conducted by MOH and MOAF, with support Fleming Fund through the Menzies School of Health Research on AMC and AMU. The methodology and results from the AMU monitoring system has been published in MDPI Antibiotics.
- 4.1 Some basic researches and training program have been conducted under NAP-AMR.

2. Challenges and issues

- 2.1 There is a lack of a formally mandated coordination committees/mechanism with dedicated budget on AMR and One Health. There is a lack of involvement of the environment sector for AMR.
- 2.2 Routine surveillance of AMR has yet to be strengthened across the referral and national hospitals.
- 2.3 Guidelines on IPC were available but implementation should be strengthened.
- 2.4 Sanitation and access to water was still a concern in many municipalities and health care facilities.
- 2.5 There is a lack of country-wide data on antibiotic usage and prescription behavior.
- 2.6 Law enforcement for antibiotics prescription is ineffective.
- 2.7 Human resources and infrastructural are inadequate.

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