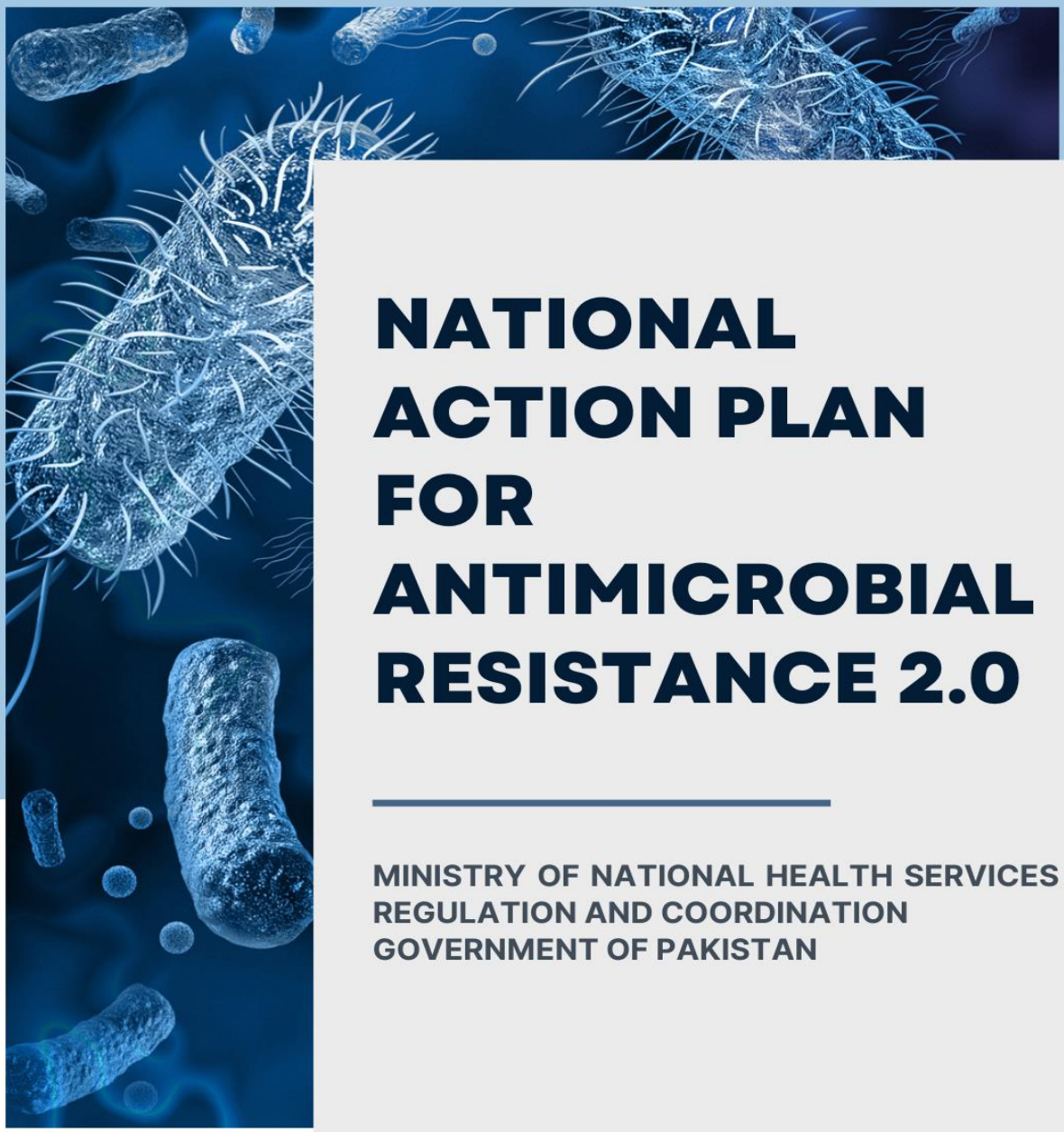


NATIONAL ACTION PLAN FOR ANTIMICROBIAL RESISTANCE 2.0

MINISTRY OF NATIONAL HEALTH SERVICES
REGULATION AND COORDINATION
GOVERNMENT OF PAKISTAN

World Health Organization

DAI
Shaping a more livable world.

The Fleming Fund

Implementing Agencies

I. Ministry of National Health Services Regulation and Coordination
II. Ministry of National Food Security and Research
III. Ministry of Climate Change
IV. Pakistan Council of Research in Water Resources (PCRWR)
V. Environmental Protection Agency / National Agricultural Research Centre /Aquaculture

Abbreviations

AHC – Animal Health Center

AMC – Antimicrobial Consumption

AMR – Antimicrobial Resistance

AWaRe – Access, Watch, Reserve (antibiotic classification)

CRE – Carbapenem-Resistant Enterobacteriaceae

CSSD – Central Sterile Services Department

DAI – Development Alternatives, Inc.

DRAP – Drug Regulatory Authority of Pakistan

DTLs – Drug Testing Laboratories

EML – Essential Medicines List

EQA – External Quality Assurance

FAO – Food and Agriculture Organization

GAP – Global Action Plan (on AMR)

GLASS – Global Antimicrobial Resistance and Use Surveillance System

HCAI – Healthcare-Associated Infections

HEC – Higher Education Commission

HRI – Health Research Institute

IHME – Institute for Health Metrics and Evaluation

IPC – Infection Prevention and Control

JEE – Joint External Evaluation

LMICs – Low- and Middle-Income Countries

M&E – Monitoring and Evaluation

MDR – Multidrug-Resistant

MoNHSRC – Ministry of National Health Services, Regulations, and Coordination

MRSA – Methicillin-Resistant Staphylococcus aureus

NAP – National Action Plan

NDM-1 – New Delhi Metallo-beta-lactamase-1

NEQAS – National External Quality Assurance Scheme

NIH – National Institute of Health

NRL – National Reference Laboratory

PASS – Pakistan AMR Surveillance System

PDR – Pan-Drug Resistant

PHRC – Pakistan Health Research Council

PPS – Point Prevalence Survey

SDGs – Sustainable Development Goals

SWOT – Strengths, Weaknesses, Opportunities, Threats

TrACSS – Tripartite AMR Country Self-Assessment Survey

TWG – Technical Working Group

UNEP – United Nations Environment Programme

UNGA – United Nations General Assembly

VPDs – Vaccine-Preventable Diseases

VRE – Vancomycin-Resistant Enterococci

WASH – Water, Sanitation, and Hygiene

WHO – World Health Organization

WOAH – World Organisation for Animal Health (formerly OIE)

XDR – Extensively Drug-Resistant

Foreword

Antimicrobial resistance (AMR) poses one of the most urgent and complex public health challenges of our time, threatening to undermine decades of medical progress and jeopardizing global health security. In Pakistan, the growing burden of drug-resistant infections demands immediate, coordinated, and multisectoral action to safeguard the health of our people, animals, and environment. This National Action Plan on Antimicrobial Resistance (NAP-AMR 2024–2028) represents Pakistan's steadfast commitment to combating AMR through a One Health approach, aligning with global frameworks while addressing our unique national priorities.

The Government of Pakistan recognizes that AMR is not just a health issue but a socioeconomic threat that requires collaboration across human health, animal health, agriculture, and environmental sectors. Building upon the achievements of NAP-AMR 2017–2022, this updated plan integrates lessons learned, emerging evidence, and innovative strategies to strengthen governance, surveillance, infection prevention, and antimicrobial stewardship. Our vision is clear: to preserve the effectiveness of antimicrobials for future generations while ensuring equitable access to safe and effective treatments for all.

We extend our gratitude to all stakeholders, federal and provincial governments, international partners, healthcare professionals, researchers, and civil society, for their invaluable contributions in shaping this plan. The Ministry of National Health Services, Regulations & Coordination (MoNHSRC) will ensure full support for its implementation, working closely with the National Institute of Health (NIH), Drug Regulatory Authority of Pakistan (DRAP), and other key institutions including provincial health departments. However, success depends on collective action, national, provincial, academicians, public health workers, animal health workers, policymakers, practitioners, and the public must all play their part in reducing unnecessary antimicrobial use, improving hygiene practices, and fostering responsible behaviours.

As we embark on this important journey, let us reaffirm our commitment to a resilient and sustainable health system. By prioritizing AMR prevention and control, we not only protect our citizens but also contribute to global efforts in combating this silent pandemic. Together, we can turn the tide against antimicrobial resistance and secure a healthier future for Pakistan.

Director General Health

Ministry of National Health Services, Regulations & Coordination

Government of Pakistan

Acknowledgement

The Ministry of National Health Services, Regulations and Coordination (MoNHSR&C) and the National Institute of Health (NIH) acknowledge with deep appreciation the dedicated engagement and valuable contributions of all stakeholders who actively participated in the NAP 2.0 development process from May 2024 to February 2025. We extend our gratitude to the Ministry of National Food Security and Research, Ministry of Climate Change, Pakistan Council of Research in Water Resources (PCRWR), National Agricultural Research Centre (NARC) including the National Veterinary Laboratory (NVL) and Aquaculture Division, Environment Protection Agency (EPA), Animal Husbandry Commission, Federal and Provincial Food Safety Authorities, and academic councils for their technical expertise and commitment. We also recognize the vital support and collaboration of our development partners—the World Health Organization (WHO), Fleming Fund Country Grant, Food and Agriculture Organization of the United Nations (FAO), and Integral Global, whose technical and financial assistance was instrumental in shaping a robust, multisectoral, and One Health–aligned National Action Plan. Their sustained involvement and coordinated efforts were essential in ensuring that NAP 2.0 reflects both national priorities and global commitments in the fight against antimicrobial resistance.

Table of Content

EXECUTIVE SUMMARY

Antimicrobial resistance (AMR) represents a growing and urgent public health threat in the country. In 2019, an estimated 59,200 deaths were directly attributable to AMR and 221,300 were associated with it (IHME). The age-standardized AMR related mortality rate placed Pakistan 176th out of 204 countries globally, and 5th highest among the five countries of South Asia.

Over the past decade, Pakistan has demonstrated sustained commitment to addressing AMR. Milestones include the formulation of the AMR Strategic Framework, the first National Action Plan on AMR (2017–2022), a PC1 worth 361.93 million for the implementation of the NAP and two Joint External Evaluations (JEE) conducted in 2016 and 2023. These efforts reflect Pakistan's alignment with the Global Action Plan on AMR and its determination to uphold international health security commitments.

The National Action Plan for AMR 2024–2028 (NAP 2.0) builds upon these foundations and offers a comprehensive, multisectoral roadmap for the next five years. Developed through a One Health approach, the plan brings together human health, animal health, agriculture, and environmental sectors to ensure a unified and holistic response. The development process was informed by inputs from national experts and technical support from international partners including the WHO Eastern Mediterranean Regional Office, DAI Fleming Fund, and ReAct Africa.

The NAP 2.0 outlines, an assessment of current AMR challenges, progress made under NAP 1.0, a strategic framework organized around six core objectives, including governance as a cross-cutting enabler, clearly defined intervention streams, priority actions, and responsible stakeholders and a robust monitoring and evaluation (M&E) framework to guide implementation and assess the impact.

This document reflects Pakistan's continued dedication to preserving antimicrobial effectiveness, safeguarding health systems, and contributing meaningfully to the global fight against AMR. Through this plan, Pakistan affirms its resolve to protect the health of its population, its animals, and its environment—ensuring a safer, more resilient future for all.

BACKGROUND

1. INTRODUCTION

GLOBAL TRENDS

Each year, an estimated 7.7 million deaths are attributed to bacterial infections, with 4.95 million linked to drug-resistant pathogens and 1.27 million caused by bacteria resistant to available antibiotics [1]. A recently published systematic analysis of burden of AMR has estimated that 1·91 million deaths attributable to AMR and 8·22 million deaths associated with AMR could occur globally in 2050 if no ameliorative actions are instituted [2]. In the updated estimates deaths from AMR decreased by more than 50 % among children below 5 years yet increased by over 80 % for adults 70 years and older [3]. Only 6 bacterial pathogens are responsible for >70% of the AMR burden with methicillin-resistant *Staphylococcus aureus* as the major contributor globally [4]. Two third (75%) of the global burden of Health Care Associated Infections (HAIs) is attributed to the drug-resistant infections, resulting in terrible patient suffering, high health and economic burden [5].

The main driver of increased AMR is the global misuse, or overuse of antimicrobials, particularly in LMICs. Global antibiotic consumption rates have risen from 9.8 to 14.3 defined daily doses (DDD) per 1000 population per day from 2000 to 2018 [6]. However, rationalizing the use and access to second line antibiotics can prevent the number of deaths due to AMR.

COVID-19 is one of such examples where antibiotics were used to relieve Covid symptoms. During its peak time, an estimated 92% of coronavirus patients admitted to intensive care units around the world received some type of antibiotic treatment [7].

THE BURDEN AND EXTENT OF AMR IN PAKISTAN

In Pakistan, antimicrobial resistance (AMR) has emerged as a major public health challenge, placing a growing strain on the health system and contributing to poor treatment outcomes. The country faces significant threats from drug-resistant infections, which undermine routine medical care and limit the effectiveness of essential medicines.[8]

Pakistan has the 3rd highest antibiotics use prevalence in EMRO, at 65.8%, after Iraq and Sudan. Approximately, 70% of patients are prescribed antibiotics with more than 3 drugs per patient. Half (50%) of the population practice self-medication - a key driver of resistance in Pakistan. [9,10]

In Pakistan, five antimicrobial resistance (AMR) pathogens account for a significant number of deaths: *Klebsiella pneumoniae* (34,400 deaths), *Escherichia coli* (31,300), *Staphylococcus aureus* (28,600), *Salmonella Typhi* (23,300), and *Streptococcus pneumoniae* (20,300) (IHME, 2019). These pathogens commonly cause bloodstream infections, lower respiratory tract infections, and other related infections of the thorax, peritoneum, and intra-abdominal regions. Over the years, a steady increase in AMR rates has been observed in Pakistan, with moderate to high resistance levels reported against third-generation cephalosporins, fluoroquinolones, and cotrimoxazole.[11]

Pakistan reported the first outbreak of XDR Salmonella Typhi in Hyderabad in November 2016.[12] In that outbreak zone, approximately 66% of culture-confirmed typhoid cases were XDR.[13]

Urinary Tract Infection (UTI) is the most clinically reported infection in Pakistan, accounting for 16.1% of cases. E. coli was identified in 28 (30.11%) cases, showing high resistance to first-line antibiotics. Methicillin-resistant Staphylococcus aureus (MRSA) was found in 49% of the total S. aureus cases reported.[14]

Carbapenem-resistant Enterobacteriaceae (CRE) are on the rise in Pakistan, particularly those producing the NDM-1 enzyme. Among Enterobacteriaceae, more than 51% of reported E. coli and Klebsiella pneumoniae isolates were Multidrug Resistant (MDR), with 2.1% and 6.7% possibly being Pan Drug Resistant (PDR), respectively.[15]

Significant bacteria of both human and animal concern, including Escherichia coli, Salmonella spp., and Enterococcus spp., have been reported from multiple federal and peripheral sentinel laboratories across Pakistan. Alarmingly high levels of resistance were observed, particularly to critical antimicrobials identified by the World Health Organization. In poultry, E. coli resistance to quinolones (ciprofloxacin and nalidixic acid) exceeded 80%, and resistance to tetracycline and ampicillin was above 90%. Similar trends were noted in large ruminants, where E. coli resistance to ampicillin reached 92%, and resistance to third-generation cephalosporins (e.g., cefotaxime) exceeded 70%. In Salmonella spp., high resistance to tetracycline, ciprofloxacin, and ampicillin was observed across both poultry and ruminants. Enterococcus isolates from both animal groups also exhibited resistance to critical antimicrobials such as vancomycin, with vancomycin-resistant enterococci (VRE) detected at high levels in some provinces. [16]

Major causes of the spread of AMR in environmental settings include (i) poor sanitation and sewage effluents; (ii) effluents from pharmaceutical industries; (iii) discharges from healthcare facilities; (iv) use of antimicrobials and manure in agricultural production; and (v) effluents and waste from animal production. These factors are particularly concerning in low- and middle-income countries (LMICs) like Pakistan, where limitations in wastewater treatment infrastructure and access to clean water exacerbate the spread of AMR. Approximately 56% of wastewater globally is released into the environment without adequate treatment, posing significant public health risks (UNEP, 2022b).

Human exposure to environmental AMR can occur through contact with contaminated water, consumption of contaminated food, and inhalation of airborne resistant organisms (UNEP, 2022c). Despite the recognized importance of environmental factors in AMR, surveillance and monitoring in environmental settings remain limited. Integrated surveillance systems that encompass environmental, human, and animal health sectors are needed, in line with the 'One Health' approach to effectively address AMR (UNEP, 2022a).

ONE HEALTH APPROACH FOR AMR CONTAINMENT

The One Health approach, adopted by the World Health Organization (WHO) and endorsed by all its Member States, is an integrated, unifying framework aimed at sustainably balancing and optimizing the health of people, animals, and ecosystems. It is rooted in the recognition that the health of humans, domestic and wild animals, plants, and the wider environment are inextricably linked. Consequently, interventions to prevent, detect, and respond to antimicrobial resistance (AMR) must be multipronged and rely on strong collaboration between human health, animal health, agricultural, and environmental sectors. [17]

AMR is, in part, a natural evolutionary mechanism, driven by the constant competition for resources within the microbiome—even against naturally occurring secondary metabolites that resemble today's antibiotics.

However, the discovery and widespread use of antibiotics in human and veterinary medicine have dramatically altered the conditions for resistance development, creating unprecedented selection pressures. These pressures have significantly impacted the microbiomes of humans, domestic animals, and environments heavily contaminated with antimicrobial residues, facilitating the transfer of antibiotic resistance genes (ARGs) to a broad range of clinically significant bacterial species. Since both bacteria and ARGs can cross species and environmental boundaries, understanding the interconnectedness of human, animal, and environmental health under the One Health concept is critical. [18]

Transmission of resistant bacteria from animals to humans can occur through multiple pathways, including the food chain, direct contact with animals, and environmental exposure. Studies have detected AMR organisms in soils and water bodies—including surface and groundwater—often linked to antibiotic use in agriculture, aquaculture, pharmaceutical manufacturing, and human healthcare.[19,20,21] wastewater treatment plants have also been identified as significant reservoirs and dissemination points for AMR .[19] Recognizing the environmental dimension, the United Nations Environment Programme (UNEP, 2017) has classified AMR as one of the most critical pollution challenges. This has been echoed by the O'Neill Report, WHO, and various scientific studies, all of which highlight the importance of integrating environmental surveillance into AMR control strategies. [22,23,24,25]

In line with the global principles and scientific evidence, the development of Pakistan's NAP 2.0 has fully embraced the One Health approach as its guiding framework. This holistic perspective has been embedded throughout the planning process by ensuring the active engagement of all relevant stakeholders at both national and provincial levels. Representatives from human health, animal health, agriculture, food safety, and environmental sectors along with academic institutions, civil society, and development partners have contributed their expertise to ensure that the plan reflects an integrated and coordinated national response. By adopting this collaborative, multisectoral model, NAP 2.0 aims to deliver sustainable and context-specific interventions that address AMR across all interconnected domains. The One Health approach adopted by the WHO and all its member states is an integrated, joined up and unifying approach that aims to sustainably balance and optimize the health of people, animals, and ecosystems. One health approach is rooted in the recognition that the health of humans, domestic and wild animals, plants, and the wider environment are intertwined. Therefore, interventions to prevent, detect and respond to AMR must be multipronged and inevitably involves collaboration across human, animal, and environmental health sectors.

PEOPLE CENTRED APPROACH TO ADDRESSING ANTIMICROBIAL RESISTANCE IN HUMAN HEALTH

Incorporating a people-centred approach is essential to ensuring that AMR containment strategies in the human health sector are not only evidence-based but also socially equitable and responsive to the needs of diverse populations. As outlined in the World Health Organization's 2023 guidance on applying a people-centred lens to AMR, this perspective reframes AMR as a challenge shaped by the lived experiences, care-seeking behaviours, and systemic barriers individuals face—particularly when dealing with drug-resistant infections. It calls for interventions that are tailored to people's needs, preferences, and contexts across the continuum of care, from community settings to tertiary hospitals. Priority actions include improving access to clean water and sanitation, strengthening infection prevention and control, ensuring availability of quality diagnostics, and providing safe, effective, and affordable treatment. This approach also underscores the importance of inclusive governance,

public awareness, and health education, thereby aligning AMR containment with the principles of Universal Health Coverage (UHC), health equity, and pandemic preparedness. By placing people at the centre of policymaking and service delivery, Pakistan's NAP 2.0 aims to ensure that no one is left behind in the fight against AMR.[26]

The people-centred approach … recognizes that before people become patients, they need to be informed and empowered in promoting and protecting their own health. There is a need to reach out to all people, to families and communities beyond the clinical setting. In addition, health practitioners are people, and healthcare organizations and systems are made up of people. Their needs should also be considered, and they must be empowered to change the system for the better. That is, a people-centred approach involves a balanced consideration of the rights and needs as well as the responsibilities and capacities of all the constituents and stakeholders of the health-care system [and beyond]. WHO

ADDRESSING GENDER INEQUALITIES

In recent years, gender dimension of AMR has surfaced as a key concern in growing literature on AMR. Though men and women share many of the AMR-associated risks, there are biological and occupational factors that increase women's vulnerability to infections. For example, childbirth, abortion and sanitary health expose women to a considerably large spectrum of infections.[27] More significantly, women are 27% more likely to receive an antibiotic prescription compared to men.[28] This gendered reality calls for a greater focus on gender dimension within the broader people-centred approach to tackling AMR.

A review of NAPs on AMR has confirmed the minimal attention to gender considerations; 125 out of 145 publicly available NAPs did not mention sex or gender.[27] Despite this lack of attention to gender, research indicates that exposure and susceptibility to infections, health-seeking behaviours, as well as patterns of antimicrobial prescribing and use are all influenced by gender considerations. Gender may also affect those who have the resources and decision-making power to access appropriate care and treatment for (drug resistant) infections, which contributes to differences in the quality of care received and patient outcomes. AMR is similarly affected by gender inequalities, where gender norms, roles and relations influence exposure and vulnerability to infection (e.g. through occupational and household roles and nutritional status), participation in infection prevention and health-seeking behaviours, access to health care, prescribing patterns and appropriate use of antimicrobials. Furthermore, in AMR, sex and/or gender disaggregated data are scarce, and disentangling the individual effects of gender and sex on risk of infection or health outcomes is challenging. National action plan 2.0 on AMR explicitly integrates gender as a cross-cutting theme, recognizing its critical influence on exposure, access to care, and health outcomes. By incorporating gender-responsive strategies, the plan aims to ensure equitable interventions that address the unique vulnerabilities and needs of all population groups underscoring the severe impact of hard-to-treat resistant infections—particularly among vulnerable populations.

2. RELATIVES' ASSESSMENT AND SITUATION ANALYSIS

BUILDING ON EVIDENCE FOR NAP 2.0

The formulation of Pakistan's National Action Plan on AMR 2025–2029 (NAP 2.0) was deeply informed by a comprehensive set of relative assessments and situational analyses. Key among these were the Joint External Evaluation (JEE) 2023, periodic TrACSS reporting, a performance review of NAP 1.0, and a cross-sectoral SWOT analysis. Each of these tools provided critical insights into Pakistan's AMR response capacities, highlighting measurable progress as well as persisting gaps—particularly in areas like multisectoral coordination, infection prevention and control (IPC), and the integration of environmental and agricultural sectors. NAP 1.0, while foundational, faced significant implementation challenges—many of which were exacerbated by the COVID-19 pandemic, including diverted resources, reduced inter-sectoral collaboration, and limited surveillance expansion. Despite these barriers, the evidence generated through these assessments created a strong base for designing NAP 2.0 with clearer priorities, stronger accountability, and a One Health-aligned approach to ensure comprehensive AMR containment over the next five years. These evaluations not only benchmarked past performance but also illuminated the structural and operational adjustments required to transform planning into measurable outcomes.

JOINT EXTERNAL EVALUATION 2023: KEY PROGRESS AND GAPS

AMR JEE indicators showed improvement from 1 to 2 in multisector coordination and optimal use of antimicrobials in human health from 2016 to 2023. According to the 2023 JEE, progress has been made since the 2016 evaluation with the development of a national action plan and coordinating mechanism for AMR in line with the WHO GAP. However, provincial operational plans for AMR have not yet been developed. Effective actions in human and animal health, such as the expansion of quality assured surveillance sites and good practices in some facilities, have been observed. The country has aligned data reporting of AMR to the global platforms including AMR GLASS, AMC, TrACSS and World Organization for Animal Health (WOAH), but data has not been used to inform evidence-based policies within the country.

Facility-based stewardship programs have not been implemented, and WHO guidance has not been translated for national/facility antimicrobial stewardship programs in both human and animal sectors. While AMR surveillance and diagnostic capacities have improved, widespread implementation of existing plans and procedures remains a challenge.

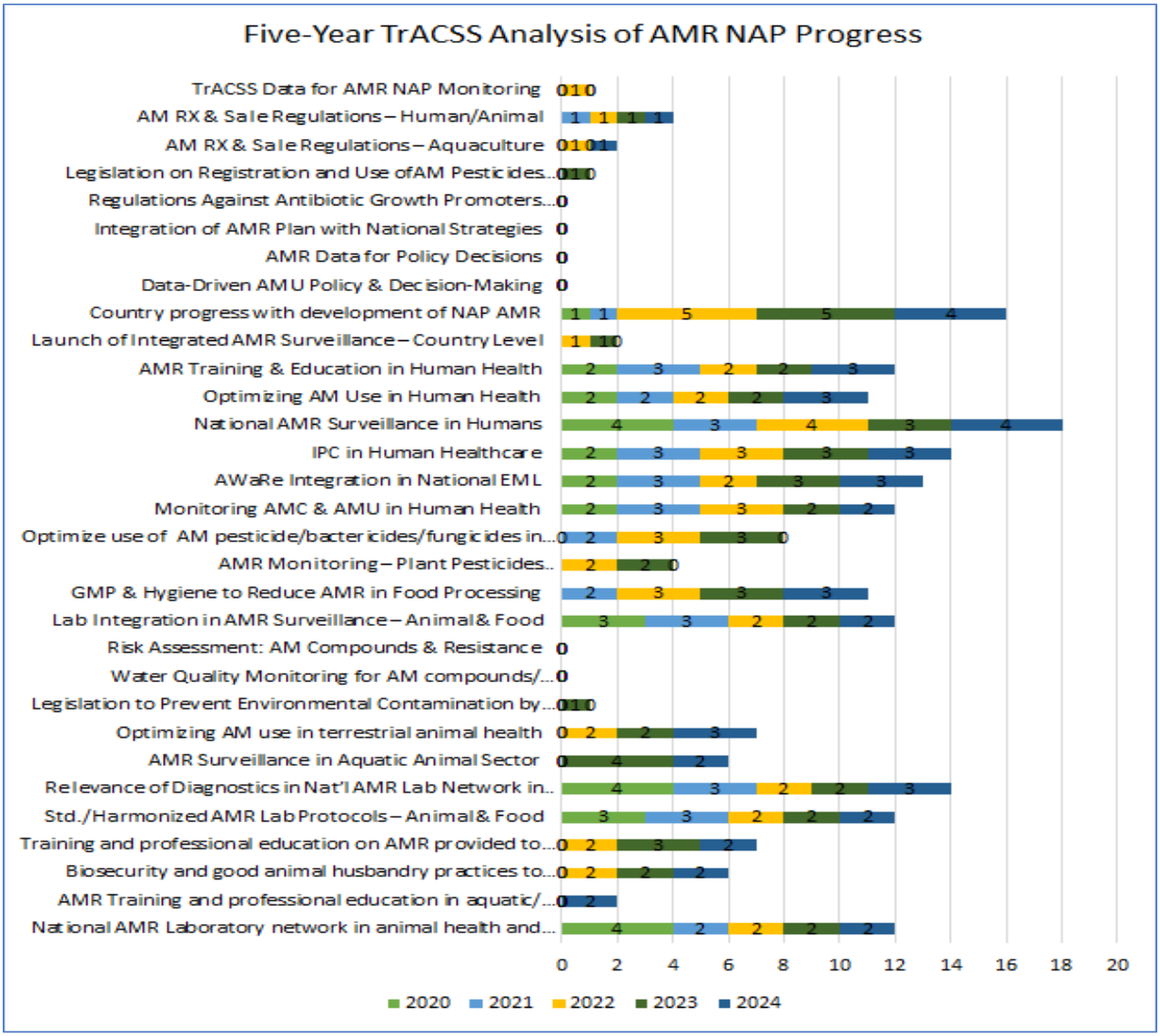
For IPC focus, IPC Programs improved to 2, while HCAI Surveillance, previously part of prevention, remains at 1. The new indicator for a safe environment in healthcare facilities also stands at 1. Significant investments have been made in IPC areas. IPC initially covered by one indicator under AMR technical area with a focus on HCAI program. Following the 2016 JEE, Pakistan progressed in developing National IPC Guidelines and standardized IPC training modules for doctors, nurses and Housekeeping Staff and conducted capacity building initiatives.

NIH has recently initiated a National IPC program at federal and provincial level. JEE 2023 Recommendations are guiding the current plan for establishment of surveillance of healthcare associated infections in tertiary hospitals and implementing IPC and WASH standards in health care facilities and communities. The scores correspond from No to Limited country core capacities in respective domains and needs to be strengthened through development of a robust NAP revision for next five years.

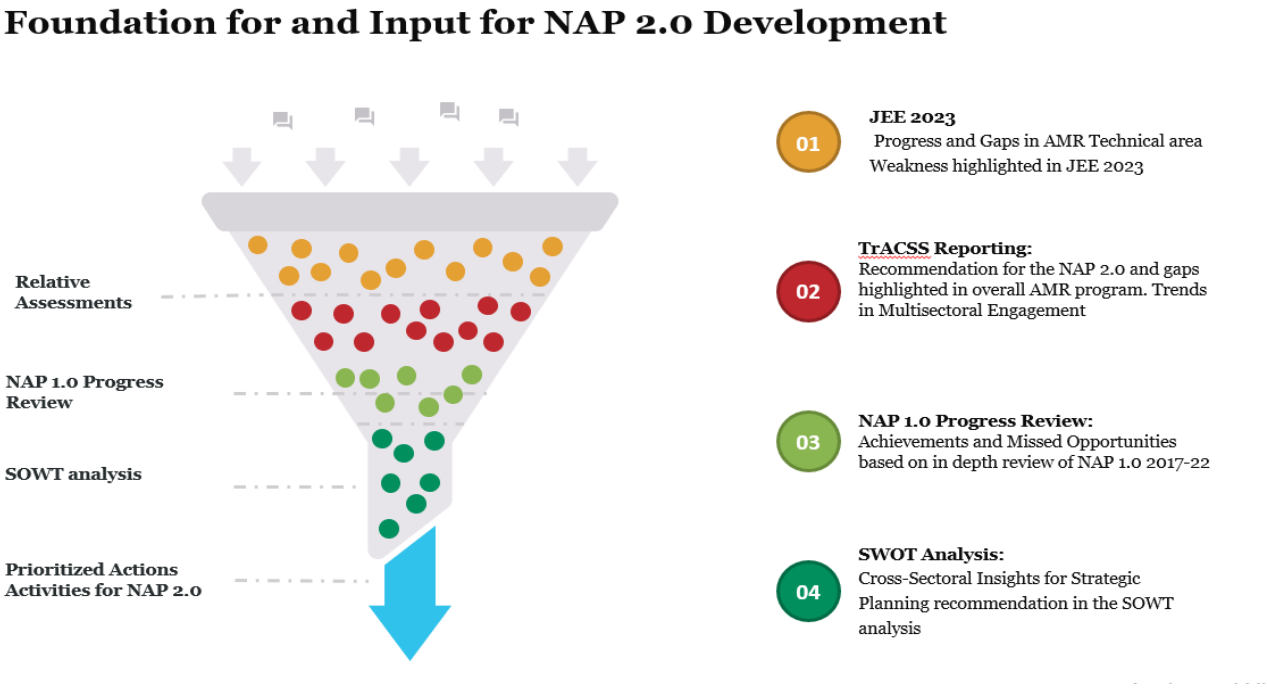
TrACSS Reporting: Trends in Multisectoral Engagement

TrACSS is the Global dataset that provides insights into country progress on AMR. Advancing the implementation of one health agenda, NAP implementation is periodically monitored through TrACSS.

From 2020 to 2024, Pakistan reported incremental scores that varied compared to global averages. The country displayed higher scores in human health indicators than in animal health. However, scores in food and agriculture, environment, legislation, and One Health sectors were weak. This indicates a lack of a comprehensive approach to NAP implementation, with some indicators scoring well while others performed poorly.



For multisectoral coordination Pakistan scored below average through reported literature analysis of AMR NAP. Later efforts to systematically monitor and evaluate the effectiveness and cost-effectiveness of these policies were relatively poor. Sustained action has been achieved only in the development of AMR NAP. The first AMR NAP reported low in adopting and facilitating equity approach.[29]



Implementation of Pakistan's NAP on AMR has revealed significant gaps in financial sustainability, regulatory frameworks, prudent antimicrobial use (AMU), and interventions beyond the livestock sector. While NAP 1.0 made notable progress in human and livestock health, it paid limited attention to other critical areas such as plant health, aquaculture, companion animals, food and feed production, and the environment. Data on AMR prevalence in Pakistan's environmental sector remains scarce, limiting evidence-based policymaking in this domain. Although NAP 1.0 incorporated provisions for adopting waste management practices aligned with the Pakistan Environmental Protection Act (1997), progress in enforcement has been slow. For instance, the Punjab Poultry Production Act (2016) was introduced to regulate waste disposal from poultry farms, but its implementation remains at an early stage, underscoring the need for stronger compliance mechanisms and cross-sectoral engagement in future AMR strategies.[30]

1st Strategic Priority: Development and implementation of a national awareness raising & behavioural change strategy on AMR.

Several awareness raising activities were implemented by all OH institutions and partners during the implementation of NAP 1.0. Nonetheless, sector specific reviews noted that these activities were mainly concentrated in the urban areas. Moreover, these activities were conducted in the absence of an overarching and integrated strategy and with limited mechanisms for assessing the effectiveness of these initiatives in fostering knowledge transfer and behavioural change.

Notable achievements against this strategic priority are, Celebration of World Antibiotic Awareness Week every year in the form of seminars, competitions, mass media campaigns, engagements with farmers, and public

awareness events, regular publication and dissemination of National AMR Newsletters and capacity strengthening initiatives across the human and animal health sectors targeting professionals, allied staff, students, and institutions.

2nd Priority: Establishment of an integrated national AMR surveillance system (human, animal usage and resistance monitoring)

Significant progress has been achieved in strengthening Pakistan's AMR surveillance system in line with NAP priorities, with regular data sharing to WHO GLASS and WOAH. Through a consultative process with stakeholders and development partners, Pakistan has developed the following strategies:

a) Pakistan AMR Surveillance Strategy – Human Health (2024)
b) National Surveillance Strategy for AMR in Healthy Food Animals
c) National Surveillance Strategy for AMR in Bacterial Isolates from Diseased Food Animals (2022)
d) National Surveillance Strategy for AMR in Aquaculture
e) National Surveillance Strategy for AMR in the Environment Sector

These strategies will guide the quality implementation of NAP 2.0. In 2018, Pakistan's AMR Surveillance System (PASS) was launched, which is supported by National Reference Laboratories (NRLs) and sentinel sites in both human and animal health sectors. National and provincial focal persons have been notified, and Pakistan is enrolled in GLASS with 33 participating laboratories. In the animal health sector, pilot AMR surveillance in healthy food animals (poultry and large ruminants) is underway, with data gathered on *E. coli* and *Enterococcus*, and expanded to *Salmonella* and *Campylobacter*.

The diagnostic harmonization efforts include capacity building for NRLs and sentinel sites, with regular participation in national and international External Quality Assurance (EQA) programmes. Under NEQAS, reference laboratories extend EQA support to provincial AMR labs. With partner support, antimicrobial consumption studies, antibiotic footprint analyses, and Point Prevalence Surveys for poultry and dairy AMU have been conducted, along with a meta-analysis of AMR in the animal health sector. These efforts collectively strengthen the evidence base for targeted AMR interventions.

The NAP1.0 included the environment sector in all strategic priorities; however, activities were limited or insufficiently specified. AMR surveillance in the environment sector—part of the strategic priority on establishing an integrated national AMR surveillance system—did not progress as envisaged. Other environmental priorities, such as creating a conducive environment for infection prevention and control (IPC) in healthcare settings and communities, were included but require more comprehensive operationalization in the revised plan.

3rd Strategic Priority: Improve prevention and control of infections in health care, community, animal health, food, agriculture, and environment.

Under this priority the National IPC guidelines were also introduced in 2020 followed by notification of an IPC technical working group and several National capacities strengthening training around IPC practices were arranged.

Federal and provincial livestock departments continue to promote good husbandry practices, farm biosecurity, and vaccination through farmer days, training courses, seminars, extension services, and disease prevention

programs. The AHC office and provincial livestock departments, according to disease situations, issue guidelines and awareness material for the control of prevalent/emerging livestock diseases. While efforts to promote good agricultural practices and biosecurity in livestock production have been initiated, they have not yet reached their full potential, particularly in rural and smallholder farming communities.

The NAP addressed the integration of waste management practices consistent with the Pakistan Environmental Protection Act 1997. Punjab Poultry Production Act 2016 regulates the disposal of waste from poultry farms. However, other provinces have no regulations for disposal of poultry/livestock waste. Additionally, the use of untreated cattle and poultry manure as a nutrient source for fish production and as crop fertilizer is a common practice, which contributes to the emergence and spread of AMR.

4th Strategic Priority: Update and enforce regulations for human and veterinary antimicrobial utilization.

The Drugs Act 1976 and the DRAP Act 2012 outline the legal standards for the manufacture, import, export, quality control, marketing, and sale of antimicrobials. However, in Pakistan, the regulation of antimicrobial use in human, livestock and poultry sectors is inadequate due to the ineffective enforcement of existing laws and a lack of coordination among key stakeholders. The federal government is tasked with establishing the national AMR regulatory framework, whereas provincial governments have the power to develop their own regulations independently. Nonetheless, there is no national mechanism for evaluating how well provincial regulations align with national standards or for overseeing their enforcement.

In 2022, the Drug Regulatory Authority of Pakistan (DRAP) shared the import data for the raw materials used in antimicrobial production into GLASS. With support from technical partners, DRAP is currently working on developing a software for estimating the Antimicrobial Consumption patterns in Pakistan. DRAP has also issued guidelines on responsible use of antimicrobials and a regulatory directive in relation to banning the use of antimicrobials as growth promotors. The AHC office is reporting information on AMU in animals, mostly qualitative, to WOAH since 2016. Pakistan has also initiated the submission of quantitative AMU data to WOAH. The data was classified according to antimicrobial class and use type (medical or growth promotion) but lacked details on animal species, production settings, and methods of administration.

The animal health sector has mapped the AMU supply chain to trace the flow of antimicrobials from import and production to farm use, highlighting the roles of various regulatory agencies and the AMU data collected at each stage. There are no national systems for tracking veterinary prescriptions or collecting AMU data at the farm level, apart from limited farm surveys conducted for specific projects. The data on the total sale of antimicrobials at national or provincial level and annual reports documenting trends in AMU in animals are not available.

Inappropriate use of antimicrobials has been observed among veterinarians and farmers, with 50% prescribing antibiotics for unsuitable conditions, including viral diseases,[30] highlighting the need for antimicrobial prescription guidelines. However, the absence of antimicrobial susceptibility testing data presents a significant challenge to their development. Additionally, three National Point Prevalence Surveys on AMR, covering major tertiary care hospitals across the country, were completed in 2019, 2023, and 2025. These surveys highlighted the irrational use of antibiotics in hospitals and aimed to estimate the prevalence of antimicrobial utilization among hospitalized patients.

5th Strategic Priority: Phase out use of Antimicrobials as Growth Promoters and provide appropriate alternatives.

WHO has defined critically important antimicrobials (CIAs) for humans, which are extensively used in the animal health sector. Farm-level studies have shown that 60% of antimicrobial use (AMU) in broiler production and 42% in dairy cattle production involve CIAs, as classified by the WHO. These antimicrobials are excessively used for prophylaxis and as growth promoters in animals, poultry, and aquaculture, with no regulations in place regarding their use for these purposes. Ciprofloxacin has been banned in the poultry and livestock sectors. In Punjab, efforts are underway to limit the use of antibiotics as growth promoters, with the province developing a list of antimicrobials approved for this purpose. DRAP has also issued guidelines on the responsible use of antimicrobials and a regulatory directive banning their use as growth promoters.

6th Strategic Priority: Integration of AMR in all public health research agendas including research on vaccines and diagnostics.

There is limited support from the government for AMR research. A national AMR research agenda has not yet been developed. The Health Research Institute (HRI) at NIH is seen as an important opportunity in advancing AMR research agenda and facilitating funding for new research projects on AMR. Review of progress against this priority in other sectors indicates that limited activities have been carried out under this strategic priority.

The provincial livestock departments have the capacity to produce vaccines for major livestock diseases such as s foot and mouth disease, haemorrhagic septicaemia, anthrax, peste des petitis ruminants (PPR), and Newcastle Disease. In addition, the livestock departments also implement vaccination programs/campaigns for important livestock diseases. Pakistan has initiated a PPR eradication program with the aim to eradicate PPR by 2030. Full potential of these efforts could not be harnessed due to challenges like limited resources, inadequate infrastructure, and knowledge gaps among livestock farmers leading to inadequate vaccination coverage and persistent disease outbreaks.

7th Strategic Priority: Promote research on estimation of health and economic burden of AMR.

Financial sustainability of Pakistan's AMR containment efforts is identified as a major challenge. The AMR NAP progress has significantly benefitted from external funding, without sufficient internal financial commitments from the government.[30] Research addressing the economic consequences of AMR and the promotion of prudent AMU in the livestock sector is conspicuously missing. Research in this area would be helpful in developing the economic case for policy makers to get more funding to sustain AMR mitigation activities in Pakistan.

The NIH is currently working on a research study to determine the financial burden of AMR in Pakistan and tracking trends of antimicrobial resistance against 12 blood pathogens.

3. SWOT Analysis: Cross-Sectoral Insights for Strategic Planning

SWOT analysis was undertaken through a consultative process. The analysis involved discussions and deliberations with technical experts, members of the technical working group, onsite visits, desk reviews, and meetings with key informants and stakeholders from different sectors. Pakistan's AMR response in the human health sector shows strong institutional foundations, including a national surveillance network, IPC guidelines,

and sectoral coordination mechanisms. However, implementation challenges persist due to limited governance capacity, gaps in treatment guidelines, insufficient stewardship programs, and fragmented provincial action.

In animal health, national surveillance frameworks and laboratory infrastructure are partially in place, with active global reporting and outreach efforts. Still, enforcement gaps, over-the-counter antibiotic sales, and limited veterinary training constrain sustainable AMR control.

The environmental sector demonstrates early institutional engagement through technical labs and collaborative pilots, yet faces systemic limitations including lack of surveillance frameworks, policies on antibiotic pollution, and critical human and financial resource gaps (Detail of the SOWT analysis is annexed).

Aligning National Priorities with Global AMR Commitments

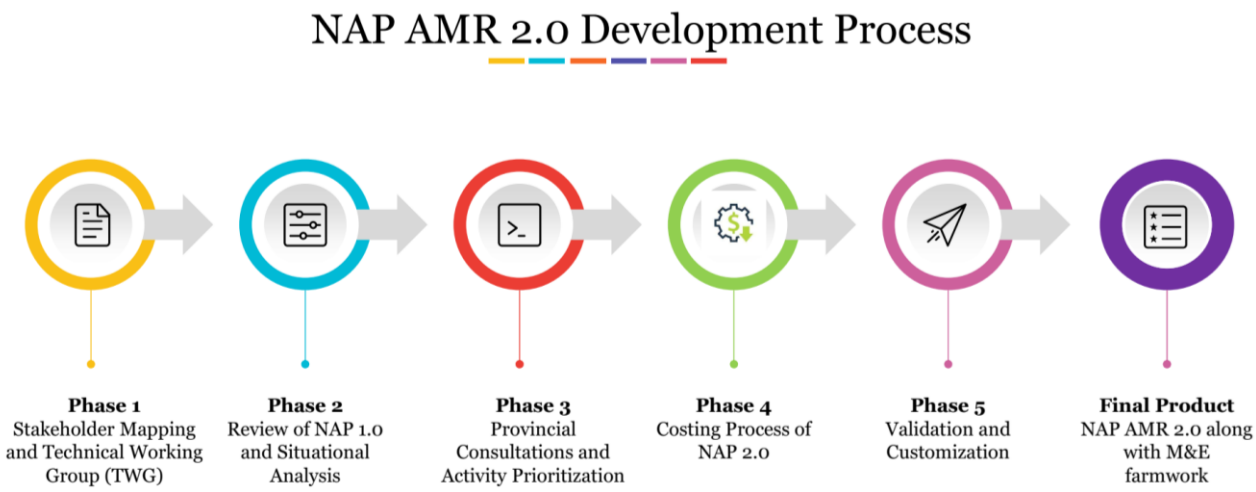
Pakistan's National Action Plan on AMR (NAP 2.0) has been developed in alignment with key global commitments, including the WHO Global Action Plan (GAP) on AMR, the Tripartite+ (WHO, FAO, WOAH, UNEP) recommendations, and the Sustainable Development Goals (SDGs)—particularly SDG 3 on good health and well-being, and SDG 17 on global partnerships. In addition, the plan reflects Pakistan's endorsement of the United Nations General Assembly (UNGA) Political Declaration on AMR, which calls for urgent and sustained political action to tackle AMR through a coordinated One Health response.

In line with the UNGA Declaration, NAP 2.0 places governance and coordination at the forefront of national priorities, making it the first strategic objective. This reflects a recognition that robust, inclusive, and accountable governance mechanisms are fundamental to effective AMR containment. The plan emphasizes strengthening multisectoral coordination, institutional leadership, and policy coherence at both national and subnational levels. It also incorporates guidance from the WHO's People-centred approach to addressing antimicrobial resistance in human health and "Addressing Gender Inequality in National AMR Action Plans," ensuring that principles of equity, sustainability, and access are fully embedded.

Through regular participation in global platforms such as GLASS and TrACSS, and alignment with international monitoring and evaluation standards, Pakistan aims to ensure that its AMR response is not only contextually grounded but also globally responsive. NAP 2.0 promotes harmonized strategies such as integrated surveillance, responsible antimicrobial use, capacity building, and whole-of-society engagement, reflecting both global best practices and national imperatives.

4. Methods and Process of NAP 2.0 development

The Ministry of National Health Services, Regulations and Coordination (MoNHSRC), in collaboration with the National Institute of Health (NIH), adopted a multisectoral and consultative approach for the development of Pakistan's second National Action Plan (NAP 2.0) on Antimicrobial Resistance (AMR). This inclusive process ensured active engagement of key federal ministries, provincial departments of health, livestock and environment, and all relevant One Health stakeholders. The process was led by MoNHSRC and technically and financially supported by key development partners including the World Health Organization (WHO), the Fleming Fund Country Grant, the Food and Agriculture Organization (FAO), and Integral Global.



Phase 1: Stakeholder Mapping and Technical Working Group (TWG) Formation

The first step in the process was a comprehensive mapping of stakeholders across human health, animal health, agriculture, food safety, and the environment sectors to ensure robust national coordination for AMR containment. Subsequently, a multisectoral Technical Working Group (TWG) was constituted in May 2024. This TWG comprised representatives from federal and provincial governments, development partners, academia, private sector entities, and civil society organizations.

Phase 2: Review of NAP 1.0 and Situational Analysis

Between May 2024 and February 2025, several TWG meetings were convened to review the implementation status of NAP 1.0. A detailed sector-wise SWOT analysis was conducted to identify strengths, weaknesses, opportunities, and threats across each of the five strategic objectives. This phase also involved the development of a time-bound operational plan, monitoring and evaluation (M&E) framework, and preliminary costing of the proposed interventions under NAP 2.0. AMR Secretariat at NIH led a situational analysis by synthesizing existing data sources, including WHO's Global Antimicrobial Resistance and Use Surveillance System (GLASS), Antimicrobial Consumption (AMC) data, the Tripartite AMR Country Self-Assessment Survey (TrACSS), and findings from the Joint External Evaluation (JEE) 2023. This was supplemented by key informant interviews with national stakeholders to contextualize AMR priorities, achievements, and implementation gaps of NAP 1.0.

Phase 3: Provincial Consultations and Activity Prioritization

To ensure local relevance and ownership, sector-specific SWOT findings were validated through two dedicated TWG meetings led by NIH, followed by extensive provincial consultations. These consultations aimed to gather deeper insights and enable contextual prioritization of activities across provinces using WHO's Activity Prioritization Tool. Two provincial consultative workshops were held—one focused on human and environmental health, and the other on animal health sectors.

Costing Process of NAP 2.0

The costing methodology for the NAP-AMR 2025–2029 was designed to ensure robust, transparent, and actionable financial planning, tailored to Pakistan's unique context. The process utilized the WHO AMR NAP Costing Tool, emphasizing a detailed, bottom-up approach that broke down objectives into actionable steps, aligned with operational realities and resource availability. This methodology ensured that all cost components, from resource estimation to prioritization, were systematically addressed. Process emphasized a detailed breakdown of activities, defining them by implementation steps, responsible entities, quantities, and timelines. Costing inputs were derived from:

- Human resources: Salaries and allowances based on government pay scales and required levels of effort.
- Equipment: Prevailing market rates for essential lab and operational equipment.
- Infrastructure: Civil works costs, including construction and refurbishment of AMR laboratories.
- Technical assistance: Costs for consultants and specialized technical support.
- Operational needs: Logistics, training, and monitoring requirements.

Validation and Customization

Workshops and validation meetings led by the TWG were conducted to review and refine costing assumptions, ensuring alignment with national priorities and operational feasibility. Assumptions regarding inflation rates, market trends, and implementation timelines were carefully reviewed to enhance accuracy. The WHO AMR Costing Tool was customized to reflect Pakistan's national context, including local currency adjustments, government budget classifications, and region-specific cost parameters.

The costing outputs were developed to facilitate analysis and policy formulation, with key parameters including:

- Annual activity-level funding requirements for the five-year NAP implementation period.
- Costs broken down by strategic objectives, interventions, and funding sources.
- Categorization by funding status (funded, partially funded, unfunded).
- Allocation by cost components, such as human resources, technical assistance, and infrastructure.

Phase 4: Finalization of NAP 2.0

A national multisectoral consultative workshop was convened to review and finalize the draft NAP 2.0. The workshop brought together stakeholders from across sectors and provinces to validate the operational plan and M&E framework. In addition, three-day intensive provincial consultations were also conducted to ensure bottom-up validation and alignment of the national plan with subnational priorities.

Stakeholder Engagement Across the Development Process

Stakeholder involvement spanned across:

- Federal line ministries (Health, Livestock, Environment, Education)
- Provincial health and livestock departments
- National Reference Laboratories and AMR Surveillance Units
- Development partners (WHO, FAO, Fleming Fund, Integral Global Health)
- Academia and research institutions
- Civil society and private healthcare providers

NAP AMR 2.0

The AMR Operational Plan is structured around six key objectives, each supported by targeted interventions and detailed activities. Objective 1 focuses on strengthening governance and coordination through three interventions (e.g., establishing AMR governance mechanisms) with 10 activities, including revising the National AMR Steering Committee and strengthening regulatory frameworks. Objective 2 aims to improve AMR awareness via two interventions (e.g., awareness campaigns and education integration) with 12 activities, such as incorporating AMR into school curricula and conducting training for professionals. Objective 3 enhances AMR surveillance with four interventions (e.g., genomic surveillance, IPC strengthening) and eight activities, including establishing reference labs and integrated surveillance systems. Objective 4 targets infection reduction through five interventions (e.g., IPC policies, vaccination) and 22 activities, such as improving water sanitation in healthcare facilities. Objective 5 optimizes antimicrobial use via four interventions (e.g., stewardship programs, AMU monitoring) and 14 activities, including updating essential medicine lists. Objective 6 promotes research investment with two interventions (e.g., priority-setting, capacity-building) and four activities, such as mapping research resources. Each activity aligns with clear responsibilities, indicators, and cost estimates, ensuring measurable progress.

5. Strategic Objectives

Objective 1: Governance and Coordination

- Intervention 1: Establishment of AMR governance and financing mechanisms
- Intervention 2: Coordination and harmonization of activities on AMR
- Intervention 3: Strengthening existing rules and regulations across sectors to address AMR

Objective 2: Improve awareness and understanding of antimicrobial resistance through effective communication, education, and training.

- Intervention 1: Establish and implement AMR awareness and behaviour change strategy
- Intervention 2: Establish and promote AMR in education and training on AMR for professionals

Objective 3: Strengthen AMR surveillance across sectors to generate quality data for policy actions.

- Intervention 1: Strengthening AMR coordinating centres and reference laboratories in all sectors
- Intervention 2: Strengthening integrated AMR surveillance
- Intervention 3: Genomic surveillance and healthcare associated infections surveillance

- Intervention 4: Ensuring quality through SOPs and EQA systems in health sector

Objective 4: Reduce infection through effective water, hygiene, and sanitation, vaccination, and infection prevention and control (IPC) measures.

- Intervention 1: Create a formal organizational structure for development and implementation of IPC policies and strategies
- Intervention 2: Availability of trained human resource at all levels
- Intervention 3: Enable conducive environment for IPC in health care settings and in the community following People- Centred approach.
- Intervention 4: Strengthen animal health and agricultural/agrifood/aqua and environment sector IPC practices
- Intervention 5: Prevention of infections through better Water sanitation and hygiene including waste management and improved vaccination coverage

Objective 5: Optimize the use of antimicrobial medicines in human and animal health.

- Intervention 1: Strengthening existing rules and regulation on manufacture, prescribing, sales and use of antimicrobials
- Intervention 2: Measuring antimicrobial (human/ veterinary/agrifood/environment/aqua) use
- Intervention 3: Implementation of antimicrobial stewardship program at HCFs
- Intervention 4: Rationalize use of antimicrobials as growth promoters & prophylaxis aligned in veterinary, agriculture, and aquaculture

Objective 6: Develop economic case for sustainable investment based on research studies focused on country needs

- Intervention 1: Mapping of AMR research landscape and priority setting
- Intervention 2: Capacity building and designing and conducting research in priority areas

6. National Operation Plan

Objective1: Strengthen governance and coordination Intervention 1: Establishment of AMR governance and financing mechanisms				
No	Activity	Responsibility	Indicator	Cost Estimates
01.01	Revision of multistakeholder National AMR Steering Committee to include all Quadripartite partners.	MoNHSR&C, NIH	No of quadripartite partners participating. No of policies endorsed & implemented by multistakeholder steering committee	
01.02	Constitution of national/ One Health Technical Working Groups (TWGs) for AMR surveillance, IPC, Optimized AMU, AMS, and Research	Ministry of NHSR&C, NIH, NFS&R & Climate Change, MoWR, Fed & Provincial EPAs	No of operational TWGs & representative members No of recommendations /policies developed by TWG	
01.03	Strengthening the capacity of the National AMR secretariat with defined TORs and replication at provincial level	Ministry of NHSR&C, NIH, NFS&R & Climate Change	% increase in budget allocation for the AMR secretariat. # of Information sharing products/publications (Newsletter, Fact sheet/tools)	
01.04	Mapping of AMR in health financing at national/provincial levels	Ministry of NHSR&C, NIH	Amount and allocation of AMR fundings at National /provincial level	
01.05	Inclusion of AMR in other programme plans and strategies (immunization, Tb, HIV, malaria etc.)	MoNHSR&C, NIH	#Briefs on cross-collaborations	
Intervention 2: Coordination and harmonization of activities on AMR				

	Update Mapping of high-level stakeholders' platforms/forums at national/provincial level within the core mandate of One Health	Ministry of NHSR&C/NIH, MoWR, MoCC, MoNHSR&C, DOH Federal and provincial EPAs.	No of Platforms/forums mapped. No of Meetings held	
01.07	Review meeting for high level engagement and Advocacy for federal/provincial secretaries, DGs, administrative heads and political leaders to seek commitment	Ministry of NHSR&C/NIH, MoWR, MoCC, MoNHSR&C, DOH Federal and provincial EPAs.	No of meetings conducted. No of declarations/MoUs signed	
Intervention 3: Strengthening existing rules and regulations across sectors to address AMR				
01.08	Legislation to strengthen drug sales in all relevant sectors.	DRAP/ Ministry of NHSR&C, NIH, NFS&R, Health & Livestock Provincial Departments, Ministry of Law & Justice Division	No of amendments Reduction in inappropriate use of antimicrobials	
01.09	Advocacy for regulatory oversight for enforcement of Drug Act 1976 and DRAP Act 2012	DRAP/ Ministry of NHSR&C, NIH, NFS&R, Health & Livestock Departments/manufacturers	No of advocacy meetings for stockholders conducted.	
01.10	Legislations to monitor pesticide residue.	NFS&R & Climate Change,	No of provinces with legislations in place	
OBJECTIVE 2: IMPROVE AWARENESS AND UNDERSTANDING OF ANTIMICROBIAL RESISTANCE THROUGH EFFECTIVE COMMUNICATION, EDUCATION, AND TRAINING.				
Intervention 1: Establish and implement AMR awareness and behaviour change strategy				
No	Activity	Responsibility	Indicators	Cost Estimate
02.01	Development of National strategic plan for communication on AMR	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, WHO,	% of planned activities conducted. % dissemination activities formed and planned.	

		academia, MoCC, Fed and Provincial EPA		
02.02	Adapt, develop, and disseminate AMR awareness raising materials, including at community level, targeting the public, health professionals (incl. pharmacists, nurses, medical doctors) and policymakers.	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, WHO, academia, MoCC, Fed and Provincial EPA	Number of communication materials developed. Level of awareness measured by surveys	
02.03	Conduct awareness campaigns aligned with the World AMR Awareness Week and other health days (such as Clean Hands, hand hygiene, patient safety)	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, WHO, MoCC, Fed and provincial EPAs	No of campaigns conducted. No of people reached with awareness campaign No of organizations involved in awareness week	
02.04	Advocacy and IEC campaign for behaviour change on misuse of antimicrobials for prescribers and consumers	Ministry of NHSR& C, NIH, DRAP, NFS&R, DOH, Relevant HDPs	Knowledge level measured by surveys. social media reach	
02.05	Engaging communicating leaders/religious clan, media influencers and civil societies in AMR awareness-raising campaigns	Ministry of NHSR&C, NIH, Ministry of religious affairs,	No. of groups engaged. No of programs conducted	
02.06	Include basics of AMR prevention in high-school curricula.	Ministry of NHSR&C, NIH, Education, Depts. of Education, HEC, federal and provincial educational boards	No of provinces that included AMR/IPC in curriculum. % of education institutions implementing the curriculum Awareness levels among school children	
02.07	Include content on AMR/IPC in college/university curriculum	Ministry of NHSR&C, NIH, Education, Depts. of Education,	No. of universities with AMR/IPC in curriculum.	

		HEC, federal and provincial educational boards Universities, Colleges,	No of trainings sessions conducted for university faculties Awareness levels among college/university students	
02.08	Incorporation of AMR related questions into existing national surveys, DHS, and readiness assessments	Ministry of NHSR&C, NIH. National Institute of Population Studies (NIPS)	No. of Surveys incorporating AMR related questions. Awareness among populations. No. of reports generated and published on AMR awareness. Frequency and reach of press briefings/releases disseminating AMR data and situation updates.	
Intervention 2: Establish and promote AMR in education and training on AMR for professionals				
02.09	Develop/adapt and include AMR in professional education (preservice) and training programs for HCPs, environment professionals, veterinarians and agricultural/aquaculture extension workers and officers	PMDC; PVMC; PNC; Pharmacy Council	No. of councils adapting the curriculum No. of training programs, certificate courses, and diplomas No. of institutions using AMR curriculum for education and training No. of people enrolled in these programs and courses	
02.10	Development of customized training modules on AMR for One Health professionals	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, WHO	No. of Modules developed and implemented.	

02.11	Refresher training of practitioners in public & private HCFs including hospitals, community (Health and Veterinary sectors)	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, WHO	No. of trainings conducted. No. of people trained/attended CMEs. % of trainees with appropriate knowledge and skill.	
02.12	Education and training on antimicrobial stewardship programs for healthcare professionals	Ministry of NHSR&C, NIH, professional councils	No. of trainings conducted. No. of people trained/attended CMEs. % of trainees with appropriate knowledge and skill.	
Objective 3: Strengthen AMR surveillance across sectors to generate quality data for policy actions.				
Intervention 1: Strengthening AMR coordinating centres and reference laboratories in all sectors				
No	Activity	Responsibility	Indicators	Cost Estimate
03.01	National & provincial AMR surveillance coordination centres in all sectors (Health, Veterinary, Agriculture & Environment)	Ministry of NHSR&C, NIH NFS&R, CC/ EPA, Ministry of water resources, Provincial Health, Agriculture &Livestock Departments, WHO, NIH	No. provinces with AMR coordination centres No. notified centres	
03.02	Notification and strengthening of National, provincial, and regional reference/ referral labs in all sectors	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, Ministry of climate change, Ministry of water resources	No. of Labs as per relevant ISO standards No. of Functional labs	
Intervention 2: Strengthening integrated AMR surveillance				

03.03	Sector specific AMR surveillance plans in alignment with national strategies for all sectors	Ministry of NHSR&C, NIH, NFS&R, CC/EPA, Provincial Health & Livestock Departments, WHO, Ministry of climate change, Ministry of water resources	No. of Sector specific plans, Strategies available and disseminated. Lists of Priority MDRO pathogens	
03.04	Strengthening of AMR sentinel laboratories for human health, Veterinary sectors, Food and agriculture aquaculture, and environment	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments	Functional AMR surveillance sites in each sector	
03.04	Integrated AMR surveillance capacities	Ministry of NHSR&C, NIH, NFS&R, Provincial Health & Livestock Departments, WHO Ministry of climate change, Ministry of water resources	No. of sectors participating No. of Focal persons nominated across sectors No. of AMR surveillance sites No. of sectors with regular data sharing No. of MOU, Sectors and SOPs available and used updated priority pathogens list	
Intervention 3: Genomic surveillance and healthcare associated infections surveillance				
03.05	AMR Genomic surveillance for selected priority pathogens at NRLs	Ministry of NHSR&C, NIH, NFS&R, CC/EPA,	No. of pathogens No. of studies No. of NRLs for AMR Genomic surveillance	
03.06	HAI Surveillance	Ministry of NHSR&C, NIH	No. of sentinel HAI sites HAI indicators	

Intervention 4: Ensuring quality through SOPs and EQA systems in health sector				
03.07	Development of standardized Lab diagnostic guidelines/ SOPs for Antimicrobial Susceptibility Testing (AST) bacteriology, and mycology protocols in all sectors	National Reference Labs, (NIH, NVL, NRLPD) EPA, PCRWR, Provincial Health & Livestock Departments	No. of Functioning sites No. of SOPs No. of sites following SOPs EQA results	
03.08	Strengthening EQA/NEQAS in all sectors	NRLs	No of EQA labs EQA results No. of Assessments Reports No. of Trainings conducted No. of Personnel trained	

Objective 4: Reduce infection through effective water, hygiene, and sanitation, vaccination, and infection prevention and control (IPC) measures. **Intervention 1: Create a formal organizational structure for development and implementation of IPC policies and strategies**				
No	Activity	Responsibility	Indicators	Cost Estimate
04.01	Strengthening national IPC unit in the human health sector.	Ministry of NHSR&C, NIH	No. of TORs No. of meetings with minutes of meetings available.	
04.02	Establishing national biosafety/ biosecurity Committee for livestock, fisheries and aquaculture sectors established.	Livestock Departments	No. of TORs No. of meetings with minutes of meetings available.	
04.03	Establishment of provincial/regional IPC Units	Ministry of NHSR&C, NIH, Provincial Health & District Management	No. of IPC Units established at each level, No. of notification and No. of meetings, No. of TORs and No. of committees finalized.	

04.04	Establishment of provincial/regional In Farm biosafety biosecurity Committees	Livestock Departments	No. of Provincial InFarm committees. No. of TORs No. of meetings with minutes of meetings available at various levels.	
04.05	Functional IPC teams and committees with focal persons in tertiary care public hospitals.	Ministry of NHSR&C, NIH, NFS&R, Provincial Health departments.	No. of tertiary care hospitals with IPC control teams and committees. No. of joint meetings	
04.06	Development, revision/dissemination, and implementation of national IPC guidelines	Ministry of NHSR&C, NIH, NFS&R, Provincial Health	No. of healthcare facilities implementing the national IPC guidelines. Compliance with the IPC guidelines /SOPs across healthcare settings.	
04.07	Development, revision/dissemination, and implementation of farm biosafety/ biosecurity guidelines	Livestock Departments /DOH, EPAs.		
Intervention 2: Availability of trained human resource at all levels				
04.08	Availability of IPC trained healthcare workers in healthcare facilities.	Ministry of NHSR&C, NIH / DOH	% of tertiary facilities with full-time IPC HCWs No. of tertiary facilities with1 IPC nurse per 150-200 beds. % of secondary and primary facilities with trained IPC HCWs	
04.09	Availability of infectious diseases (ID) professionals in every teaching hospital.	Ministry of NHSR&C, NIH/ DOH	% of teaching hospitals with dedicated ID physicians/ID trained physicians % of teaching hospitals with ID trained clinical pharmacists	

04.10	IPC structures at HCFs	Ministry of NHSR&C, NIH/ DOH	No. of HCFs with core structures as per ToRs	
Intervention 3: Enable conducive environment for IPC in health care settings and in the community following People- Centred approach.				
04.11	Regular mapping and monitoring availability of clean water supply systems for drinking and clinical purposes in all HCFs	Ministry of NHSR&C, NIH, DOH/ Provincial allied departments, WASA and local government (e.g.CDA in Isb)	No. of water quality assessments conducted in healthcare facilities % of healthcare facilities with clean water supply systems	
04.12	Strengthen sterilization and disinfection/CSSD (as per standards (WHO/CDC) as appropriate to levels of care	DOH, Regulatory bodies, Healthcare commission	No. of healthcare facilities with operational CSSD and isolation facilities. No. of HCFs with dedicated HR and supplies for CSSD, sterilization & disinfection.	
04.13	Strengthen the enforcement of isolation protocols/high containment rooms/areas inn hospitals	DOH	No. and % of hospitals where containment /isolation facilities area available	
04.14	Develop, adopt and enforce and apply IPC building codes for health care facilities	Ministry of NHSR&C, NIH/ IPC FP/ NIH/ DOH, EPA, Building and Works Department	No. of inspections or audits conducted to ensure adherence to IPC building codes No. of healthcare facilities that have adopted IPC building codes. % compliance with IPC building codes across healthcare facilities.	
04.15	Improving IPC and waste management practices	Ministry of NHSR&C, NIH, NFS&R, Health & Livestock Departments, Federal and provincial EPA's, Academia	No. of inspections or audits conducted to ensure adherence to Hospital Waste Management rules	

			% compliance with Hospital Waste Management rules.	
04.16	Monitoring of occupational and HCWs safety	DOH	% of Vaccination coverage No. &% of HCWs infections No. &% of HCAI infections	
Intervention 4: Strengthen animal health and agricultural/agrifood/aqua and environment sector IPC practices				
04.17	Implementation of farm biosafety biosecurity guidelines in livestock, poultry, aquaculture	Ministry of NFS&R/L&DD	No. sectors with guidelines No. and % of animal health workers vaccinated No. provinces with vaccine producing units	
04.18	Development & Implementation of Safe production/hygienic standards of food from animal origin	Ministry of NFS&R, Livestock Departments, Federal and Provincial EPA's, Local Governments	% of slaughterhouses with standard hygiene practices	
04.19	Zoonotic and food borne outbreaks detection, response, and containment.	Ministry of NFS&R Agriculture & Livestock Departments, FAO, WHO Food Safety Authority	No. of quarantine facilities at checkpoints No. and % of food storage units following SOPs	
Intervention 5: Prevention of infections through better Water sanitation and hygiene including waste management and improved vaccination coverage				
04.20	Water treatment and quality monitoring	WASA/ local gov WASA/ Municipality/ District Governments /DOH, EPA - Federal and Provincial PCRWR	% of household with safe water supply e. coli load from water samples	
04.21	Solid and infectious waste segregation.	WASA/ DOH/ Ministry of Climate Change, Local	% HCFs with colour coded bins % HCFs following SOPs.	

		Government, fed, Federal and provincial EPAs.	% HCFs with trained HCWs on waste segregation %HCFs following waste disposal as per SOPs	
04.22	Use of vaccines for VPDs to minimize antimicrobial use in both human and animal sector	Ministry of NHSR&C, NIH, NFS&R, Health & Livestock Departments, WHO, FDI, Provincial EPI	No. of new vaccines added to national immunization programmes Vaccination coverage	
Objective 5: Optimize the use of antimicrobial medicines in human and animal health. Intervention 1: Strengthening existing rules and regulation on manufacture, prescribing, sales and use of antimicrobials				
No	Activity	Responsibility	Indicator	Cost Estimate
05.01	Review and update Access, Watch and Reserve (AWaRe) & National essential medicines list (EML) supported by local data	DRAP, Ministry of NHSR&C, NFS&R, Health &	EML list AWaRe classification in EML AWaRe share, % Access, Access: Watch ratio	
05.02	Standardize record keeping mechanism for antimicrobial sale and use at all levels (pharmacies, medical & veterinary hospitals/ GPs)	DRAP/ Ministry of NHSR&C, NFS&R, Health & Livestock Departments,	% inspections conducted in point of sales and use %adherence to record keeping norms	
05.03	Strengthening of quality testing facilities testing laboratories (DTLs) for antimicrobials	DRAP (federal and provincial)/ DOH	No. of DTLs accredited for antimicrobial drug testing No. of ISO certified drug testing labs % spurious, falsified, and substandard medicines	
05.04	Improving availability, quality, and affordability of antimicrobials	DRAP (federal and provincial)/ DOH	No. of reported shortages No. of spurious and substandard, and falsified antimicrobials drugs Affordability and availability	

			% HCFs reporting availability of EML antibiotics as per AWaRe list	
Intervention 2: Measuring antimicrobial (human/ veterinary/agrifood/environment/aqua) use				
05.05	Development of AMU surveillance plan at national and provincial levels across sectors	DRAP/ Ministry of NHSR&C, NFS&R, Health & Livestock Departments,	Surveillance plan with timelines No. of M& E Indicators	
05.06	Capacity building on generating and use of data at national and provincial levels across sectors		No. of Tools No. of Materials developed No. of Training No. of Skilled HR No. of provinces reporting and regularly using M&E indicators No. of Annual reports	
05.07	Regular monitoring of antimicrobial use at national and provincial levels across sectors		No. of Data available on antimicrobial product registrations No. of import versus export of AWaRe composition GLASS AMU, ANIMUSE, INFARM reporting National level joint dashboards Annual report on consumption	
05.08	Regular monitoring of antimicrobial use at HCFs	Provincial MoH and provincial DRAP	No. of HCFs using the M&E plan % HCFs with regular data collection % HCFs with regular review meetings	
Intervention 3: Implementation of antimicrobial stewardship program at HCFs				
05.09	Development/adaptation antimicrobial stewardship implementation guidelines at national level		No. of Antimicrobial stewardship Guidelines No. of training /workshop No. of training tools developed/adapted	

05.10	Development of facility specific antibiotic use guidelines for tertiary care	Ministry of NHSR&C, NFS&R, Health & Livestock Departments, WHO, Health Care Commissions/private sector	No. of HCFs with antibiotic use guidelines % adherence to guidelines % empirical versus targeted antimicrobial use No. of facilities generating antibiograms Antibiotic use prevalence AWaRe use % top 5 antimicrobial use Level of appropriateness of antimicrobials use.	
05.11	Establishing ASP at tertiary level hospitals	DRAP, Ministry of NHSR&C, WHO, Health Care Commissions	No. of hospitals conducting ASP Assessment scores No. of antimicrobial use prevalence AWaRe use % Top 5 antimicrobials used.	
05.12	Programme for appropriate antibiotic use at the Primary care.	Ministry of NHSR&C, Departments, WHO, Health Care Commissions/private sector/professional associations	No. of PHCs conducting PPS/prescription audit antimicrobial use prevalence No. of prescribers using mobile application No. of HCWs adopting guidelines AWaRe use % Top 5 antimicrobials used.	
Intervention 4: Rationalize use of antimicrobials as growth promoters & prophylaxis aligned in veterinary, agriculture, and aquaculture				
05.13	Baseline survey on usage of antimicrobials as growth promoters in animal feed industry including assessment of feed (utilization audit)	DRAP/ Ministry of NFS&R, AHC	No. of List and quantity and antimicrobial used No. of surveys	

05.14	National strategy for the control of antimicrobials usage as growth promoters and prophylaxis in veterinary/agriculture/ aqua /industry sector	DRAP/ Ministry of NFS&R/ DOH, AHC PL&DD, PL&DD, AHC, Provincial Livestock Departments	No. of phasing out of critically important antibiotics from non-human sectors	

Objective 6: Develop economic case for sustainable investment based on research studies focused on country needs				
Intervention 1: Mapping of AMR research landscape and priority setting				
No	Activity	Responsibility	Indicator	Cost Estimate
06.01	Mapping of available resources for AMR research	Ministry of NHSR&C/ Ministry of NFS&R/ PHRC/ DOH/ HRIHEIs/Focal Person from each Province	No. of resources identified No. of priority list for AMR research	
06.02	Development of national AMR research priority setting		No. of AMR studies and publications No. of AMR research proposals AMR and AMU data	
Intervention 2: Capacity building and designing and conducting research in priority areas				
06.03	Capacity building on AMR research	Ministry of NHSR&C/ Ministry of NFS&R/ PHRC/ DOH/HRIHEIs/Focal Person from each Province	No. of AMR studies and publications No. of AMR research proposals No. of workshops No. of fellowships No. of grants	
06.04	Design and conduct studies as per global, regional and national priorities	Ministry of NHSR&C, NFS&R,	No. of AMR studies and publications No. of operational research	

		Health & Livestock Departments, WHO, FAO DRAP/P&D/PSWR/ Provincial Health Department HEC/ Academia/ DOH/P&D/NIH/ AMRN	No. of research used in policy changes	

NAP AMR 2.0 Costing Estimates

The overall aggregate cost for AMR NAP is PKR. 13,258.8 million. As compared to the later years, approximately 50% of the total NAP costs are allocated to Years 2026 and 2027, reflecting the peak investment period driven by major activities such as strengthening AMR surveillance, infection prevention measures, and system-wide interventions. The initial year (2025) primarily focuses on foundational investments, including governance setup, awareness campaigns, and capacity building (Tool with full detail of costing is attached Annex-1). The outer years (2028 and 2029) reflect a gradual shift toward operational costs, sustainability measures, and research-related activities (Detail of costing sheet is attached as annex-2).

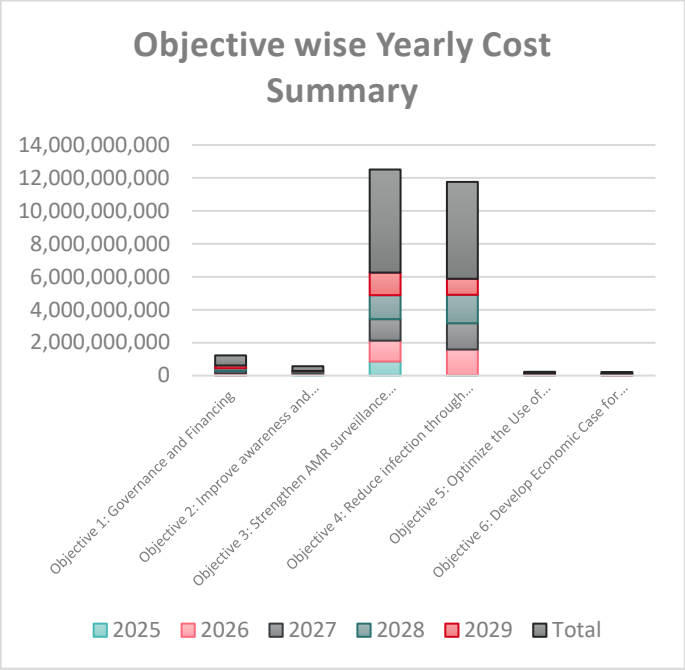
Objective wise Breakdown

The following table provides a year-wise breakup of NAP costs (amount in Million PKR) across its key objectives:

Sr. No.	Objectives	2025	2026	2027	2028	2029	Total Cost
1	Governance and Financing	1	140	154	152	166	613
2	Awareness and Education	32	89	74	66	23	284
3	Strengthen AMR surveillance across sectors	855	1,268	1,304	1,456	1,374	6,257
4	Reduce infections through WASH, vaccination, and IPC	27	1,559	1,597	1,726	972	5,880
5	Optimize use of antimicrobial medicines	12	72	22	7	2	115
6	Develop an economic case on research	2	13	24	60	9	109

This allocation reflects a phased approach, prioritizing critical infrastructure and interventions in the earlier years while ensuring continuity and operational efficiency in subsequent years. The NAP has six objectives, each addressing a key area of the AMR response for Pakistan. However, based on the activities identified under each area, Objectives 3 (Strengthen AMR Surveillance across sectors) and 4 (Reduce infections through WASH, vaccination, and IPC) account for nearly 85% of the overall NAP

response. This is largely driven by civil works for laboratories, procurement of equipment, and staffing and operational expenses required to enhance AMR surveillance and reduce infections effectively.



Objective 1 (Governance and Financing) focuses on improving coordination mechanisms and supporting the establishment of an AMR secretariat at the National Institute of Health, the designated AMR focal point for Pakistan in the Human Health sector. This objective accounts for a smaller portion of the budget as it primarily focuses on governance and coordination efforts.

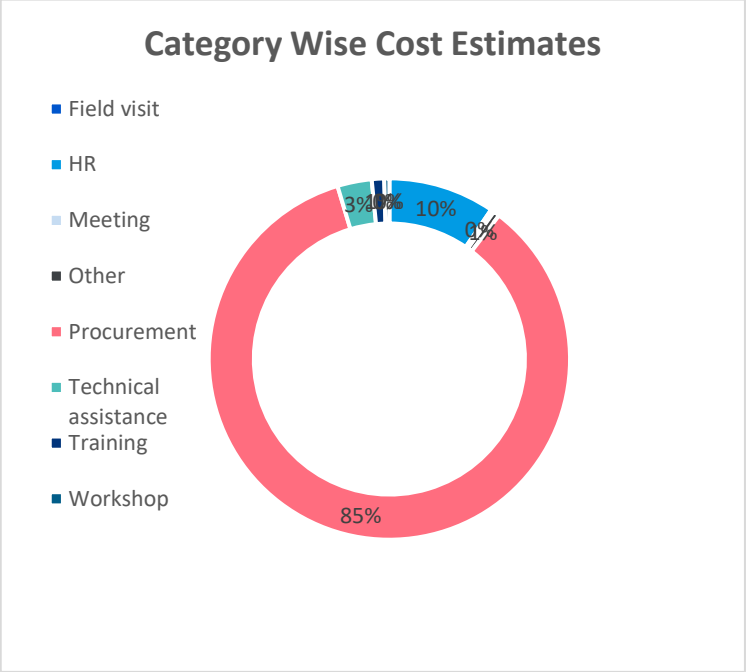
At the federal level, Objectives 5 (Optimize the use of antimicrobials in human and animal health) and 6 (Develop an economic case for sustainable investment based on research) are largely comprised of costs for technical assistance in specific areas. Hence, their cost estimates are significantly lower compared to other objectives. Figure 1 illustrates the percentage of NAP costs by objective.

As noted earlier, the NAP costs have been categorized into specific cost categories, detailed in the methodology section. Technical assistance makes up about 2.8% of the total NAP cost. The key requirements for technical assistance include expertise in the Animal Sector, Public Health, Environmental Health, Senior Epidemiology, Surveillance, Data Analysis, and Financial Management.

Training, seminars, and meeting costs are estimated based on the projected number of participants expected to attend capacity development workshops, trainings, seminars, and meetings. This category contributes to 2% of the total cost and includes facilitator fees, venue costs, meals, and other miscellaneous expenses.

Approximately 9.5 % of the total cost has been allocated to the Human Resource category. Based on discussions with key stakeholders, cost estimates for the addition of new staff assume their recruitment as permanent government employees with remuneration set according to GOP pay scales. The total cost for

human resources is estimated at PKR 7,131 million Key HR categories include National Coordinator, Epidemiologists, Microbiologists, Laboratory Staff, Data Analysts, and support personnel.



In terms of hospital and laboratory support, approximately 85% of the total NAP cost has been allocated for the procurement activities which includes refurbishment and civil works of AMR reference laboratories, including procurement of new laboratory equipment. The "Others" category, which includes courier costs for specimen transport, preparation and dissemination of IEC material, software maintenance, monitoring visits, and AMR secretariat costs, constitutes approximately 3 % of the total NAP cost.

Sectoral Investment Breakdown

Given the One Health nature of AMR, the financial framework supports interventions across multiple sectors to address the interconnectedness of antimicrobial resistance in human, animal, and environmental health.

The distribution of costs across these sectors is as follows:

Sector	Total Cost (PKR Million)	% of Total Budget
Human Health	2,002	15%
Animal Health	202	2%
Environmental Health	1.8	0.05%
Multisectoral Interventions (One Health)	11,052.22	83%
Total	**3,303.72**	**100%**

The predominant allocation to multisectoral interventions (83%) highlights the integrated governance, surveillance, and stewardship strategies necessary to combat AMR at a national level. Investments in human and animal health ensure rational antimicrobial use, enhanced diagnostics, and regulatory reforms, while environmental health interventions focus on antimicrobial residues, waste management, and pollution control.

KEY INTERVENTIONS AND RESOURCE ALLOCATION

The financial estimates include specific, high-impact interventions, ensuring strategic deployment of resources across core AMR response areas. The financial plan also includes the upgradation of 10 hospitals and 15 laboratories, ensuring enhanced diagnostic capacity, infection prevention, and surveillance capabilities across Pakistan.

Objectives and Interventions	2025	2026	2027	2028	2029	Total
Objective 1: Governance and Financing	**0.9**	**140.1**	**153.7**	**152.0**	**166.4**	**613.1**
Intervention 1.1: Establishment of AMR governance and financing mechanisms	0.4	134.5	142.2	150.5	165.6	593.2
Intervention 1.2: Coordination and harmonization of activities on AMR	0.5	1.2	0.6	1.4	0.8	4.6
Intervention 1.3: Strengthening existing rules and regulations across sectors to address AMR	0.0	4.4	10.9	0.0	0.0	15.3
Objective 2: Awareness and understanding through communication and education,	**32.2**	**88.9**	**73.7**	**66.2**	**23.2**	**284.2**
Intervention 2.1: Establish and implement AMR awareness and behaviour change strategy	32.2	51.8	40.3	29.4	21.9	175.7
Intervention 2.2: Establish and promote AMR in education and training on AMR for professionals	0.0	37.0	33.4	36.7	1.3	108.5
Objective 3: AMR surveillance	**855.4**	**1,268.0**	**1,304.0**	**1,455.8**	**1,373.6**	**6,256.8**
Intervention 3.1: Strengthening AMR coordinating centres and reference laboratories in all sectors	841.5	997.3	1,125.5	1,286.4	1,333.6	5,584.4
Intervention 3.2: Genomic surveillance and healthcare associated infections surveillance	0.0	266.9	169.2	159.2	28.9	624.1
Intervention 3.3: Ensuring quality through SOPs and EQA systems in health sector	13.9	3.8	9.2	10.2	11.2	48.3
Objective 4: AMR – Infection prevention and control (IPC) measures	**26.5**	**1,558.8**	**1,597.1**	**1,725.8**	**971.9**	**5,880.2**
Intervention 4.1: Create a formal organizational structure for development and implementation of IPC policies and strategies	7.8	36.5	34.1	36.6	40.3	155.3
Intervention 4.2: Availability of trained human resource at all levels	18.7	9.8	9.1	8.8	0.7	47.0

Intervention 4.3: Enable conducive environment for IPC in health care settings and in the community following People- Centred approach.	0.0	1,512.2	1,509.8	1,655.3	910.1	5,587.4
Intervention 4.4: Strengthen animal health and agricultural/agrifood/aqua and environment sector IPC practices	0.0	0.0	35.4	21.9	20.8	78.1
Intervention 4.5: Prevention of infections through better Water sanitation and hygiene including waste management and improved vaccination coverage	0.0	0.4	8.7	3.2	0.0	12.3
Objective 5: AMS - Antimicrobial Medicines in Human and Animal Health	**12.3**	**72.2**	**22.2**	**6.6**	**1.8**	**115.0**
Intervention 5.1: Strengthening existing rules and regulations on manufacture, prescribing, sales, and use of antimicrobials	3.3	19.3	0.0	0.0	0.0	22.6
Intervention 5.2: Measuring antimicrobial (human/veterinary/agrifood/environment/aqua) use	0.9	24.8	12.2	0.7	0.8	39.5
Intervention 5.3: Implementation of antimicrobial stewardship program at HCFs	0.0	4.5	9.9	5.9	1.0	21.4
Intervention 5.4: Rationalize use of antimicrobials as growth promoters & prophylaxis in veterinary, agriculture, and aquaculture	8.0	23.5	0.0	0.0	0.0	31.5
Objective 6: Sustainable Investment Based on Research Studies	**2.4**	**13.4**	**23.9**	**60.3**	**9.4**	**109.5**
Intervention 6.1: Mapping of AMR research landscape and priority setting	2.4	6.5	0.0	0.0	0.0	8.9
Intervention 6.2: Capacity building and designing and conducting research in priority areas	0.0	6.9	23.9	60.3	9.4	100.5
Total	**929.8**	**3,141.4**	**3,174.7**	**3,466.6**	**2,546.3**	**13,258.8**

Expenditure Categories

The distribution of costs across expenditure categories ensures a balanced allocation between infrastructure development, capacity building, and operational sustainability:

Cost Category	Total Cost (PKR Million)	% of Total Budget
Procurement	11,267.7	85.0%
Human Resources	1,261.1	9.5%
Technical Assistance	407.0	3.1%
Training & Capacity Building	211.6	1.7%
Workshops & Meetings	100.5	0.9%
Field Visits & Operational Support	1.67	0.05%
Total	**13,258.8**	**100%**

- Over 85% of the total budget is allocated to procurement, ensuring the availability of critical hospital, laboratory equipment, and Office related equipment, IPC supplies, and infrastructure upgrades.
- 9.5% is dedicated to human resources, emphasizing the need for trained personnel, capacity building, and intersectoral workforce development.
- 3.1% is allocated to technical assistance, covering policy development, research, and expert consultations to strengthen evidence-based decision-making.

IMPLEMENTATION FRAMEWORK FOR NAP 2.0

Roles and Responsibilities of Key Stakeholders

The implementation of Pakistan's National Operational Plan 2.0 for AMR involves a broad range of key stakeholders, each with defined roles and responsibilities to ensure effective, multisectoral coordination. The Ministry of National Health Services, Regulations & Coordination (MoNHSR&C) and the National Institute of Health (NIH) serve as central coordinating bodies, overseeing governance, surveillance, awareness, infection prevention, and antimicrobial stewardship activities across human health. The Drug Regulatory Authority of Pakistan (DRAP) is responsible for strengthening legislation, regulating the manufacture, sale, and use of antimicrobials, and ensuring the quality of medicines. The Ministry of National Food Security & Research (NFS&R) and provincial livestock and agriculture departments lead interventions in veterinary, agriculture, and aquaculture sectors, including biosecurity, vaccination, and reduction of antimicrobials as growth promoters. The Ministry of Climate Change and federal/provincial Environmental Protection Agencies (EPAs) address AMR risks in the environment, including water, waste management, and pesticide residue monitoring. Professional councils (PMDC, PVMC, PNC, Pharmacy Council) integrate AMR into professional education and training. Provincial and district health departments implement AMR, IPC, and stewardship programs at subnational and facility levels. Academia and research institutions contribute to AMR research, capacity building, and innovation, while WHO, FAO, and other development partners provide technical guidance, capacity support, and facilitate global reporting. Civil society, media, and community leaders are engaged to promote awareness, behaviour change, and community participation in AMR prevention efforts. Together, these stakeholders ensure a One Health, coordinated, and evidence-based approach to containing antimicrobial resistance in Pakistan.

7. Monitoring, Evaluation, and Learning (MEL) System

The monitoring and evaluation (M&E) of Pakistan's National Action Plan on Antimicrobial Resistance (NAP AMR 2.0) (2025-2028) follows a structured Results-Based Framework aligned with WHO guidelines. Governance is led by the National AMR Secretariat, supported by Technical Working Groups (TWGs) across One Health sectors. Key indicators track progress in governance, awareness, surveillance, infection prevention, antimicrobial use optimization, and research. Data will be collected annually or biennially, based on national and provincial priorities and reporting system through government reports, surveillance systems, and implementation reviews, with responsibilities assigned to relevant ministries and departments along with development partners. Baseline and target values will help to ensure measurable outcomes, such as increased regulatory measures, trained professionals, and improved surveillance etc. Regular reviews and stakeholder engagement enhance accountability, ensuring effective implementation and adaptive management of the NAP AMR 2.0 (Detailed M&E plan is annexed at annexture-2).

8. Implementation Roadmap and Way Forward

The implementation of Pakistan's NAP 2.0 will follow a phased approach to ensure systematic progress, institutional strengthening, and sustainable impact. In the foundational phase (short term, 1–2 years), the National Institute of Health (NIH), as the federal coordinating body, will focus on strengthening governance structures, operationalizing the Multistakeholder Intersectoral Steering Committee (MISC), formalizing Technical Working Groups, and enhancing the capacity of AMR focal points at federal and provincial levels. This phase will prioritize the integration of AMR/AMU data systems, the development of national guidelines, and the initiation of high-impact awareness campaigns. In the consolidation phase (medium term, 3–5 years), the focus will shift to expanding surveillance coverage across human, animal, and environmental sectors; implementing antimicrobial stewardship programs in tertiary and secondary care hospitals; integrating AMR into veterinary and environmental monitoring systems; and scaling up laboratory capacity for AMR diagnostics. NIH will coordinate implementation through regular MISC and TWG meetings, joint work planning with provincial health departments, and close collaboration with partner ministries, academia, and civil society to address intersectoral dependencies such as data sharing, laboratory networks, and joint capacity building. Resource mobilization will combine domestic budget allocations with external funding from development partners, leveraging project-based proposals aligned with NAP objectives. Monitoring and evaluation will track milestones at each phase, enabling mid-course corrections, documenting best practices, and ensuring alignment with the One Health approach to contain AMR in Pakistan.

References:

1. Alara, J.A. and O.R.J.I.D.-D.T. Alara, *An overview of the global alarming increase of multiple drug resistant: a major challenge in clinical diagnosis.* 2024. **24**(3): p. 26-42.

2. Taiwo, S.S.J.A.o.T.P., *The Rise of Global Antimicrobial Resistance: Impacts, Responses and Future Prospects in Nigeria.* 2025. **16**(1): p. 1-18.

3. Naghavi, M., et al., *Global burden of bacterial antimicrobial resistance 1990–2021: a systematic analysis with forecasts to 2050.* 2024. **404**(10459): p. 1199-1226.

4. Ikuta, K.S., et al., *Global mortality associated with 33 bacterial pathogens in 2019: a systematic analysis for the Global Burden of Disease Study 2019.* 2022. **400**(10369): p. 2221-2248.

5. Gheorghe, A.J.R.A.o.M. and Immunology, *THE NATIONAL-LEVEL ECONOMIC BURDEN OF ANTIMICROBIAL RESISTANCE-A REVIEW OF AVAILABLE DATA.* 2024. **83**(1).

6. Dat, V.Q.J.B.o., *Antibiotic use in public hospitals in Vietnam between 2018 and 2022: a retrospective study.* 2024. **14**(8): p. e087322.

7. King, L.M., et al., *Trends in US outpatient antibiotic prescriptions during the coronavirus disease 2019 pandemic.* 2021. **73**(3): p. e652-e660.

8. Sulis, G., et al (2020). Antibiotic prescription practices in primary care in low- and middle-income countries: A systematic review and meta-analysis Available from: (https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.1003139)

9. Mirha HT, Ali SH, Aamar H, Sadiq M, Tharwani ZH, Habib Z, Malikzai A. The impact of antibiotic resistance on the rampant spread of infectious diseases in Pakistan: Insights from a narrative review. Health Sci Rep. 2024 Apr 22;7(4): e2050. doi: 10.1002/hsr2.2050. PMID: 38655423; PMCID: PMC11035969

10. Global Antibiotic Resistance Partnership–Pakistan (GARP–Pakistan). (2018). Situation analysis report on antimicrobial resistance in Pakistan. Center for Disease Dynamics, Economics & Policy (CDDEP). Available from One Health Trust website

11. Saleem Z, Godman B, Azhar F, Kalungia AC, Fadare J, Opanga S, Markovic-Pekovic V, Hoxha I, Saeed A, Al-Gethamy M, Haseeb A. Progress on the national action plan of Pakistan on antimicrobial resistance (AMR): A narrative review and the implications. Expert review of anti-infective therapy. 2022 Jan 2;20(1):71-93.

12. Qamar FN, Yousafzai MT, Khalid M, Kazi AM, Lohana H, Karim S, Khan A, Hotwani A, Qureshi S, Kabir F, Aziz F. Outbreak investigation of ceftriaxone-resistant Salmonella enterica serotype Typhi and its risk factors among the general population in Hyderabad, Pakistan: a matched case-control study. The Lancet Infectious Diseases. 2018 Dec 1;18(12):1368-76.)

13. Dall C. Study: XDR typhoid in Pakistan carries added resistance genes. CIDRAP News. 2018 Feb 20. Available from: https://www.cidrap.umn.edu/typhoid/study-xdr-typhoid-pakistan-carries-added-resistance-genes

14. Bilal H, Khan MN, Rehman T, Hameed MF, Yang X. Antibiotic resistance in Pakistan: a systematic review of past decade. BMC infectious diseases. 2021 Mar 6;21(1):244.

15. Umair M, Walsh TR, Mohsin M. A systematic review and meta-analysis of carbapenem resistance and its possible treatment options with focus on clinical Enterobacteriaceae: thirty years of development in Pakistan. Heliyon. 2024 Apr 15;10(7)

16. Irshad, H., Zaheer, M. U., & Khan Bahadur, S. U. (2023, September 5). Antimicrobial Resistance Surveillance Pilot in Healthy Food Animals: Final report (Fleming Fund Country Grant—Pakistan). Ministry of National Food Security and Research, Government of Pakistan; DAI.

17. World Health Organization. One Health [Internet]. Geneva: World Health Organization; 2021 [cited 2025 Aug 16]. Available from: https://www.who.int/health-topics/one-health

18. Larsson, D.G. and Flach, C.F., 2022. Antibiotic resistance in the environment. Nature Reviews Microbiology, 20(5), pp.257-269.

19. Kaiser, R.A., Taing, L. and Bhatia, H., 2022. Antimicrobial resistance and environmental health: a water stewardship framework for global and national action. Antibiotics, 11(1), p.63.

20. Laroche, E., Petit, F., Fournier, M. and Pawlak, B., 2010. Transport of antibiotic-resistant Escherichia coli in a public rural karst water supply. Journal of Hydrology, 392(1-2), pp.12-21.

21. Zhang, X.X., Zhang, T. and Fang, H.H., 2009. Antibiotic resistance genes in water environment. Applied microbiology and biotechnology, 82, pp.397-414.

22. Anjum, M.F., Schmitt, H., Börjesson, S., Berendonk, T.U., Donner, E., Stehling, E.G., Boerlin, P., Topp, E., Jardine, C., Li, X. and Li, B., 2021. The potential of using E. coli as an indicator for the surveillance of antimicrobial resistance (AMR) in the environment. Current Opinion in Microbiology, 64, pp.152-158.

23. O'Neill, J., 2016. Tackling drug-resistant infections globally: final report and recommendations.

24. World Health Organization, 2021. WHO integrated global surveillance on ESBL-producing E. coli using a “One Health” approach: implementation and opportunities. World Health Organization

25. Hart, A., Warren, J., Wilkinson, H. and Schmidt, W., 2023. Environmental surveillance of antimicrobial resistance (AMR), perspectives from a national environmental regulator in 2023. Eurosurveillance, 28(11), p.2200367.

26. World Health Organization. People-centred approach to addressing antimicrobial resistance in human health: WHO core package of interventions to support national action plans. Geneva: World Health Organization; 2023 Oct 19.

27. World Health Organization. Addressing gender inequalities in national action plans on antimicrobial resistance: Guidance to complement the people-centred approach. Geneva: World Health Organization; 2024 Sep 16.

28. Schröder, W., Sommer, H., Gladstone, B. P., Foschi, F., Hellman, J., Evengard, B., & Tacconelli, E. (2016). Gender differences in antibiotic prescribing in the community: A systematic review and meta-analysis. Journal of Antimicrobial Chemotherapy, 71(7), 1800–1806. https://doi.org/10.1093/jac/dkw054

29. Patel J, Harant A, Fernandes G, Mwamelo AJ, Hein W, Dekker D, Sridhar D. Measuring the global response to antimicrobial resistance, 2020–21: a systematic governance analysis of 114 countries. The Lancet Infectious Diseases. 2023 Jun 1;23(6):706-18.

30. Qiu Y, Ferreira JP, Ullah RW, Flanagan P, Zaheer MU, Tahir MF, Alam J, Hoet AE, Song J, Akram M. Assessment of the implementation of Pakistan’s national action plan on antimicrobial resistance in the agriculture and food sectors. Antibiotics. 2024 Feb 22;13(3):206.

ANNEXURES

ANNEXURE-1: SWOT analysis

Human Health

STRENGTHS	WEAKNESSES
▪ Existing NAP as a guiding document for NAP 2.0 ▪ Multisectoral coordination mechanism. ▪ PC-1 developed for National AMR&IPC Program since 2020. ▪ Biannual AMR newsletter, covering all three sectors. ▪ AMR Surveillance Strategies for Human Health (2024). developed and disseminated by NIH. ▪ Quality assured network of laboratories in place. ▪ National data of AMR surveillance from 26 labs, since 2017. ▪ National AMC data reporting in GLASS from 2023. ▪ Substantial MDR-TB data available. ▪ HAI's surveillance piloted in 6 tertiary care hospitals. ▪ Drug Act 1976 and DRAP Act 2012 in place. ▪ 4 out of 11 DTLs WHO pre-qualified. ▪ Quality control boards for control of spurious and falsified medication. ▪ National IPC Guidelines in place. ▪ National TWG on IPC and Provincial committees in place. ▪ Public Health Act on IPC. ▪ Extensive HCWs training during COVID-19 ▪ Antimicrobial stewardship program established in few private hospitals. ▪ National Guidelines for hospital waste management in place ▪ Few private hospitals exhibit optimal compliance with cleaning and sterilization	▪ NAP lacks mechanisms for governance and monitoring of long-term behaviour change. ▪ Provincial action plans not yet developed ▪ Weak coordination between national and provincial levels, and between sectors too. ▪ No Standardized surveillance approach. ▪ No regular Surveillance system in environment sector ▪ Culture testing preferred in cases with treatment failure for improved representativeness of data. ▪ Adoption of standard MDROs list needed. ▪ No SOPs for MDROs management. ▪ Lack of national antibiogram and national AWaRE list. ▪ No standard National Treatment Guidelines for antimicrobials use present. ▪ Lack of infrastructure to implement an electronic record of antibiotic prescription and retail invoice. ▪ Stewardship programs in only few private sector hospitals. ▪ No specific regulations for growth promoters, medicated feeds, and pesticides ▪ Water chlorination required to ensure safe water supply. ▪ Suboptimal regulation of private sector. ▪ Lack of standardization in sterilization services ▪ Lack of AMR topics in medical and paramedical curriculum.
OPPORTUNITIES	**THREATS**
▪ Collaborative projects for AMR surveillance under One Health umbrella. ▪ Expansion of AMR, NEQAS, and AMC surveillance sites and strengthening on data reporting. ▪ Provincial Health Care Commissions (Punjab, Sindh, KP, Baluchistan, and ICT) are in place and can be leveraged.	▪ Lack of sustainable indigenous resources and funds for smooth execution of AMR program. ▪ Non-availability of dedicated, domestic funding for AMR. ▪ Shifting of focus and political will to other competing political and economic priorities. ▪ High cost for existing and new diagnostics and limited access to expensive diagnostics.

- Engaging NGOs and civil societies for community awareness and education on AMR.
- Incorporate people centred and gender focused lens.
- Using new media platforms (social media, podcast etc.) for awareness, education, and training of AMR.
- Politicians and policy makers can be further sensitized and continually engaged to improve political ownership and governance of the AMR agenda.
- Enhancing the scope of AMR research by engaging different academic institutes.
- Highlighting National AMR success stories at international level to seek political interest.
- Development partners supporting the public sector to strengthen the AMR surveillance network.
-

- Interests of professionals and pharmaceutical industry may not align to AMR agendas.
- Reluctance in data sharing due to devolution of health sector.
- Time-limited and project-focused funding can affect long term planning.
- Shrinking fiscal space.
- Import of substandard equipment and supplies.

Animal Health

STRENGTHS	WEAKNESSES
▪ NAP 2.0 includes most livestock-related activities recommended by WOAH and FAO. ▪ National AMR surveillance strategies for healthy and diseased animals, aquaculture, and food-animal-environment are developed and partially implemented. ▪ Well-established National Reference Labs for veterinary (NVL) and poultry (NRLPD) sectors with Quality Management Systems. ▪ Enrolment of AMR sites with quality assurance (NEQAS). ▪ Coordination mechanism established at the national level. ▪ The National Laboratory Networking Group for the animal health sector has been established and notified by MoNFS&R. ▪ AMR/AMU surveillance data is shared with the AMR Secretariat and published in the AMR newsletter at NIH. ▪ Pakistan has enrolled in InFARM (FAO) and regularly submits AMU/C data to Animuse (WOAH). ▪ Seminars, competitions, and media campaigns and farmers engagement during World Antimicrobial Awareness Week. ▪ National veterinary laboratory policies and guidelines are developed. ▪ Antimicrobial use prescription guidelines for veterinarians in Pakistan developed. ▪ Vaccines for key animal diseases available. ▪ AMR surveillance dashboard has been developed for the KP and Sindh provinces.	▪ Lack of surveillance strategies for provinces. ▪ Effective multisector coordination. ▪ Lack of sensitization and harmonization of SOPs among public and private laboratories. ▪ No legislation to govern over-the-counter sale of antimicrobials in the animal health sector. ▪ Updated veterinary curriculum regarding AMR not available. Veterinarians lack adequate training. ▪ Stewardship programs lacking. ▪ Lack of effective regulations for antibiotics used as growth promoters and in medicated feed. ▪ Insufficient AMR research and training programs. ▪ Unregistered medicines and falsified antimicrobials used extensively at the farm level. ▪ There is a lack of evidence-based research for effective interventions and therapeutics as alternatives to antimicrobials.
OPPORTUNITIES	**THREATS**
▪ The Animal Health Act 2022 has been submitted to the cabinet for approval. ▪ Collaborative projects for AMR surveillance (e.g., Tricycle and CRE projects) implemented at national and provincial levels under the One Health umbrella. ▪ AMR and prudent antimicrobial use incorporated into para-veterinary and farmer training programs.	▪ Farmers and veterinarians may prioritize economic gains over responsible antimicrobial use. ▪ Inadequate enforcement of antimicrobial use regulations at the provincial level could hinder progress.

- Established health and livestock infrastructure can support the surveillance system.

Environment Sector

STRENGTHS	WEAKNESSES
▪ Technical Working Group (TWG) for AMR surveillance strategy has been constituted. ▪ Under Pak- EPA, the Central Laboratory of Environmental Analysis and Networking (CLEAN) for microbial analysis of environmental samples i.e. Water (Drinking, waste, surface, ground, stream and reservoirs) and air present. ▪ The CLEAN lab has well qualified microbiologists and technical staff. ▪ Pakistan Council of Research in Water Resources (PCRWR) is having a well-established laboratory (National Water Quality Laboratory-NWQL) for detection of pathogens in water. ▪ Facilities of Culture sensitivity available at PCRWR molecular lab. ▪ Executing One health collaborative projects as tricycle. ▪ PCRWR has necessary infrastructure/equipment for monitoring of antibiotics residues.	▪ Lack of policy guidelines for prevention of antibiotics pollution. ▪ No standardized framework/strategy for environmental AMR surveillance in drinking water, wastewater. ▪ Non-existence of designated national reference laboratory for environmental surveillance of AMR ▪ The lack of funds and advanced laboratories for AMR monitoring (Pak-EPA and Provincial EPAs). ▪ The scarcity of trained human resource and financial constraints at PCRWR laboratories.
OPPORTUNITIES	**THREATS**
▪ Implementation of Environmental Samples Rules, 2001 established under Section 31 of PEPA act 1997. ▪ Broadening the scope of research on microbiological analysis of environmental samples. ▪ Designation of environmental AMR surveillance sites. ▪ Enrolment of environmental AMR surveillance sites to NEQAS, and national antimicrobial surveillance system. ▪ Planning of similar One health projects as tricycle and CRE. ▪ Monitoring and reporting on antibiotics residues.	▪ Political instability, governance ▪ Non-sustainability of resources (financial and trained human resource) ▪ Climate change/ global warming ▪ Catastrophes like flooding, drought. ▪ Ever increasing human population.

ANNEXURE-2: M&E Plan

[Pakistan] [NAP version no2.] [NAP 2025-2028] Results Based M&E Framework										
SN	**Type of Indicator (Result)**	**Activities**	**Indicator (title/small description)**	**Data source (including collection methods)**	**Frequency of data collection**	**Responsibility (key entity, if there are more than one)**	**Assumptions**	**Baseline**	**Overall Target**	**Actual/ achievement**
Objective 1: Enhance governance, coordination, and regulatory frameworks for AMR										
1	Long term outcome	Advocacy for regulatory oversight for enforcement of Drug Act 1976 and DRAP Act 2012; Legislations to include pesticides/fungicides/insecticides; Monitor pesticide residue	Number of legal or regulatory or policy measures taken based on the recommendations of SC	Government circulars/notifications on legal regulatory or policy measures	Annually	DRAP/ Ministry of NHSR&C, NFS&R, Health & Livestock Provincial Departments, Ministry of Law & Justice Division		0	4 legal or regulatory measures	Improved regulation of antimicrobial use in all relevant sectors Decrease in the inappropriate use

		and growth promoters								
2	Short/ medium outcome	Inclusion/integration of AMR in other programme plans and strategies (Health systems, immunization, TB, HIV, malaria, pandemic preparedness etc.)	Number of programs (e.g., immunization, XDR Typhoid, TB, HIV, malaria, NTDs etc.) that incorporate AMR in their reports	Review of program reports that incorporate AMR	Annually	MoNHSR&C, NIH		0	4 programs	Improved cross-collaboration
3	Short/ medium outcome	Mapping of AMR financing at national/provincial levels	Percentage change in allocation of government budget towards AMR initiatives at the national and provincial levels	Annual tracking of government budgets allocated to AMR-related activities at the national and provincial levels	Annually	MoNHSR&C Provincial Health Departments		PC-1 approved for 3 years, extended twice	At least 5% annual increase based on preceding year's	Sustainable funds for execution of National Action Plan 2.0, Increased awareness and targeted allocation of resources for public decision making.

									allocation	
4	Output	Revision of multistakeholder National AMR Steering Committee to include all relevant stakeholders; Conduct regular (annually) meeting of National AMR steering committee and provide recommendations for improvement of policies and legislation based on Committee monitoring and evaluation reports and surveillance data	Multistakeholder National AMR Steering Committee formally constituted with clear TORs and operationalized, ensuring regular meetings are held in alignment with the TORs	Official government notification, meeting minutes to confirm the operational status of the SC	Annually	MoNHSR&C NIH		SC exist and 3 SC meetings held	Notify revised MSC4 MSC meeting (annual)	Improved AMR coordination and collaboration. Better coordination between national and provincial AMR Secretariat cell and focal persons
5	Output	Constitution of national/One Health Technical	Number of thematic technical working groups (TWGs)	Official government notifications, meeting minutes, and the ToRs	Bi-annually	Ministry of NHSR&C; NFS&R &		No TWGs exit	Notify 4 thema	Sustained and strategic AMR governance.

		Working Groups (TWGs) for Awareness & education, AMR surveillance, IPC, AMU, AMS, and Research with functionalization & clear ToRs	constituted with clear TORs and made functional at the national level	to verify the constitution and functionality of TWGs		Climate Change, MoWR, Fed & Provincial EPAs			tic TWGs 32 (2 meetings per TWG per year)	Enhanced coordination and collaboration among sectors
6	Output	Strengthening the capacity of the National AMR secretariat with defined TORs and replication at provincial level; Mapping of AMR financing at national/provincial levels	Number of National and Provincial AMR Secretariats established and/or strengthened, as evidenced by government notification, availability of dedicated staff with defined TORs, and allocation of government budget	Government circulars, appointment letters of dedicated staff with TORs, and govt budget documents		Ministry of NHSR&C, NFS&R & Climate Change		4 (1 national, 3 provincials in KP, GB, and Sindh)	3 (Punjab, Baluchistan, AJK)	Enhanced AMR coordination for implementation and information sharing. Increased implementation of AMR activities at all levels
7	Output	Update and enforce implementation of Prescription monitoring & drug sales in all relevant sectors;	Number of monitoring visits conducted related to prescription monitoring, drug sales, and pesticide residues	Monitoring reports and monitoring data	Bi-annually	DRAP PRAs HCCs NIH		0	32 (4 visits per year)	Improved regulation of antimicrobial use in all relevant sectors Decrease in the inappropriate

		Monitor pesticide residue and growth promoters								use. Improved pesticide residue monitoring at high-risk areas
8	Output	Meeting for high-level engagement and Advocacy for federal/provincial secretaries, DGs, administrative heads, and political leaders to seek commitment; Inclusion/integration of AMR in other programme plans and strategies (Health systems, immunization, TB, HIV, malaria, pandemic preparedness etc.)	Number of advocacy materials (e.g., presentations, briefs, information products, reports, newsletters) developed and disseminated	Advocacy toolkits, presentations, and briefs shared with stakeholders	Biannually			NIH Newsletter disseminated nationally/provincially	60 (12 per year)	Strengthened multisectoral/ One Health collaboration. Improved cross-collaboration Commitment from political and administrative leaders

Objective 2: AMR Education and Awareness										
1	Impact	Development of National strategic plan for communication on AMR; Advocacy and IEC campaign for behaviour change on misuse of antimicrobials for prescribers and consumers; Conduct awareness campaigns aligned with the World AMR Awareness Week and other health days (such as Clean Hands, hand hygiene, patient safety)	Percentage change in the prevalence rate of AMR in healthcare settings and the community	Laboratory surveillance data and healthcare facility reports on AMR trends	annually	MoNHSR&C, NIH, Hospital administration				
2	Long term	Include basics of AMR prevention in high-school	Number of educational institutions that	Curriculum documentation and reports from	need based	HEC, FBISE, Provincial boards,		AMR topic not	Inclusion of AMR/I	Improve knowledge and awareness

	outcome	curricula. Include content on AMR/IPC in college/university curriculum, Develop/adapt and include AMR in professional education (preservice) and training programs for HCPs, environment professionals, veterinarians and agricultural/aquaculture extension workers and officers	incorporate AMR prevention and IPC content into their curricula	educational institutions to confirm the inclusion of AMR topics in high school and college/ university programs		Ministry of NHSR&C, Education, Depts. of Education, PMDC; PVMC; PNC; Pharmacy Council		included in curricula yet	PC content in school, college and university curricula	among school, college and university students leading to behavioural change practices, Increased availability of trained professionals/skilled professionals
3	Short/medium outcome	Education and training on antimicrobial stewardship programmes for healthcare professionals; Advocacy and IEC campaign for	Percentage of trained healthcare professionals adhering to antimicrobial stewardship practices	PPS and compliance audits on antimicrobial stewardship	annual	Ministry of NHSR&C, professional councils		few private sector hospitals are implementing ASP	Functional ASP in 30-40% of major tertiary care	Better use of antibiotics

		behaviour change on misuse of antimicrobials for prescribers and consumers						program	hospitals	
	Short/medium outcome	Develop/adapt and include AMR in professional education (preservice) and training programs for HCPs, environment professionals, veterinarians and agricultural/aquaculture extension workers and officers; Refresher training of practitioners in public & private HCFs including hospitals, community (Health and	Percentage of trained professionals demonstrating improved knowledge and skills in AMR practices	Evaluated through pre- and post-training assessments and feedback surveys collected from participants after training sessions	biennial	Ministry of NHSR&C, NFS&R, Provincial Health & Livestock Departments, WHO		no AMR specific training modules developed yet	30% HCPs trained on modules	Improved knowledge and better practices Standardization of practices

		Veterinary sectors)								
4	Output	Conduct awareness campaigns aligned with the World AMR Awareness Week and other health days (such as Clean Hands, hand hygiene, patient safety) Advocacy and IEC campaign for behaviour change on misuse of antimicrobials for prescribers and consumers. Adapt, develop, and disseminate AMR awareness-raising materials, including at community level, targeting the general public, health professionals	Number of awareness and advocacy campaigns conducted to promote AMR awareness and behaviour change	Campaign reports and attendance records to quantify the number of campaigns and evaluate engagement levels	Annually	NIH, Ministry of NHSR&C, NFS&R, Provincial Health & Livestock Departments, WHO, MoCC, Fed and provincial EPAs, DRAP, DOH, Ministry of religious affairs		WAAW commemorated every year at federal level, and in few provinces	country wide celebration	Improved knowledge and awareness among the public and district health committees, Improved behaviour and social norms in prescribers and consumers regarding misuse of antibiotics

		(incl. pharmacists, nurses, medical doctors) and policy-makers; Engaging communicating leaders/religious clan, media influencers and civil societies in AMR awareness-raising campaigns.								
5	Output	Incorporation of AMR related questions into existing national surveys, DHS, and readiness assessments	Number of national surveys and assessments that include AMR-related questions	Review of survey instruments and reports from national health authorities to confirm the inclusion of AMR questions in national surveys and assessments		NIH PSB DOH Development partners				Improved awareness and access to data on AMR
6	Output	Education and training on antimicrobial stewardship programmes for healthcare professionals	Number of healthcare professionals trained on antimicrobial stewardship	Training modules, training attendance records, and training reports	annual	Health departments, professional councils, hospitals		zero level, no training modules	training modules developed and	Rational use of antimicrobials

								develo ped	trainin gs condu cted	
7	Output	Develop/adapt and include AMR in professional education (preservice) and training programs for HCPs, environment professionals, veterinarians and agricultural/aqua culture extension workers and officers; Development of customized training modules on AMR for One Health professionals; Refresher training of practitioners in public & private HCFs including hospitals,	Number of professionals trained on AMR in health, veterinary, environment, and agriculture sectors using customized training modules	Training modules, training attendance records, and training reports		Ministry of NHSR&C, NFS&R, Provincial Health & Livestock Departments, WHO				Improved knowledge and skills. Standardizatio n of practices

		community (Health and Veterinary sectors)								
Objective 3: Strengthen AMR surveillance across sectors to generate quality data for policy actions										
1	Long term outcome	Strengthening integrated AMR surveillance; Integrated AMR surveillance capacities	Percentage change in the prevalence rate of AMR in healthcare settings and the community(impact)	Laboratory surveillance data and healthcare facility reports on AMR trends						
2	Long term outcome	Strengthening integrated AMR surveillance; Genomic surveillance and healthcare-associated infections surveillance	Percentage change in AMR-related morbidity and mortality rates in the population (JEE score as impact (rephrase --)	Health department records and mortality statistics, measured by the change in rates over time						
3	Short/medium outcome	Integrated AMR surveillance capacities	Percentage of reported AMR cases from integrated surveillance systems	Surveillance reports from coordinating centres, measured by comparing pre- and post-intervention reporting rates	annual	NIH, NVL, EPA, PCRWR, provincial health		Human and animal health reporting separat	all sectors reporting surveil	

						depts, sentinel labs		ely, environment at 0	lance data	
4	Short/medium outcome	Strengthening EQA/NEQAS; Development of Lab diagnostic AST SOPs according to GLASS/bacteriology/mycology protocols and international standards (CLSI; EUCAST)	Percentage/number of laboratories/AMR sentinel sites achieving satisfactory scores in EQA/NEQAS assessments	EQA/NEQAS assessment reports, measured by calculating the percentage of Amr sentinnel sites that obtain satisfactory results in external quality assessments conducted within a specified period	annual	NIH, NVL, provincial health depts, sentinel labs		40 laboratories enrolled for NEQAS	all AMR sentinel sites enrolled in NEQAS generating satisfactory results	Enhanced quality assurance. Improved data quality
5	Short/medium outcome	HAI Surveillance	Number of HAIs reported and monitored over time	Hospital infection control data, measured by the count of HAIs tracked through hospital records	monthly	NIH, provincial health depts, hospital		Piloted in 6 tertiary care hospitals	100 tertiary care hospitals	Improved HAI surveillance Reduced HAI incidence, mortality Reduced length of stay and cost of care
6	Output	National & provincial AMR surveillance	Number of provincial AMR surveillance coordination centres/	Government notifications by relevant health departments	annual	Ministry of NHSR&C, NFS&R, CC/		NIH from human	one health AMR	Robust AMR Surveillance Functional

		coordination centres in all sectors (Health, Veterinary, Agriculture & Environment)	mechanism established across One Health sectors	across one health sectors at the provincial levels		EPA, Ministry of water resources, Provincial Health & Livestock Departments, NIH		health & NVL from animal health	surveillance coordination centres notified and functional in all provinces	national & provincial coordinating centres Improved AMR data
7	Output	Development of Lab diagnostic AST, SOPs according to GLASS/bacteriology/ mycology protocols and international standards/ (CLSI; EUCAST). National, provincial, and regional reference/ referral labs in all sectors	Number of provincial reference laboratories across One Health sectors accredited and operational as per international standards	Accreditation documents and operational reports, measured by the count of labs certified to operate according to national standard	annual	Ministry of NHSR&C, NFS&R, Provincial Health & Livestock Departments, Ministry of climate change, Ministry of water resources		NIH (ISO 15189), NVL, and NRLPD (ISO 17025) accredited	all provincial and regional reference labs notified and accredited	Improved quality control in surveillance Improved AMR data

8	Output	Sector specific AMR surveillance plans in alignment with national strategy for all sectors	Number of sector-specific AMR surveillance plans/strategies developed at the national and provincial levels	Sector-specific AMR surveillance plans/ strategies from relevant govt departments	annual	Ministry of NHSR&C, NFS&R, CC/EPA, Provincial Health & Livestock Departments, WHO, Ministry of climate change, Ministry of water resources		Human and animal health (healthy and diseased animal, livestock) surveillance strategies developed	strategy for environment and aqua culture, agrifood and for provinces available	Robust integrated AMR surveillance Functional AMR surveillance Strategy Lists of Priority MDRO pathogens
9	Output		Percentage of reference laboratories adopting integrated surveillance methodologies across OH sectors	Surveys and laboratory reports, measured by the percentage of laboratories confirming the adoption of integrated approaches(delete)						
10	Output	HAI Surveillance	National HAI surveillance protocol/plan developed, disseminated and public sector	Hospital infection control reports, measured by the count of hospitals reporting adherence to HAI protocols	annual	Ministry of NHSR&C, NIH		piloted in 6 tertiary care hospitals	plan implemented in 100 tertiar	Improved HAI surveillance Reduced HAI incidence, mortality Reduced length

			hospitals across the country implementing HAI surveillance protocols.					across Pakistan	y care hospitals	of stay and cost of care
11	Output	Strengthening EQA/NEQAS	Percentage of AMR sentinel sites participating in EQA/NEQAS programs	EQA participation records, measured by the percentage of AMR sentinel sites enrolled in external quality assessment programs	annual	NIH, NVL, provincial health depts, sentinel labs		28 AMR sentinel sites enrolled with NEQAS	Inclusion of all new AMR sentinel sites in NEQAS	
	Output	AMR Genomic surveillance for selected priority pathogens at NRLs	number of national reference labs in all sectors performing genomic surveillance of priority pathogens	genomic surveillance project reports, published papers,	annual	Ministry of NHSR&C, NIH, NFS&R, CC/EPA,		capacity in Human health sector	All national reference labs equipped and functional	AMR Genomic surveillance Biobank /repository of priority pathogens of concerns

Objective 4: Reduce infection through effective water, hygiene, and sanitation, vaccination, and infection prevention and control (IPC) measures										
1	Long term outcome	Functional IPC teams with dedicated focal persons for implementing IPC in tertiary care public hospitals; Implementation of national IPC guidelines; Strengthen the enforcement of isolation protocols/high containment rooms in hospitals	Number of HCFs reporting reduction to HCAIs	National AMR surveillance reports						
2	Long term outcome	Regular mapping and monitoring of clean and safe water supply systems in HCFs; Water treatment and quality monitoring	Percentage of healthcare facilities and communities implementing improved water sanitation and hygiene practices	Public health reports and environmental health assessments	annual	WASA/ local gov WASA/ Municipality / District Governments /DOH, EPA -Federal and Provincial PCRWR				Improved water supply Reduced infections

3	Short/medium outcome	Functional IPC teams with dedicated focal persons for implementing IPC in tertiary care public hospitals; Implementation of national IPC guidelines	Percentage of healthcare facilities compliant with national IPC guidelines	Facility assessment reports and IPC compliance evaluations	annual	Ministry of NHSR&C, NFS&R, Provincial Health				Standardized IPC practices implemented nationwide, leading to improved infection control outcomes. Infections in humans reduced.
4	Short/medium outcome	Implementation of biosafety biosecurity guidelines in livestock, poultry, and aquaculture sectors; Prevention of zoonotic and foodborne infections transmission from animals to humans	Percentage of livestock and aquaculture farms adhering to safe production and biosecurity standards	Inspection reports from agricultural and animal health authorities	annual	Ministry of NFS&R, Livestock Departments, Federal and Provincial EPA's, Local Governments				Quality vaccines available Improved IPC and waste management Protection of health workforce Prevention of spread of transmission. Safe Slaughtering & milk practices Prevention of spread of

										infection to humans
5	Short/medium outcome	Prevention of zoonotic and foodborne infections transmission from animals to humans; Development & Implementation of Safe production/hygienic standards of food from animal origin	Number of zoonotic and foodborne disease control measures implemented in the animal health and food sectors	Zoonotic disease surveillance reports and food safety inspection data	annual	Ministry of NFS&R Agriculture & Livestock Departments, FAO, WHO Food Safety Authority				Prevention of transboundary disease transmission Improved food storage conditions Reduced spread of infections.
6	Output	Strengthening national IPC unit in the human health sector with dedicated budget; Establishing national biosafety biosecurity Committee/TWG for livestock,	Number of national and provincial IPC units and biosafety/biosecurity committees/TWGs formally established (measured by dedicated staff, defined TORs, and dedicated budget)	Government notifications and meeting minutes will be reviewed to verify the establishment of units and committees	annual	Ministry of NHSR&C, Provincial Health & District Management Livestock Departments		NIH designated as National focal point for IPC	Functional and regional IPC and biosafety units in all provinces and	Functional provincial and regional IPC units, biosafety/ biosecurity Committee at the national level.

		fisheries and aquaculture sectors under AMR IPC steering committee; Establishment of provincial/regional biosafety biosecurity Committees							regions	
7	Output	Functional IPC teams and committees with focal persons in tertiary care public hospitals. Availability of IPC trained healthcare workers in healthcare facilities. Availability of infectious diseases (ID) professionals in every teaching hospital.	Number of healthcare facilities with trained IPC teams and focal persons deployed	Facility records and HR rosters, training records	annual	Ministry of NHSR&C, NFS&R, Provincial Health departments.		IPC teams/ committees in few private tertiary care hospitals	IPC teams /committees with competent staff established in 30% of tertiary care hospitals	Improved IPC practices in healthcare facilities. Enhanced capacity to manage and control infections within teaching hospitals. Reduced HAIs.

8	Output	Development, revision/dissemination, and implementation of national IPC guidelines. Functional IPC teams with dedicated focal persons for implementing IPC in tertiary care public hospitals; Strengthen the enforcement of isolation protocols/high containment rooms/areas in hospitals.	Number of tertiary care public hospitals implementing national IPC guidelines and isolation protocols	Hospital compliance audits and IPC implementation reports	biennial	Ministry of NHSR&C, NIH, NFS&R, Provincial Health departments, hospitals		National IPC guidelines developed in 2020	Revision and dissemination of National IPC guidelines	Standardized IPC practices implemented nationwide, leading to improved infection control outcomes. Infections in humans reduced.
9	Output	Development, revision/dissemination, and implementation of farm biosafety/ biosecurity guidelines. Implementation of biosafety biosecurity	Number of biosafety and biosecurity guidelines developed and disseminated for livestock, poultry, and aquaculture sectors	Sectoral reports and field inspections	annual	Livestock Departments /DOH, EPAs.				Infections in animals reduced.

		guidelines in livestock, poultry, and aquaculture sectors;								
10	Output	Regular mapping and monitoring of clean and safe water supply systems in HCFs; Strengthen sterilization and disinfection/CSSD as per standards (WHO/CDC) appropriate to levels of care	Number of healthcare facilities regularly monitored for clean and safe water supply systems	Monitoring reports and water quality assessments from healthcare facilities	annual	Ministry of NHSR&C, DOH/ Provincial allied departments, WASA and local government (CDA in Isb)				Improved hygiene and IPC in HCFs Improved access to clean water
11	Output	Improving IPC and waste management practices	Number of healthcare facilities compliant and implementing healthcare waste management practices	Hospital waste management records. Number of assessments visits /no of assessment report	annual	Ministry of NHSR&C, NFS&R, Health & Livestock Departments, Federal and provincial EPA's, Academia				Improved healthcare waste management

Objective 5: Optimize the use of antimicrobial medicines in human and animal health										
1	Long term outcome	Development of AMU surveillance plan at national and provincial levels across sectors. Regular monitoring of antimicrobial use at national and provincial levels across sectors	Number of sectors (human, veterinary, agrifood, aqua, environment) annually regularly contributing AMU data to national databases	National AMU database logs, sector-specific data collection reports; percentage calculation based on sectoral data submission	Annually	DRAP (National data base), Animal husbandry commission, Provincial Governments MoNFS&R, Health & Livestock Departments,		Isolated data available, data base currently under development (DRAP)	Data base developed and functional, receiving data from all sectors regularly	Regular submission of actual amc/use data from all sectors. Better understanding of antimicrobial use /trends of antimicrobial utilization patterns
2	Long term outcome	Development/adaptation antimicrobial stewardship implementation guidelines at national level.	Percentage of tertiary care and primary care facilities adhering to antimicrobial stewardship guidelines	Compliance audits of stewardship programs at tertiary and primary care levels; percentage of facilities in compliance with guidelines	every three years	DRAP, IHRA, PROVINCIAL Health care commissions, NIH		Zero status	Major tertiary care hospitals	Improved antimicrobial stewardship and better use of antibiotics at HCFs.
3	Short/medium outcome	Standardize record keeping mechanism for antimicrobial sale and use at all levels	Proportion of licenced retail outlets (Pharmacies, Wholesalers/distributers, medical store) (medical/veterinary/	inspection reports and audit documents; percentage of standardized systems in place as per inspections	On the basis of renewal of licence (every two years)	Drug Control administration, DHO ICT		manual data maintenance of sale only,	data of prescriptions agains	Better data on antimicrobial sales Better monitoring of

		(pharmacies, medical & veterinary hospitals/ GPs)	agriculture) implementing standardized record-keeping for antimicrobial sales and use					Drug sales rules are in place	t sale of antimicrobials available. 25-30% Licenced retail outlets with Standardized record-keeping for antimicrobial sales and use.	antimicrobial sales
4	Short/medium outcome	Regular monitoring of antimicrobial use at HCFs	Percentage of healthcare facilities conducting regular monitoring and reporting of	Healthcare facility AMU reports: percentage of facilities regularly	Annually	DRAP, provincial departments of health, private		amu data from 50-60% public	100% healthcare facilities	Reporting of AMU data to GLASS. Consumption pattern and

			antimicrobial use data	submitting monitoring data		health care facilities, any other administrative body		healthcare facilities reported in 2024 on excel sheets	reporting data via electronic system	trend available at HCF level Audit and feedback to improve use
5	Short/medium outcome	Capacity building on generating and use of data at national and provincial levels across sectors	Percentage of trained personnel applying AMU data generation and analysis techniques in their respective sectors	Post-training evaluations, monitoring reports from trained sectors; percentage of trained personnel using new skills, % of trained personnel reporting data as per WHO methodology	Annually	DRAP, provincial departments of health, private health care facilities, any other administrative body		No Trainings conducted so far for health care facilities on data generation and analysis	AMU data reporting as per WHO methodology from trained HCF	Standardized amu data Available. Enhanced capacities for generating quality data. Better use of data
6	Output	Review and update Access, Watch and Reserve (AWaRe)	Number of updated rules, regulations, and guidelines on antimicrobial quality	Official government publications and notifications of revised regulations; count of	As required	DRAP, NIH, Provincial departments of health,		Certain rules and regulat	Guidelines for priorit	Published and notified Guidelines for prioritized

		& National essential medicines list (EML) supported by local data. Improving availability, quality, and affordability of antimicrobials.	testing, prescribing, sales, use published and national aware list	published updates notification of rules and regulations		Pakistan medical association		ions are in place. Sales rules, rules for assuring quality of drugs	ized quality testing of antimicrobials, prescription /treatment are required to be formulated, harmonization of sales rules	quality testing of antimicrobials, prescription/treatment and harmonized sales rules resulting in improved use Improved availability and affordability of quality assured antimicrobials at healthcare facilities
7	Output	Strengthening of quality testing facilities testing laboratories (DTLs) for antimicrobials	Number of quality testing facilities for antimicrobials strengthened (e.g., with updated equipment, trained staff)	Government records/reports and facility assessments; count of facilities with new infrastructure or personnel improvements, number	Biennial	DRAP, provincial departments of health		6-7 labs are WHO prequalified	50-60% Labs to be iso certified	Improved quality of antibiotics

				of accredited drug testing labs						
8	Output	Development of AMU surveillance plan at national and provincial levels across sectors	Number of national and provincial AMU surveillance plans/strategies developed across human, veterinary, agrifood, environment, and aqua sectors	National/provincial surveillance plans/ strategies, and official government notifications; count of approved plans across sectors	annual	DRAP, MONFS&R, MoNHSR&C, MOCC, AHC, Provincial health. Departments		AMU surveillance plan for human health developed	AMU one health surveillance plan	AMU surveillance plan continuously monitored, evaluated, and improved. Better data on antimicrobial use
9	Output	Capacity building on generating and use of data at national and provincial levels across sectors	Number of personnel trained on generating and using AMU data at national and provincial levels across sectors	Training completion reports, attendance sheets; count of trained individuals.	biennial	DRAP/ Ministry of NHSR&C, NFS&R, Health & Livestock Departments,		No Trainings conducted so far for health care facilities on data generation and analysis	AMU data reporting as per WHO methodology from trained HCF	Enhanced capacities for generating quality data. Better use of data

10	Output	Regular monitoring of antimicrobial use at national and provincial levels across sectors	Number of sectors (human, veterinary, agrifood, and aqua) producing regular monitoring reports (biannually or annually) on antimicrobial use at the national and provincial levels	Government records/reports on AMU; Number of sectors producing regular reports	Annually (human & animal)	DRAP, MONFS&R, MoNHSR&C, MOCC, AHC, Provincial health. Departments		Reports from a few sectors available (DRAP, AHC)	Standardized AMU DATA FROM human and animal health sector, initiating the data collection in environment sector	Regular annual reports available from all Possible sectors
11	Output	Development of facility specific antibiotic use guidelines for tertiary care	Number of tertiary care hospitals with facility-specific antibiotic use guidelines in place in accordance with aware and local antibiogram	Hospital records and reports; count of hospitals that have developed and implemented guidelines	Biennial	Ministry of NHSR&C, NFS&R, Health & Livestock Departments, WHO, Health Care Commission		No national standard treatment guidelines	National guidelines available as per antibiogram	Better treatment protocols Appropriate use of antibiotics

						s/private sector		availabl e	and aware	
11	Output	Programme for appropriate antibiotic use at the Primary care.	Number of primary care facilities with programs for promoting appropriate antibiotic use	Primary care facility reports, health department audits; count of facilities implementing appropriate use programs	Biennial	Ministry of NHSR&C, Departments, WHO, Health Care Commissions/private sector/professional associations		ZERO	25-30% actively implementing the program	appropriate antibiotic use guidelines available in all PHC. Appropriate use of antibiotics promoting use of Access antibiotics.
12	Output	Establishing ASP at tertiary level hospitals	Number of tertiary care hospitals with established antimicrobial stewardship programs (ASP)	Hospital compliance audits, facility reports; count of hospitals with functioning ASPs	Biennial	DRAP, Ministry of NHSR&C, WHO, Health Care Commissions		ASP established and functional in some private tertiary care hospitals (2)	Functional AMS program major tertiary care hospitals across the country	Improved stewardship practices Appropriate use of antibiotics
13	Output	Baseline survey on usage of antimicrobials as	Number of surveys conducted on antimicrobial usage	Survey reports from animal feed and veterinary departments;	Biennial	DRAP/ Ministry of NFS&R/		a few surveys	Regular survey	Improved understanding of use of

		growth promoters in animal feed industry including assessment of feed (utilization audit). National strategy for the control of antimicrobials usage as growth promoters and prophylaxis in veterinary/agriculture/ aqua /industry sector	as growth promoters in animal feed industries	count of completed surveys		DOH, AHC PL&DD, PL&DD, AHC, Provincial Livestock Departments		availabl e	s in all provinces and regions	antibiotics in non-human health sector
Objective 6: Develop economic case for sustainable investment based on research studies focused on country needs										
1	Long term outcome	Development of national AMR research priority setting	Number of AMR research findings integrated into national and provincial policies, programs, or guidelines	Policy and program review reports; count of findings incorporated into national strategies		Ministry of NHSR&C/ Ministry of NFS&R/ PHRC/ DOH/ HRIHEIs/Focal Person from each Province				Understand the research gaps. Advocacy on research needs

2	Long term outcome	Capacity building on AMR research	Number of national institutions /one health partners conducting AMR research on a regular basis	Research institution/ one health partners activity reports; count of institutions with ongoing AMR research		Ministry of NHSR&C/ Ministry of NFS&R/ PHRC/ DOH/HRIHEIs/Focal Person from each Province				Increased pool of AMR researchers. Increased research products
3	Short/medium outcome	Design and conduct studies as per global, regional and national priorities	Number of instances of national participation in regional or global AMR research initiatives	Conference participation records, international initiative reports; calculate the number of instances of Pakistan's participation						
4	Short/medium outcome	Development of national AMR research priority setting; Mapping of available resources for AMR research	Percentage of national and provincial research priorities reflected in newly designed AMR research studies	Research proposals and reports; proportion of studies aligned with set priorities		Ministry of NHSR&C/ Ministry of NFS&R/ PHRC/ DOH/ HRIHEIs/Focal Person from each Province				Resource gaps identified. Advocacy for pooling and mobilization of resources Pooling of available resources for development of new vaccines, diagnostics &

										antibiotic alternatives
5	Short/medium outcome	Design and conduct studies as per global, regional and national priorities	Number of high-quality AMR research publications produced annually by national research institutions/ One health partners	Peer-reviewed journals, research institution/ One health partners reports; count of publications		Ministry of NHSR&C, NFS&R, Health & Livestock Departments, WHO, FAO DRAP/P&D/ PSWR/ Provincial Health Department HEC/ Academia/ DOH/P&D/NIH/ AMRN				Improved understanding on the AMR burden Improved understanding on cost effective interventions Improved advocacy for resource allocation for AMR Better estimates of AMR Better prescription practices, stewardship programmes, and reduced use of antibiotics
6	Output	Development of national AMR	Number of AMR research priority-setting exercises	Government and research body reports;		Ministry of NHSR&C/ Ministry of				Understand the research gaps.

		research priority setting	/workshops conducted at the national and provincial levels	count of completed exercises/WORKSHOPS		NFS&R/ PHRC/ DOH/ HRIHEIs/Focal Person from each Province				Advocacy on research needs
7	Output	Capacity building on AMR research	Number of personnel trained in AMR research methodologies and techniques	Training completion reports, and attendance sheets; count of participants trained in relevant research areas		Ministry of NHSR&C/ Ministry of NFS&R/ PHRC/ DOH/HRIHEIs/Focal Person from each Province				Increased pool of AMR researchers. Increased research products
8	Output	Design and conduct studies as per global, regional and national priorities	Number of AMR research studies designed and conducted based on national, regional, or global priorities	Research reports; count of research projects completed		Ministry of NHSR&C, NFS&R, Health & Livestock Departments, WHO, FAO DRAP/P&D/ PSWR/ Provincial Health Department				Improved understanding on the AMR burden Improved understanding on cost effective interventions Improved advocacy for resource allocation for AMR

						HEC/ Academia/ DOH/P&D/NIH/ AMRN				Better estimates of AMR Better prescription practices, stewardship programmes, and reduced use of antibiotics

	Output	Design and conduct studies as per global, regional and national priorities	Number of AMR research collaborations established between national and international stakeholders	Memoranda of understanding (MoUs), agreements signed; count of collaborations established		Ministry of NHSR&C, NFS&R, Health & Livestock Departments, WHO, FAO DRAP/P&D/ PSWR/ Provincial Health Department HEC/ Academia/ DOH/P&D/NIH/ AMRN				Improved understanding on the AMR burden Improved understanding on cost effective interventions Improved advocacy for resource allocation for AMR Better estimates of AMR Better prescription practices, stewardship programmes, and reduced use of antibiotics


World Health
Organization


F A O
FIAT PANIS


MINISTRY OF CLIMATE CHANGE
GOVERNMENT OF PAKISTAN


The
Fleming
Fund


DAI
Shaping a more livable world.