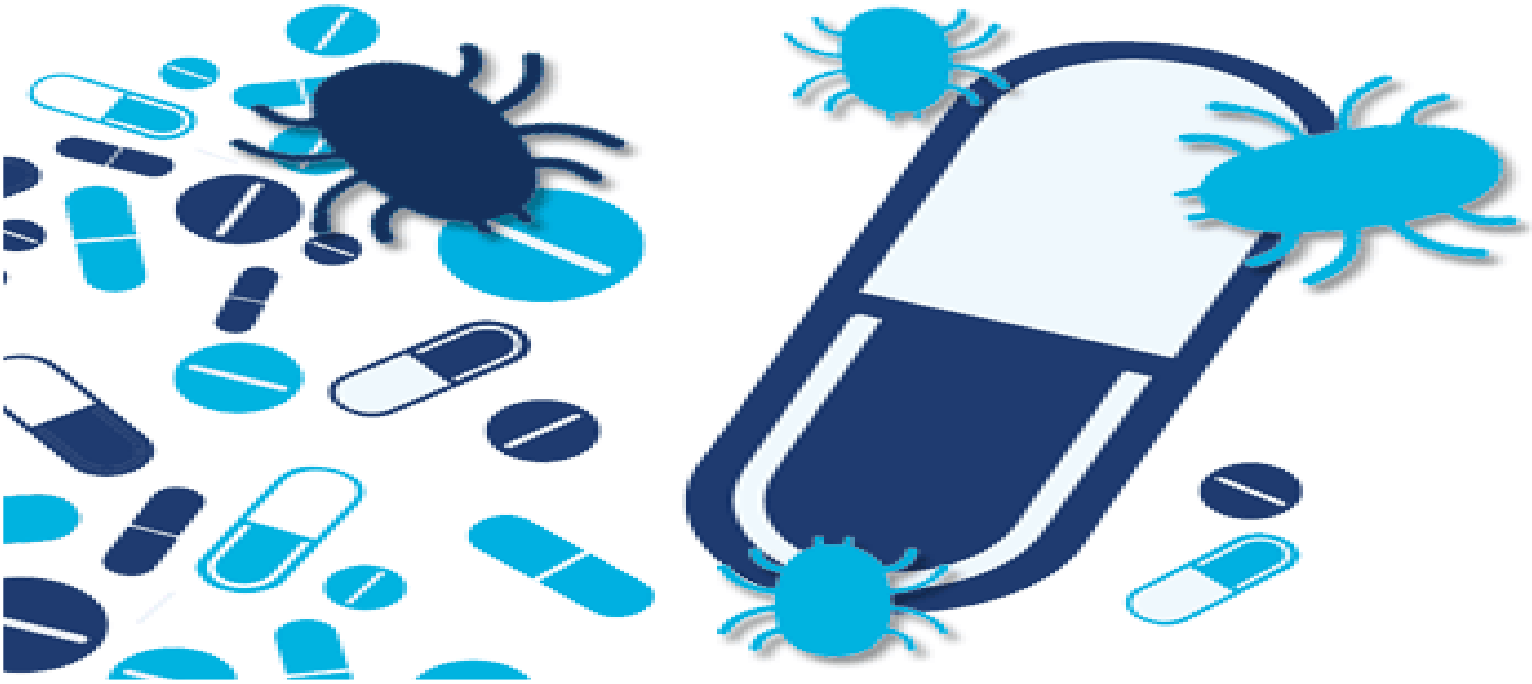
State of Palestine

Ministry of Health

National Action Plan for Antimicrobial Resistance

(2020-2024)



January 2020

Foreword

Palestine has always accorded top priority to the health of its citizens. National Policy Agenda (2017-2022) accords priority to health of its citizens and this commitment is articulated under the *National Priority 9: Quality Health Care for All.* The National Health Strategy (2017-2022) further elaborates the direction that the Palestinian government is pursuing in providing quality health care services to its entire population in true spirit of Universal Health Coverage.

Sustained efforts in recent past, and with investment of substantial resources, it has been possible to significantly reduce the infant mortality and maternal mortality. Unlike many other developing countries, infectious diseases do not contribute to huge mortality and morbidity in Palestine. Less than 2.5% of all deaths in a year is attributed to infectious diseases. This has been possible with high coverage of immunization and efficient patient care. These successes are however at risk now. Emergence and spread of resistance in many bacteria of medical importance to commonly used and affordable antibiotics is threatening achievements of Palestine as well as rest of the world in containing infectious diseases.

This antimicrobial resistance (AMR) is rightly recognized as the greatest challenge being faced by the humankind in its battle against infectious diseases. A widely read report that was commissioned by the Prime Minister of the United Kingdom has projected that if no action is initiated now, the mortality due to antibiotic resistant bacteria by 2050 shall exceed 10 million per year. Most of these deaths and patients with infectious diseases shall be from developing world with limited resources to manage these.

The impact of AMR is not limited to human and animal health. Huge economic implications adversely affecting the human development and global economic growth

In response to a call by the global community and through extensive consensus process, WHO, FAO and OIE developed a Global Action Plan to combat AMR in 2015. The United Nations General Assembly in its special meeting in 2016 discussed

this burgeoning challenge and called upon all countries to develop, and implement their respective National Action Plans with comprehensive One Health approach where human health, animal health and environment sectors work together in a coordinated way to prevent emergence of AMR and its spread.

It gives me immense satisfaction to note that to undertake this task; Palestine has developed its National Action Plan for AMR for next five years. Though the national action plan is aligned with the WHO Global Action Plan, it has been formulated in context of Palestine with very practical and doable activities using the available human resource and the infrastructure available within the country. The action plan has been developed through a multisectoral, multidisciplinary and inter-ministerial collaborative efforts by large of national experts.

I endorse this national action plan and assure all support for its speedy and efficient implementation in Palestine.

Dr. Mai Salem Kaila
Health Minister, Palestine

Preface

Of late, the antibiotics which have saved millions of lives in past seven decades are slowly and steadily becoming ineffective. Most of the infectious diseases have ceased to respond to common and affordable antibiotics. The common pathogens, in their quest for survival and propagation, have developed variety of mechanisms to thwart the action of antibiotics. The continuous irrational use of antibiotics has facilitated selection and propagation of these resistance pathogens. We are surely and swiftly moving to an era where even minor infections shall have the potential to be fatal.

Unlike numerous other medicines, the pipeline for the discovery, development and dissemination of new antibiotics is virtually dried out. No new class of antibiotics has been discovered in past three decades. The reason is simple. Availability of a new antibiotic takes (10 - 12 years) and almost an investment of 1 billion USD. Once it comes into the market, its indiscriminate use swiftly results into resistance, rendering it useless. Hence, the pharmaceutical industry is not keen to invest into these discoveries.

The growing problem of AMR has been a manmade disaster. Use of antibiotics has been irresponsible, irrational, and abusive in all sectors – human health, animal health, fisheries, agriculture etc. Unfortunately, this behaviour remains unstoppable leading to widespread antimicrobial resistance or AMR. Extensive use of antibiotics is the greatest driver for emergence of AMR. While in humans, antibiotics are primarily used for treating sick patients, in animal antibiotics are extensively used as growth promoters and as economical replacement of essential sanitary environment.

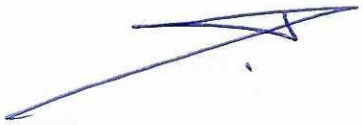
Only recently, AMR has been recognized as an important global public health challenge with serious impact on global economy and development. Various political and economic fora have deliberated on this emerging phenomenon and given a call for a coordinated One Health approach to combat AMR worldwide. The Sustainable Development Goals or SDGs have also articulated importance of containing AMR in its political declaration. Similar articulations have been made by (G7, G20, EU, ASEAN) and other such economic and political platforms.

Inter country development agencies led by the WHO, FAO and the World OIE developed Global Action Plan on AMR and requested all Member States to formulate GAP-aligned respective National Action Plans for AMR by May 2017.

Following guidance of FAO, OIE and WHO, Palestine through an extensive countrywide consultative process during 2019, developed its National Action Plan. Palestine national action plan is based on the One Health approach, which means that human health, animal health as well as environment sectors have equal responsibilities and strategic actions.

Implementation of Palestinian NAP needs to be accelerated. This plan aims to augment capacity of all stakeholders for all dimensions of AMR including regulatory mechanisms; infection control practices and diagnostics support; availability and use of appropriate guidelines for therapy; biosecurity in animal rearing practices and active engagement of communities. These are challenging tasks. However, with health already high on national agenda, with our concerted efforts we shall be able to reduce the impact of AMR on human health in Palestine.

Mr. Ibrahim Salem
National Focal Point for AMR



Contents

List of Figures

List of Annexes

Abbreviations and Acronyms

AMR	Antimicrobial Resistance
AMU	Antimicrobial Utilization
AMS	Antimicrobial Stewardship Programme
AST	Antimicrobial Susceptibility Testing
CLSI	Clinical Laboratory Standards Institute
CPHL	Central Public Health Laboratory
EQA	External Quality Assessment
ESBLs	Extended Spectrum Beta Lactamases
FAO	Food and Agriculture Organization of the UN
GAP	Global Action Plan
GDP	Gross Domestic Product
GLASS	Global Antimicrobial Resistance Surveillance System
HAIs	Healthcare Associated Infections
HCP	Health Care Providers
KAP	Knowledge, Attitude and Practice
IPC	Infection Prevention & Control
M&E	Monitoring and Evaluation
MDR	Multi Drug Resistance
MDROs	Multi Drug Resistant Organisms
MoA	Ministry of Agriculture
MoE	Ministry of Education
MoH	Ministry of Health
MRSA	Methicillin Resistant Staphylococcus aureus
NEQAS	National External Quality Assessment Scheme
NFP	National Focal Point for AMR

GD-VSAH	General Directorate of Veterinary Services and Animal Health
PVS	Palestinian Veterinary Services.
CVL	Central Veterinary Laboratory.
PRCS	Palestine Red Crescent Society
SDGs	Sustainable Development Goals
SOP	Standard Operating Procedure
ToR	Terms of Reference
TOT	Training of Trainers
TWG	Technical Working Groups
PRCS	Palestine Red Crescent Society
OIE	World Organization for Animal Health
OTC	Over the Counter
SOP	Standard Operating Procedure
UNRWA	United Nations Relief and Works Agency
WAAW	World Antibiotic Awareness Week
WHA	World Health Assembly
WAHIS	World Animal Health Information System
MoH / EH	Ministry of Health / Environmental Health Department
MOLG, JSC	Ministry of Local government –joint service council
EQA	Environmental Quality Authority
PWA	Palestinian Water Authority

Executive Summary

Antimicrobial agents (commonly known as antibiotics) have and continue to play a critical role in the treatment of infectious diseases. These are essential to protect both human and animal health. Antibiotics are also mandatory for successful use of modern medical interventions and complex surgeries. Unfortunately, prolonged abuse of these drugs in human health, the livestock sector, and poor ecological management of antibiotic residues, has led to the emergence and spread of antimicrobial resistance (AMR) in microorganisms (primarily bacterial pathogens) making several antibiotics ineffective. If AMR is not urgently countered, the world is likely to slide into a "post-antibiotic era", where even minor infections may prove fatal and modern complex surgeries redundant because of poor outcomes.

AMR is no longer a human health issue. It has a grave potential to damage the national and global economy, food security and the health of people. O'Neill study that was commissioned by the Government of the United Kingdom estimates that as of now AMR annually kills about 700,000 people worldwide – a number that is projected to rise to 10 million by 2050 if adequate measures are not initiated now. It also projects based upon mathematical models that by 2050, a global loss of $100 trillion shall be ascribed to AMR. Global GDP is likely to decrease by 3.5% during same period.

AMR has the potential to push people in developing countries into poverty because of high cost of treatment for prolonged period. The World Bank estimates that 28 million people are likely to be pushed into poverty as a direct consequence of AMR. It also projects that livestock production may be reduced by 7.5% throughout the world, thus damaging food security.

Resistant to AMR has thus become a world-wide challenge that has been highlighted in the UN Sustainable Development Goals (SDGs). Accordingly, there has been a serious global political response to threat of AMR. The UN General Assembly, the World Health Organization (WHO), the Food and Agriculture Organization of the UN (FAO) and the World Organisation for Animal Health (OIE) have recognized the seriousness of the situation and requested countries for urgent and globally coordinated action against AMR.

In May 2015, the sixty-eighth World Health Assembly (WHA) endorsed the Global Action Plan on Antimicrobial Resistance (GAP-AMR). The WHA resolution 68.7 has urged Member States to align their National Action Plan on AMR with GAP-AMR by May 2017. Commitment by global leaders to combat AMR was further strengthened at the High-Level Meeting on AMR at the United Nations General Assembly on 21 September 2016. FAO and OIE have also endorsed similar Resolutions.

AMR is not a patient oriented issue. Resistant pathogens arising in humans, animals, or the environment have the potential to spread from one to the other, and from one

country to another. International travel and trade accelerate the spread of AMR across national borders. There is frequent transmission of resistant pathogens between animals and humans, true zoonosis.

While the emergence of AMR has accelerated, the discovery and development of new classes of antimicrobial medicines have drastically slowed because of the high cost of discovery and development of new molecules and associated low return on investment. It is estimated that it takes up to 10-12 years for a new antibiotic to come to the market. Total cost of development process is estimated to be around USD 1 billion.

Palestine, like all other developing countries is also struggling with management of infectious diseases using affordable and safe antibiotics. There are several reports available in the global literature in support of prevalence of multidrug resistant pathogens in human and animal health sectors especially poultry. This challenge needs to be addressed on priority.

The possible solutions to contain AMR requires a comprehensive and integrated One Health approach with coordinated efforts by human health, veterinary and environment sectors through a whole-of-society initiative. Indeed, major roles are to be played by political, financial, technical, regulatory, programmatic, and education stakeholders representing both public and private sectors.

With above mentioned background, Palestine has identified five Goals for its National Action Plan (NAP) which are in alignment with the WHO Global Action Plan on AMR (GAP). These are:

1. Improve public awareness, understanding of antibiotic use and antimicrobial resistance.
2. Strengthen national one-health surveillance efforts for antimicrobial resistance and antimicrobial use.
3. Implement evidence-based infection control practices that can prevent the spread of resistant pathogens.
4. Optimize the use of antimicrobial medicines in human and animal health sectors and
5. Encourage and promote operational research on AMR.

NAP AMR is expected to reflect the five principles based on which GAP was developed. These include:

1. Whole-of-society engagement including a One Health approach,
2. Prevention first,
3. Access,
4. Sustainability, and
5. Incremental targets for implementation

NAP Goal 1

Focuses on improving awareness and understanding of AMR through effective communication, education and training, thus bringing about a change in behaviour of users and prescribers.

NAP Goal 2

Is directed to establishment of a national One Health surveillance system for AMR and strengthening laboratory capacity for undertaking surveillance. It also aims to track use of antimicrobials and their residues in various locations and develop policies that promote their rational use.

NAP Goal 3

Attempts to reduce the incidence of infection through effective infection prevention and control in healthcare, in animal health and food chain to reduce spread of AMR.

NAP Goal 4

Aims to promote rational and optimal use of antibiotics in various settings through strengthening of enforcement of regulations, ensuring access and surveillance of antimicrobial use, antimicrobial stewardship in healthcare as well as animal health.

NAP Goal 5

Aims to promote operational research (OR) that supports activities under NAP and make them more efficient and cost-effective.

The Palestinian Operational Plan to implement NAP has identified various activities that need to be carried out by different sectors in a time bound manner to meet the targets set in this NAP. A monitoring and Evaluation (M&E) Plan for each goal has also been proposed to keep track of the progress made and modifying the operational plan, if needed.

Using an efficient multi-sectoral, multi-disciplinary and multipronged model with One Health approach, as envisaged in this National Action Plan, Palestine aims to combat AMR in near future and thus contribute to welfare of its people and contribute to the global health security.

Introduction

Antibiotics that have also been called as magic bullets came into clinical use more than 70 years back. They revolutionized medicine, transforming often fatal diseases into curable, or at least manageable, problems. So much was the impact of antibiotics on human health that people started using these as solution to all health problems irrespective of evidence for use of antibiotic therapy. This accelerated the survival process in microorganisms too who rapidly developed several defence mechanisms to protect themselves from antibiotics. The advantage accrued to them because of selection pressure by antibiotics. The more antibiotics were used greater became the resistance.

The indiscriminate use of antibiotics in different settings have given an edge to pathogens. Most of the infectious diseases have ceased to respond to common and affordable antibiotics. Unless checked, very soon minor infections shall have the potential to be fatal. Complex surgeries such as organ transplantation, cardiac bypass, etc. shall be difficult to undertake because of catastrophic complications that may occur after surgery. Food security for burgeoning populations shall also be at risk.

At the same time, the pipeline for the discovery, development and dissemination of new antibiotics is virtually dried out. No new class of antibiotics has been discovered in past three decades. Availability of a new antibiotic takes (10 - 12 years) and an investment of around 1 billion USD. Once new antibiotic comes into the market, its indiscriminate use swiftly results into resistance, rendering it useless and negating any potential return on investment.

Today antimicrobial resistant [AMR] pathogens are estimated to kill about 700,000 people worldwide every year. In the absence of concerted global actions, the mortality, morbidity and economic loss will swell in next 2-3 decades. The livestock production will decrease due to infections in food producing animals thus influencing food security and affecting most the poor.

Fortunately, during past few years there has been huge global concern and political dialogue on combating AMR. In an unprecedented move in 2016, and next only to HIV, non-communicable diseases and Ebola pandemic, the United Nations General Assembly deliberated on AMR and gave a call for an urgent implementation of global, coordinated efforts adopting WHO GAP. In its political declaration, UN Sustainable Development Goals or SDGs have articulated importance of containing AMR. Powerful global and regional political platforms especially (G7, G20, EU, ASEAN) have also voiced their concern on emerging problem of AMR and its impact on human development and global economy.

Spurred by the global concern, inter country development agencies led by the WHO, FAO and the World OIE developed Global Action Plan on AMR and requested all Member States to formulate GAP-aligned respective National Action Plans for AMR by May 2017.

Overview of genesis of global action plan

Several national, regional and global initiatives are engaged in tackling AMR. In 1998, the World Health Assembly (WHA) of the WHO urged member states to develop suitable measures to tackle AMR. In 2000, WHO called the rise of AMR a global crisis, and in 2001, it released its first global strategy for its containment. However, the real impetus came in 2011 when WHO dedicated the World Health Day theme to antimicrobial resistance.

In 2015, WHO developed Global Action Plan on Antimicrobial Resistance (GAP) and through WHA resolution 68.7, it called upon all countries to develop their respective National Action Plans (NAP) in alignment with GAP before May 2017. It also advocated with the countries that they must use a One Health approach for combating AMR thereby involving animal health and environmental areas also in these global efforts.

GAP was adapted by the Food and Agriculture Organization of the United Nations (FAO) and the World Organization for the Animal Health (OIE), the international agencies that are engaged with health of animal and agriculture. In September 2016, the United Nations General Assembly came out with a political declaration asking all countries to galvanize their efforts in combating AMR using One Health approach.

Development of national action plan to combat antimicrobial resistance in Palestine emanates from global efforts as have been reflected in the WHO Global Action Plan for AMR (2015) that provides a broad framework for combating AMR.

Goal of GAP

To ensure, for as long as possible, continuity of successful treatment and prevention of infectious diseases with effective and safe medicines that are quality-assured, used in a responsible way, and accessible to all who need them.

Strategic Objectives of GAP

GAP has defined the following five strategic objectives for containment of AMR:

1. Improve awareness and understanding of antimicrobial resistance.

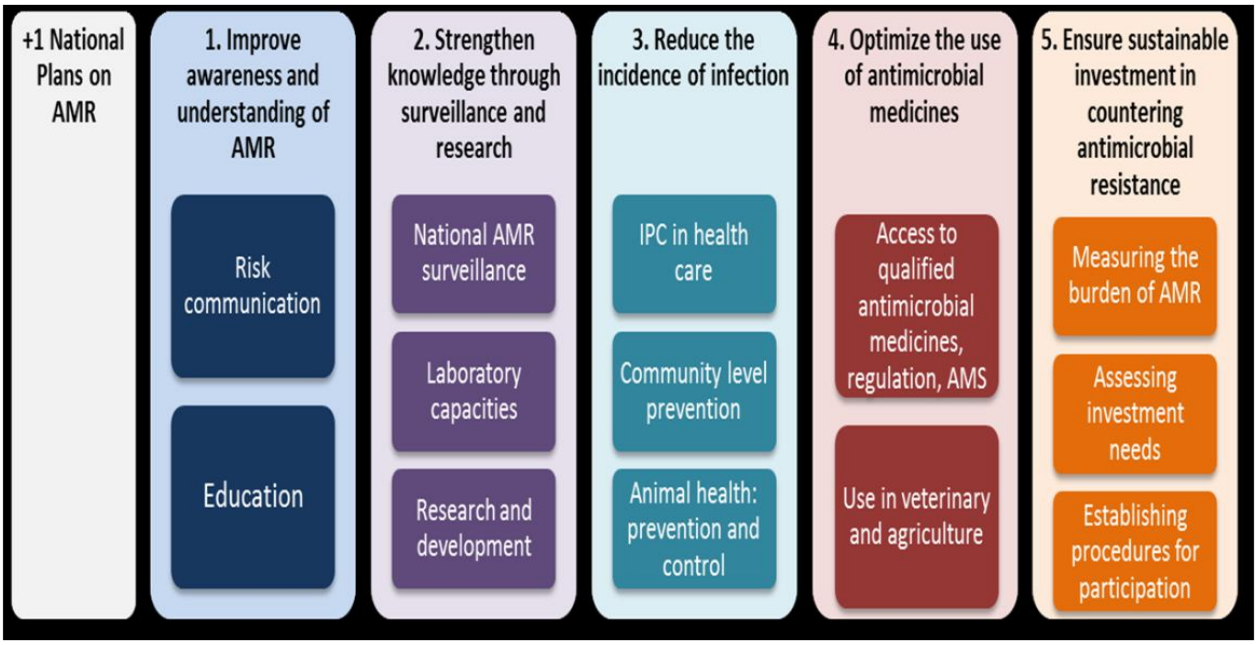
2. Strengthen knowledge through surveillance and research.

3. Reduce the incidence of infection.

4. Optimize the use of antimicrobial agents; and,

5. Develop economic case for sustainable investment based on country needs and increase investment in new vaccines, diagnostics and other interventions, (Figure 1)

FIGURE 1: **FIVE STRATEGIC OBJECTIVES FOR CONTAINMENT OF AMR**



GUIDING PRINCIPLES FOR IMPLEMENTATION OF GAP

GAP suggests that all action plans should reflect the following principles:

1. Whole-of society engagement including "One Health" approach.

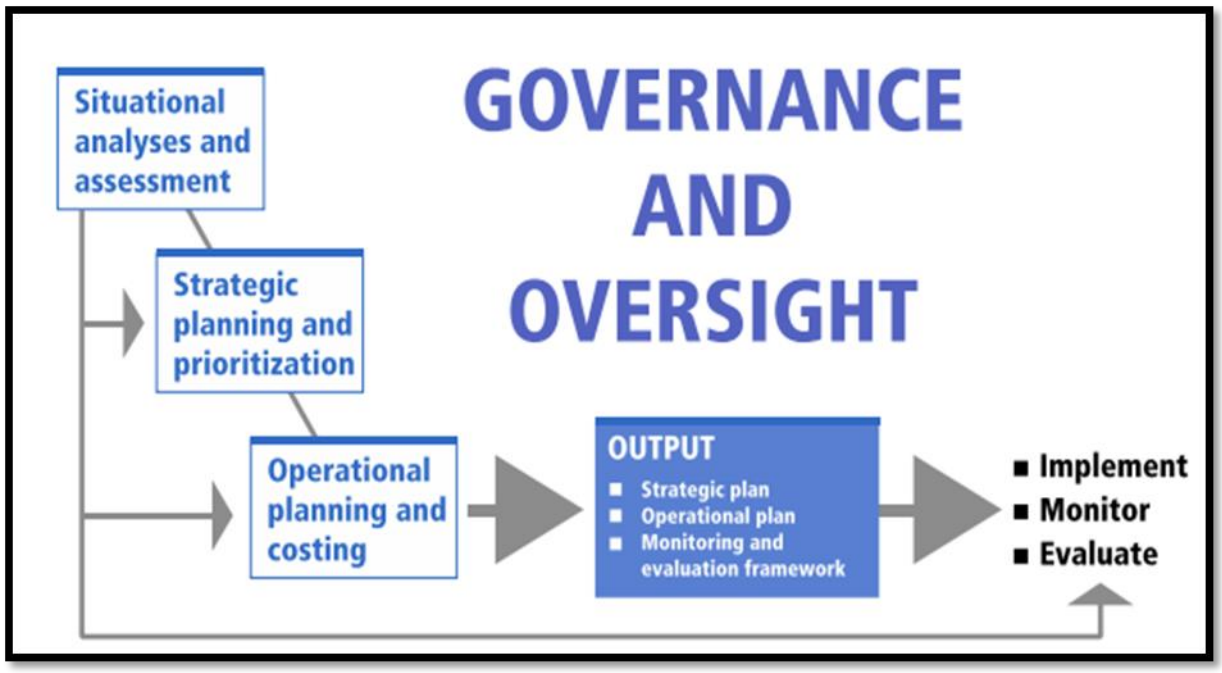
2. Prevention first.

3. Access.

4. Sustainability.

5. Incremental Targets for implementation.

Until December 2019, 73 Member States of the WHO have developed and submitted their National Action Plans to WHO. Palestine also has a strong desire to join this group of countries and initiate implementation of the NAP on priority.



Genesis of National Action Plan in Palestine

In accordance with World Health Organization Resolution WHA 68.7, the Palestinian national authority has decided to develop a national AMR plan that would be aligned with the GAP for the use of antimicrobial medicines in animal health, agriculture, environment and human health.

Accordingly, in 2019 Palestine decided to follow the overall strategy as recommended by WHO and shown in Fig above.

The Country

The State of Palestine is inhabited by 4.85 million people (2018) with 2.92 million people living in the West Bank and 1.93. million in the Gaza Strip. This population lives in an area of 6,220 square kilometres, with a population density of around 795 people per square kilometre. Life expectancy at birth for Palestinians was 73.9 years in 2018. The overall Palestinian population is predominantly young: nearly 40% of Palestinians are aged 0–14 years, and 5% are aged 65 years or older[1].

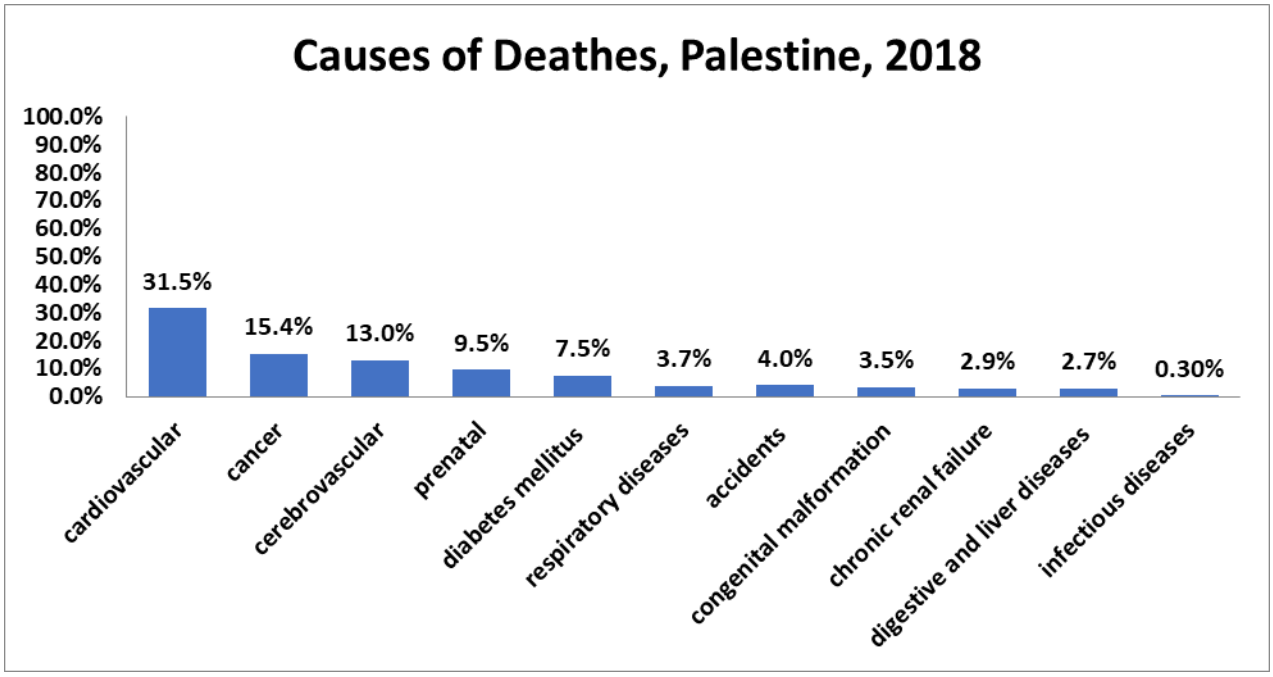
Health profile

Palestine, with one of the youngest populations in the Region, is experiencing a demographic and epidemiological transition. Total fertility is high but declining, slowing population growth. Non communicable diseases account for four of the five deaths.

Infant mortality in 2018 reached 11.7 deaths per 1000 live births, and the under-five mortality rate reached 13.4 deaths per 1,000 live births. This reflects a significant improvement when compared to death rates in previous years. The MoH (2018 estimated the maternal mortality rate in Palestine to be 16.7 per 100,000 live births.In 2018, 98.4%of all children (aged 12-23 months) received the full set of recommended vaccinations[1], (Figure 2).

FIGURE 2: **CAUSES OF DEATHS, PALESTINE, 2018.**

Non-communicable diseases are predominantly major causes of mortality. According to Health Annual Report of Ministry of Health top ten causes of reported deaths in



[1]Annual Health Report, Ministry of Health - Palestine, 2018

2018 were cardiovascular diseases (31.5%), cancer (15.4%), cerebrovascular diseases(13.0%), prenatal conditions (9.5%), diabetes mellitus (7.5%), respiratory diseases (3.7%), accidents (4.0%), congenital malformation (3.5%), chronic renal failure 2.9%, digestive and liver diseases 2.7% **infectious diseases (0.3%)**. Infectious diseases are ranked at No 9 amongst top 10 causes of mortality[1].

Health services and Infrastructure

There are four main providers of health care services in the West Bank and the Gaza Strip: Ministry of Health, United Nations Relief and Works Agency (UNRWA), nongovernmental organizations and the Palestinian Military Medical Services, each with its own respective network of primary health care centres and hospitals.

The Palestinian Ministry of Health (MoH), UNRWA, Military Health Services, NGOs, and the private sector cover primary, secondary, and tertiary health care services. According to the MoH (2017), there are 743 primary health care centers in Palestine (583 in the West Bank and 160 in Gaza).

The Palestinian Ministry of Health is the major provider of primary health care in the West Bank, accounting for more than 70% of the 583 clinics. UNRWA and NGOs operate additional 24 mobile clinics. In the Gaza Strip, the MoH accounts for about one third (32%) of the 160 primary health clinics, with a larger role played by UNRWA and nongovernmental organizations. UNRWA provides services for Palestinian refugees in the occupied Palestinian territory, and covers comprehensive primary health services, with limited support for hospital care. In Gaza there are 158 centers, the MoH operates about 51 primary health care centers while UNRWA operates about 22 centers. The majority of centers are operated by NGOs, privet sectors (80 centers), and the military services operates only five centres[2].

There are 81 hospitals in total in the occupied Palestinian territory, with 51 in the West Bank and 30 in the Gaza Strip. Bed capacity is approximately 1.3 beds per 1000 of the population. East Jerusalem hospitals are the cornerstone of the tertiary care in the Palestinian health system.

The central preventive medicine unit undertakes data collection and analyses of health -related data. The Central Public Health Laboratory is the national reference laboratory for providing laboratory support system.

Gaza reported a shortage of about 170 types of medicine and 267 types of medical disposables[3].

The continuing blockade and successive conflicts have influence the health sector capacity in the Gaza Strip. From 2010 to 2016, there has been a 9% reduction in the number of hospital beds, a 5% reduction in nurses, and a 21% reduction in doctors,

[2] Annual Health Report, Ministry of Health - Palestine, 2018.
[3] PCHR, 2017

per head of the population. This is a severe challenge to provide sustainable health services to citizens.

Health Financing

According to the World Bank (2012), public spending on health is close to 5% of GDP, exceeding the regional average of 2.6% and the low- and middle-income country average of 1.7% of GDP, and fuelled by relatively high spending on salaries, medical referrals for tertiary care and pharmaceuticals. Public and private spending for health more than tripled from 2000 to 2012, to US$ 1.3 billion, more than 12% of GDP. Per capita total health expenditure more than doubled between 2000 and 2012, from US$ 126 to US$ 294. Reflecting high out-of-pocket spending, especially for pharmaceuticals. Pharmaceutical expenditure is affected by import.

About 82% of the Palestinian population living in the West Bank and the Gaza Strip is covered by some form of prepayment for health care. Around 38% of health financing comes from out-of-pocket payments. Sustainability of its health service provision is a challenge.

The major providers of health coverage, the Government Health Insurance and UNRWA, account for more than 90% of the coverage provided and overlap significantly. The government health insurance covers primary health care services including maternal and child health services, secondary health care services, prescription medicines on the essential medicines list, and tertiary care services needed.

National Health Initiatives

National Policy Agenda (2017-2022) accords priority to health of its citizens. It commits through its *National Priority 9: Quality Health Care for All* better health care services through following policy interventions:

1. Reform the public health insurance system.
2. Ensure the fiscally sustainability of the health care system.
3. Improve the quality of health care services (infrastructure, equipment, medicines, IT, training of health care workers, standards)
4. Increase equitable access to health care services.
5. Improving Citizens' Health and Well-Being
6. Strengthen preventive health care, raise awareness and promote healthy lifestyles. Introduce a family health care approach. Improve and implement national policies on chronic disease management.

In continuation with National Policy Agenda, Ministry of Health has issued National Health Strategy **(2017 – 2022)** with following strategic objectives that are aligned with National Policy Agenda

1. Ensure rights-based, comprehensive and integrated health care services for all citizens (taking into consideration gender, age, geographic distribution and political and socioeconomic equity).
2. Promote preventative health care and management of non-communicable diseases.
3. Establish an effective, comprehensive and sustainable quality system for all health services.
4. Ensure the availability of a qualified health workforce capable of delivering high quality health services
5. Enhance institutional, financing and governance mechanism

Universal Health Coverage is high priority on national agenda. The Palestinian Ministry of Health continued its coordination with local and international partners towards the realization of universal health coverage.

The Palestinian Institute of Public Health is currently finalizing the establishment of the first comprehensive **observatory of human resources for health** in the occupied Palestinian territory. As a second step, projections of needed specialties will be developed as the basis for the first comprehensive health workforce strategy.

A central database is being developed to provide computerized and up to date information on matters such as medical professionals, patient medical records, and prescription drug use.

Communicable Diseases in Palestine

Palestine has a successful immunization programme and a well-functioning surveillance system for the control of communicable diseases. Some diseases, such as schistosomiasis, leprosy, rabies and wild poliovirus, were historically eradicated The incidence of tuberculosis is low, with 29 cases reported in 2015, or 0.61 per 100 000.21 The national immunization schedule covers tuberculosis, hepatitis B, poliomyelitis, diphtheria, pertussis, tetanus, *Haemophilusinfluenzae type* B, rotavirus, pneumococcus, measles, mumps and rubella. Immunization coverage is consistently high, ranging from (96% to 99%) since 2013.

Immunization

Health service coverage and utilization are high, with full coverage of DPT3 and measles immunization for 1-year old children in 2015, universal antenatal care and

skilled health workers at almost all deliveries. This is one of the reasons for low incidence of communicable diseases.

Cooperation with International Development Partners

Several international development partners including World Bank, WHO, FAO, UNICEF, Government of Italy, USAID, UNFPA etc. provide financial and technical assistance to the country in various fields in health and allied sectors. WHO is supporting through its Country Cooperation Strategy. Areas where WHO support has been available include universal health coverage; strengthen the country's core capacities for the International Health Regulations, supporting quality and patient safety programs, health emergency and disaster risk management, supporting the Ministry of Health and partners to develop a system to monitor antimicrobial resistance and to develop an action plan to address antimicrobial resistance**.**

WHO also provides technical assistance to strengthen the national capacity to prevent, manage and control non-communicable diseases and improve the social determinants of health.

Pharmaceutical regulatory agency

Antibiotics have been categorized as essential medicines and constitute 57 of total drugs in the essential drug list (EDL) constituting almost 10% of EDL. The General Directorate of Pharmacy through its seven departments ensures that effective and safe medicines of good quality are affordable, available and rationally used, through the application of regulations and instructions of the Ministry of Health.

Antibiotics are available only on prescription. One of the prerequisites for registering antibiotics at the Ministry of Health (MoH) is that the label on the antibiotics must clearly mention that this product is available only by prescription ("prescription only" Rx).

The Ministry of Health has issued a circular to all doctors and pharmacists in all health centers in Palestine, to comply with the following instructions:

- Antibiotics should not be dispensed without a prescription under legal accountability especially in the private sector.
- Doctors should not prescribe unnecessary antibiotics to patients, especially in diseases caused by viruses such as influenza, flu, colds, congestion and others.

MoH has approved an OTC list of medicines that can be sold by the pharmacist to the patient without a prescription. Antibiotics have been excluded from this list. Moreover, Antibiotics are not allowed to be promoted by pharmaceutical companies

through the media. According to MoH Medicines Promotion instructions, “that allows promotion -for OTC drugs only.

Animal health sector in Palestine

Livestock production is an integral part of Palestinian agricultural sector, and is of economic and social importance both at the household and national levels. Cattle, poultry, sheep, goats, beekeeping and fishes dominate livestock in Palestine. It provides the main source of income and food security for thousands of Palestinian households through food supply directly in the form of meat, milk, and eggs, and indirectly providing income, saving, asset value and employment to the smallholders.

At the national level, the value added by the agricultural sector in Palestine for the year 2012 was US$ 322.6 million, which contributes about 5.9 % of the GDP. Of this, livestock contributes about 40% of agricultural GDP.

The national strategy that has vision of “A sustainable and productive livestock sector that is competitive both locally and externally, enhances food security in Palestine, promotes resilience of Palestinian breeders, and supports economic growth” carries a strategic objective to improve and increase livestock productivity, profitability, competitiveness and contribution to food security, employment generation and economic growth.

Institutional Infrastructure in animal health sector

The animal health care services in Palestine are under the responsibility of the General Directorate of Veterinary Services and Animal Health (GD-VSAH), one of the main directorates of MoA. GD-VSAH deliver its services through six central sub-directorates (veterinary field service, poultry health and diseases, veterinary public health, veterinary quarantine and drug control, veterinary epidemiology, central veterinary laboratory), thirteen regional directorates in the West Bank provinces, and 5 regional directorates in the Gaza Strip. VSAH plays a pivotal role in animal health, food hygiene and public health protection, its key charge is to protect the Palestinian livestock (including both poultry and large animal) as a national wealth for country food security, as well as protect human health from zoonotic disease transmitted to human through diseased animals or contaminated food of animal origin.

The main activities of VSAH related to food safety include inspection of raw animal products to ensure their safety for human consumption, conducting surveys on the safety of livestock products (milk, meat, and egg), issuing veterinary certificates, and controlling the circulation of animal products.

VSAH has well-organized systems in tracing and diagnosing diseases, conducting epidemiological animal health surveys, prevention against major zoonotic and

infectious diseases through vaccination and controlling programs, controlling animal movement through areas, monitoring activities in private sector, observing veterinary medicinal products, licensing and observing activities of slaughterhouses, and many other related activities.

Central Veterinary Laboratory (CVL) is one of the six main sub-directorates of GD-VSAH, it is considered as a key indicator in many of the upper mentioned activities. CVL is well constructed and managed according to global criteria of veterinary laboratories, quality criteria are applied in different acceptable levels according to types of tests and continuous and successive process of development. Two main parts of CVL: animal health laboratory and food safety laboratory are working under one administration to follow up the requirements of livestock health and safety of their products. Diagnosis and surveillance of diseases, isolation of pathological agents and testing their sensitivity, evaluation of animal immunization, and testing of antimicrobial residues and zoonotic pathogens in raw food product of animal origin, are examples of CVL activities. Another central veterinary laboratory is constructed in Gaza strip, besides two local veterinary laboratories in Nablus and Ramallah cities in the West Bank.

Strong governance and extensive capacity enable any working system to offer big successes and robust achievements, besides that, only robust plans and policies enable controlling of AMR, from this point VSAH managed several projects lately to construct appropriate and modern legislations and directions able to meet the newly emerged health requirements in animal health sector, as well as to strengthen the governance and build capacity. These projects such as Draft of Palestinian Animal Health law (2018), National Food Safety Control Plan (2017 - 2022), Mandatory Technical Instructions 62-2016: Health conditions of food of animal origin (2016), Slaughterhouses Protocol (2019), Veterinary Pharmaceuticals Regulations create a good base to start with and improve upon in this area.

VSAH is considering OIE as the central reference for its activities and methodology of work. VSAH is committed in OIE requirements regarding periodical reports, annual meetings, training courses, and alarms notifications. The last OIE PVS (Performance of Veterinary Services) - mission for VSAH was in 2017 and is adopted as general guidelines for improvement and extension of VSAH activities. VSAH has also good communication with FAO as a referral international organisation in agricultural activities. Many projects, programs, plans, and strategies were implemented and still done under the wide cooperation between VSAH and FAO.

Challenges in animal health sector

Nearly all animal feeds, which constitute 70% to 85% of the total production costs, are imported from Israel through a local intermediary. Feed supply is insufficient in both quality and quantity. It is not obvious whether these feeds have antibiotics in it as growth promoters. The continuous rise of fodder prices in recent years has increased

the cost of production and forced farmers to use lower quality feed to the animals (e.g. lower quality protein mixture). As a result, the high dependence on imported inputs led to lower productivity and lower quality of animal feed.

The health of animals also suffers because of inadequate quality and quantity of animal vaccines and medicines. This can be another contributory factor for irrational use of substandard antibiotics in Palestine. As a result, the livestock sector has suffered from weak institutional and regulatory settings.

Smuggling animals throw Israeli borders enlarged the issue in different directions, some of these animals are diseased and carrying pathogens of unknown source or nature to Palestinian farms, other animals are food producing and suspected to have antibiotic residues, this issue need serious handling.

Shortage in veterinary health staff is a major challenge; responsibilities on VSAH are increased in a continuous manner without corresponding expansion in the staff. This issue obstacles fast completion of whole responsibilities and force VSAH to deal with priorities.

Resistance: Unknowns challenges

It is obvious that because of low incidence of communicable diseases, the challenge of antimicrobial resistance has not been very high on national agenda. Given the emergence of AMR as a global problem, its perceived impact in conflict situations where injuries are rampant can be overemphasized. Lack of adequate data because of absence of a comprehensive national surveillance system on AMR and quality published data is an obstacle in assessing the magnitude of problem of AMR as well as factors responsible for it.

Many individual efforts were done before 2017 in separate hospitals to work on AMS, but no central or official party took this responsibility until Quality Planning Department with cooperation with USAID started a big AMS project on national level, the project started with 22 hospitals where many comprehensive efforts and activities were done to ensure rational use of antibiotics.

Major Stakeholders

A large number of important institutions, organizations and agencies are to actively work together in mitigating AMR to ensure success in implementation of NAP. Accordingly, all were engaged from the planning stage of development of NAP. Some of these are:

1- Governmental Organization: Ministry of Health, Ministry of Agriculture, Ministry of Education, Ministry of Higher Education, Ministry of Local Governments and Environment authority.
2- Universities and teaching institutions in both human and animal health sectors.
3- International Agencies: UNRWA, FAO, OIE, UNICEF, UNEP and WHO.
4- Private Sectors: Humans and Animals health sector (Hospitals, Veterinary services and laboratories).
5- Palestine Red Crescent Society (PRCS) and other related NGOs.

Current status of AMR in human and animals

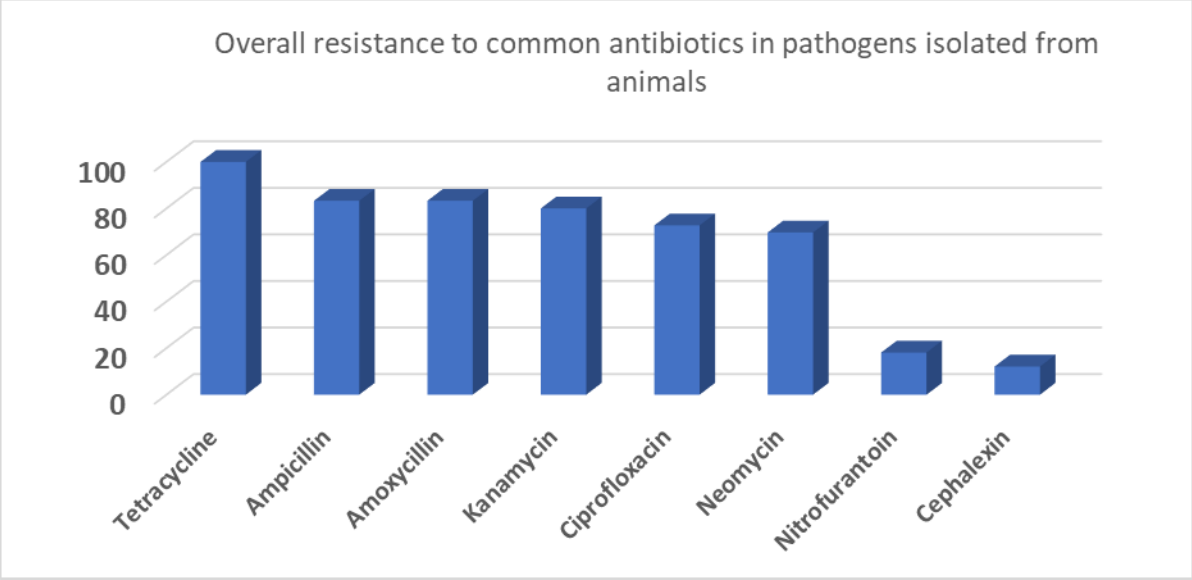
Antibiotic resistance is prevalent across the world including in Palestine. In this country, AMR acquires an additional dimension because of the prevailing conflict situation. Though not articulated as such, AMR is an emerging part of a larger crisis, which often leads to poor infection control, irrational prescription practices, and easy antibiotic availability. Several outbreaks of antibiotic resistance have been documented in English scientific literature. The quality and number of these publications would have been much higher if infrastructure of laboratories to identify pathogens and undertake antimicrobial susceptibility testing were extensively available.

In the absence of real-time availability of antibiogram, clinicians have used empirical guidelines to manage community-acquired pneumonias. In a study, although 18 different antibiotic regimens were used, 81% patients received a β-lactam either plus macrolide combination therapy, given alone 49% or with another antibiotic 32% patients. The impact of use of these regimens of high-end antibiotics remains indeterminate.

In a cross-sectional study performed in the two burn units of a teaching hospital, 118 wound samples from burn patients, 97 environmental samples and 28 samples from health care workers (HCWs) were collected and cultured according to the standard microbiological procedures. Moreover, antimicrobial susceptibility ascertained using Clinical and Laboratories Standard Institute (CLSI) guidelines. *Pseudomonas aeruginosa* was the most common pathogen isolated 50% followed by *Enterobacter cloacae* 28.3%. *Pseudomonas* could be detected in the hospital environment as well as in the health care workers. Most of the pathogens isolated from patients and environment were resistant to almost all antibiotics except piperacillin–tazobactam. Of *Staphylococcus aureus* isolated from patients, 60% were Methicillin Resistant Staphylococcus aureus (MRSA).

To identify the causative agents of urinary tract infections and their susceptibility to commonly used antibiotics, a total of 375 specimens were collected. Three hundred and thirty-nine (90.4%) of isolated uropathogens were Gram-negative bacteria, of which 243 (71.7%) were Escherichia coli. Thirty-six 9.6 % of the total isolates were Gram-positive bacteria of which 21, 58.3% were Staphylococcus saprophyticus. High resistance rates were recorded for E. coli against trimethoprim / sulfamethoxazole (37%), nitrofurantoin 29%, ampicillin 65%, and nalidixic acid (37%). E. coli showed low resistance to amoxicillin / clavulanic acid, ciprofloxacin, cefotaxime and ceftriaxone with rates of 12.2, 17.2, 11.1, and 11.1% respectively. This study emphasized the need for developing local guidelines for rational prescribing decisions, (

FIGURE 3: OVERALL RESISTANCE TO COMMON ANTIBIOTICS IN PATHOGENS ISOLATED FROM ANIMALS.

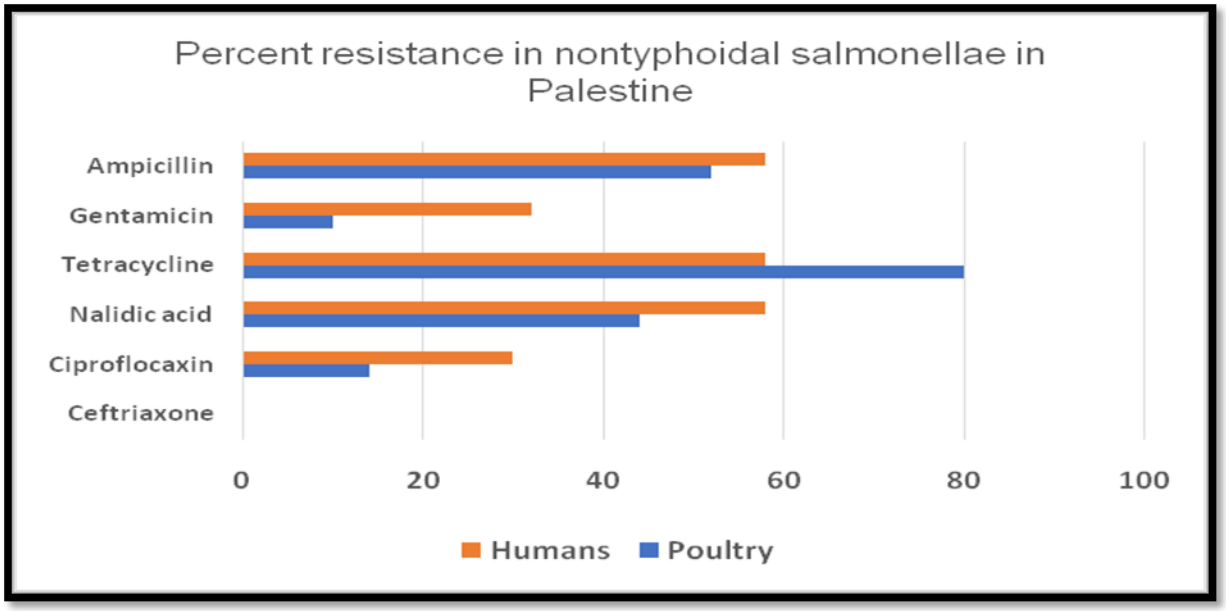


*Acinetobacter baumannii*is a well-known pathogen of hospital associated infections and mainly affects immunocompromised patients admitted to intensive care units. These are usually multi drug resistant. Isolates from 72 patients were collected from all over Palestine, except Gaza. These isolates were resistant to all the b–lactam antibiotics including the carbapenems. Of the 72 isolates, 77.9% were positive for *blaOXA-23*, 14.7% positive for *blaOXA-24*, and 4.4% positive for *blaOXA-58*. In addition, 5.88% were positive for *blaNDM*. The pathogens were susceptible to colistinsulfate (78%) and tigecycline (95%) only.

The detection of these extremely drug resistant pathogens in Palestine was a strong reminder of the importance of mandating that the infection control programs in all the hospitals must be active in order to reduce the spread of these deadly pathogens.

AMR has also been detected in non-typhi*Salmonella enterica*inpoultry in Palestine along with humans. Resistance rates among human and poultry isolates were respectively 59% and 51% for ampicillin, 31% and 10% for gentamicin, 59% and 80% for tetracycline, 59% and 45% for nalidixic acid, and 30% and 15% for ciprofloxacin. All the isolates were susceptible to ceftriaxone. Mutations at positions 83 and/or 87 were detected in *gyrA* of isolates with resistance to nalidixic acid. It is essential that more studies and continued surveillance of AMR among human and animal pathogensare needed to understand the increasing prevalence of resistance, (Figure 4).

FIGURE 4*: PERCENT RESISTANCE IN NONTYPHOIDAL SALMONELLAE IN*



PALESTINE.

In another study in animals, internal organ samples from 83 infected flocks were collected and tested for presence. The study of antibiotic susceptibility profiles showed high resistance levels against tetracycline 100%, ampicillin 83.33%, amoxicillin 83.33%, kanamycin 80.3%, ciprofloxacin 72.72% and neomycin 69.70%, while the lowest resistance levels were against nitrofurantoin 18.18% and cephalexin 12.12%.

Interest in AMR in Palestine scientists has been demonstrated by their publications that review global status of pathogens for a particular syndrome. Sweileh et al (2018) reviewed the global research output in antimicrobial resistance among uropathogens. The paper does not describe status of uropathogen and resistance but summarizes various publications from across the world on his important pathology.

The most important cause of infant morbidity and mortality in the Middle East is acute and chronic diarrhea and resulting conditions of dehydration, marasmus, and protein malnutrition. This is particularly the case in summer and autumn months. In recognition of the fact that routine treatment is not wholly satisfactory, a program was developed by the UNRWA. The results of this programme, especially the use of antibiotics is yet to become available.

Safe water

Provision of safe water is a huge resource in mitigating infectious diseases thus reducing the use of antibiotics and resultant emergence of AMR. Studies done on quality of water in the country have frequently shown that the total and faecal

coliform contamination exceeded the World Health Organization's limit for water wells and piped water supply. However, the contamination percentages were higher in piped water supply than in wells. Diarrhoeal diseases were strongly correlated with faecal coliform contamination in piped waters (r=0.98). This is consistent with the finding that diarrhoeal diseases were the most common self-reported diseases among the interviewees. Possible reasons for unsafe water supply include intermittent water supply, insufficient chlorination and sewage contamination.

Alternate therapies

Traditional therapies have historically shown remarkable success in healing acute as well as chronic diseases. These are extensively utilized by the people who have faith in spiritual healers. Traditional medicines were believed at times to treat ailments such as infertility, epilepsy, psychosomatic troubles and depression. The available literature in English does not show role of such medicines in treatment of common infectious diseases and their impact on antimicrobial resistance.

Work already done on AMR in Palestine

Recognizing the importance of AMR and in alignment with the World Health Assembly resolution of 2015, the Ministry of Health nominated the Director of the Central Public Health Laboratory as the national focal point (NFP) for antimicrobial resistance.

Many efforts were done by ministry of health to establish a national surveillance system, all governmental hospitals reported their data to quality planning department, but with no private sector participation until 2017.

In 2017 a comprehensive AMS project (focused on infection control and prevention) was started by ministry of health with USAID support, the participants were from 22 national hospitals includes all governmental hospitals, UNRWA hospital, four private and NGOs hospitals, and five hospitals in east Jerusalem.

The activities included learning sessions, on job training for hospitals staff, couching visits by national and international experts, and networking communications by video calls and Whats App groups.

Many indicators were set by the experts, hospitals improving teams collected and submitted data to quality planning department, the experts used the data to focus on improving quality and infection control aspects in hospitals, unfortunately the project stopped by the end of 2017, but USAID gave the flag to Augusta Victoria hospital (AVH) to lead this effort. Since the beginning of 2018 a new phase of AMS project was started, this time focusing on AMS.

The project is still running with national expert's efforts who follow up with all participated hospitals in order to improve all aspects that affects AMS components.

The NFP has already obtained experience and international exposure in AMR through participation in various workshops. The nominations have been sought from different ministries and institutions to nominate contact persons to include them in the national AMR Committee. This Committee shall oversee and guide the work on AMR in the country.

During 2018, the country celebrated the event of the World Antibiotic Awareness Week (WAAW) with collaboration with several ministries and institutions, universities, and syndicates. The event focussed on the awareness week through posters, videos, presentations from different ministries, universities and syndicates that summarised the general ideas for AMR, its pillars and awareness sections for health professionals and for the public. Similar event has been planned for 2019 in collaboration with the big national university (An-Najah National University) which provides teaching and training to the students, medical doctors, pharmacists, veterinarians, and lab technicians. The focus shall be on importance of AMR and mechanisms to contain it.

In 2019, a one-day workshop on AMR was organized which was participated by the members of the national AMR committee. The meeting discussed various issues on AMR, pillars to contain it, national AMR action plan and its possible contents. It also deliberated upon the role of veterinary services, infection prevention and control, laboratory-based surveillance of AMR and the antibiotic consumption in the country. The role of technical committees for each of the pillars of AMR control was also discussed.

***TERMS OF REFERENCE (TOR) FOR THE NFP, NATIONAL AMR COMMITTEE AND THE TECHNICAL COMMITTEE HAS BEEN DEVELOPED* (ANNEX 2*)*.**

A surveillance system for multidrug resistance bacteria (MDR) including patient information, sample type, type of MDR bacteria has been drafted in coordination with national experts.

It is also planned to organize a workshop for the technical groups to prepare the first draft of national action plan (NAP) which shall be finalized through a process of national consultation.

National Strategic Plan for AMR

Vision

Palestine will endeavor to reduce the morbidity, mortality and economic impact of antimicrobial resistance.

Mission

To protect and improve the health of Palestinian people through control of AMR by raising public awareness, forging national AMR integrated surveillance, strengthening infection control measures, promoting rational use of antimicrobials and promoting research in Palestine

Goals

Following are the five goals for Palestinian NAP. These align well with the WHO Global Action Plan and incorporate all key elements that have been articulated in the GAP.

1. Improve **awareness** to reduce AMR and promote rational use of antibiotics.
2. Strengthen national one-health **surveillance** efforts for antimicrobial resistance and antimicrobial use.
3. Implement evidence-based **infection control practices** to prevent the spread of resistant pathogens.
4. **Optimize the use of antimicrobial** medicines in human and animal health sectors and
5. Encourage and promote **operational research on AMR.**

Targets

As compared to baseline data of 2020, by 2024, Palestine will achieve

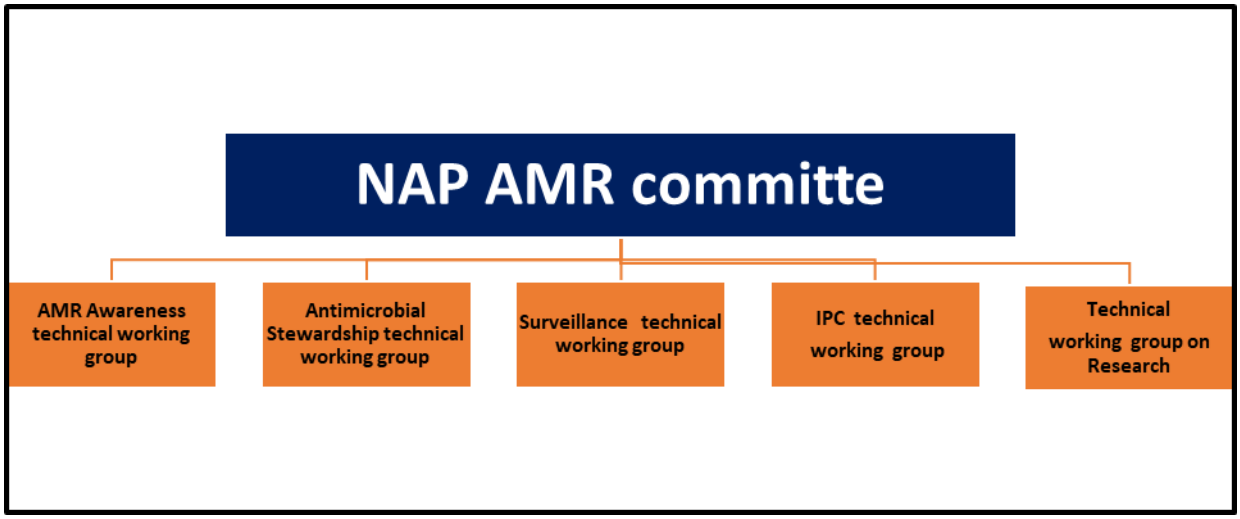
- The mortality rate associated with drug-resistant pathogens is less than 20%.
- Human cases due to drug-resistant pathogens are less than 25%.
- 30 Percent reduction in use of antibiotics for growth promotion or prophylactic purposes in livestock, poultry, fishes.
- 10% Percent reduction in use of antibiotics therapeutic purposes in livestock, and poultry.
- 10 Percent reduction in total use of antibiotics in the country.

Several activities have been planned to achieve these targets through a national governance mechanism including monitoring and evaluation process.

National governance mechanism

There will be a national AMR committee directly under the supervision of Minister of health, consists of 5 main technical working groups (TWG). Each strategic objective in the NAP will be moderated by a separate TWG that is composed of **different expert members** from **all sectors (MoH, MoA, MoHE, MoEnv, MoE etc.)** involved in the NAP, *(Figure 5), (Annex 1).*

FIGURE 5: NAP AMR COMMITTEE



Concerted and nationally coordinated efforts shall be needed to bring together various stakeholders and harness their expertise and the resources available within the country in different sectors to efficiently implement this NAP.

Following is a step-by-step approach for implementing NAP that would be adopted by the country.

1. Constitution of a national antimicrobial resistance intersectoral steering committee with all stakeholders from the public and private sectors represented, which is chaired by Minister of health.
2. The Committee acts as coordinating mechanism and has overarching responsibility of steering the national action plan.
3. Allocation of adequate financial; resources on sustained basis from government, UN agencies and international development partners
4. Establishment, if possible, of a Unit and focal point in the MoH to coordinate with the national and international partners.
5. Establishment, if possible, of corresponding Unit and focal point in Ministry of Agriculture.

6. Designation of subgroups/Technical Working Group for each Goal comprising of specialists in the field.
7. Frequent meetings at different levels to review the progress and troubleshooting.
8. Modifications in NAP according to the needs, availability of resources and advances in knowledge.
9. Active collaboration and technical support from WHO, FAO and OIE.

Goal 1: Improve awareness to reduce AMR and promote rational use of antibiotics

Public awareness on rational use of antimicrobial agents and necessity for bringing about a change in their behaviour towards rational use of these medicines has been recognized in the NAP. Accordingly, several levels of interventions from general community to school going children to professionals and policy makers have been identified. These shall be targeted with specific tools on a sustainable basis to bring about necessary change in their behaviour.

Palestine shall work towards making AMR a core component of the professional education training, certification, continuing education and development for medical, dental, pharmacy, nursing, and veterinary professionals as well as related workers in different sectors.

All awareness and behaviour modifying activities will be carried out across the country in a systematic way and using evidence-based interventions and tools. The curricula of different target groups shall be reviewed and revised. Community and school education, including that of farmers shall be coordinated and guided by MoH, MoA/Palestine Veterinary Services (PVS), MoE and various other sectors with provision of adequate information on AMR and also with the focus on prevention of diseases, good hygiene and appropriate knowledge on AMR. NAP recognizes that it is a critical aspect, which has been often neglected.

SWOT Analysis

Strengths	Weaknesses
1. Strong mass media presence with extensive reach in country and accessible for health promotion programmes 2. Government support and commitment. 3. Support from UN Agencies. 4. Some awareness activities for AMR already initiated. 5. Existence of some laws and regulations. 6. Increasing use of social media 7. Health education activities on various ongoing health issues with strong infrastructure in place. 8. National committee on health education and promotion functioning operational 9. Ongoing outreach activities with databases and records of users and documentation of activities.	1. Insufficient sustainability and continuity in AMR communication activities. 2. Inadequate financial resources for awareness programs and campaigns. 3. Prevailing cultural myths and beliefs on use of antibiotics 4. Weak enforcement of existing inadequate human resource, expertise and available infrastructure within the public sector. 5. Difficulties in accomplishing behaviour change for the health, vet professionals and for the public in rational use of antibiotics. 6. Inadequate implementation of laws and regulations. 7. Lack of awareness among farmers and general public 8. No continuing education program for public and private veterinarians exists.
Opportunities	**Threats**
1. National initiative to develop National Action Plan for AMR 2. Availability of NGOs working in Palestine **3.** Global interest in AMR and influence on national leadership **4.** Growing reach of social media 5. Support from policy makers and	1. Political situation, occupation and lack of borders control. 2. Sustainability of funds 3. Inadequate active intersectoral cooperation. 4. Conflict of interest with pharmaceutical companies to promote their awareness. 5. Inherent resistance to change amongst people.

UN agencies. 6. Cooperative mass media 7. Health and vet syndicates support. 8. Best use of global awareness and commitment including antibiotic awareness week. 9. Increasing interest (professional societies, general public, media) 10. New technical possibilities (mobile apps, networks) 11. Positive influence of global trends in addressing AMR problem 12. Availability of national and international policies and strategies.	6. Possibility of "Campaign fatigue" (need to regularly vary and update key messages). 7. Communication on AMR (rather than prudent use) carries the risk of being perceived as more prescription. 8. Incomplete knowledge among professionals and technologies on optimize use of antibiotic. 9. Shortage of new affordable antibiotic. 10. Fast spread of AMR

Strategic objectives

The major objectives to achieve this goal shall be followings:

1. Develop a national awareness raising, communication and education programme with focus on health promotion, infection control, vaccination and rational use of antibiotics in all sectors.
2. Promote education and in-service training (continuous education) on AMR in professional curricula in medicine, pharmacy, dental, veterinary and allied sciences.
3. Enhance community awareness on hygiene (especially hand hygiene), health promotion activities, biosecurity and vaccination of humans and animals.

Operational Plan

Strategic Objective 1.1: Develop a national awareness raising, communication and education programme with focus on health promotion, infection control, vaccination and rational use of antibiotics in all sectors.

Activities:

Activity	Time Frame Q/Y	Responsibility	Estimated Budgeted USD
Assign responsibility to the existing communication technical working group to develop the national awareness program lead by the MoH and undertake a mapping of resources available within the country	Q4/2020	MoH	1000
Develop a national AMR communication plan including awareness topics, objectives, messages, activities and tools. Include component of M&E in this Plan.	Q4/2020	AMR awareness technical working group	1000
Develop a fund raising/marketing -plan to obtain funds to implement the national awareness program activities on hand hygiene, health promotion, rational use of antibiotics and vaccination (humans and animals). Approach UN agencies and international development partners for technical support	Q4/ 2020	AMR awareness technical working group	5000
Develop a comprehensive advocacy plan for sensitizing leaders and opinion makers on need to support rational use of antibiotics and development and enactment of appropriate laws	Q1/2021	AMR awareness technical working group	5000

Organize awareness programmes for managerial leadership (Director of Facility) in hospitals (public and private sector) , veterinary sector and environment	Once in two years	AMR awareness technical working group	2500
Organize awareness programmes for technical directors in hospitals (public and private sector) , veterinary sector and environment	Q4/2020	AMR awareness technical working group	5,000
Organize MoH-MoA joint national antibiotic awareness scientific conference	Every two years	AMR Awareness TWG	15,000
Conduct Capacity building workshops (TOT) for those implementing the awareness programmes	Annually	MOH, MOEnv, MOE, MOA, Universities, Schools	15,000
Develop and conduct public awareness campaigns (including material and logistics)	Annually Align with World Antibiotic Awareness Week WAAW	MOH in collaboration with other partners	15,000
Conduct a national baseline and post KAP survey through a predesigned validated questionnaire	Q2 / 2021 Q1/2024	MOH-MoA in collaboration with other partners including WHO, FAO, OIE	30,000
Advocate to include the topic of rational use of antimicrobial agents and resistance in school and university curricula	Q1/2021	AMR Awareness TWG	1000

Objective 1.2: Promote education and in-service training (continuous education) on AMR in professional curricula in medicine, pharmacy, dental, veterinary and allied sciences

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Develop training curriculum and material for imparting training to professionals on communication and behaviour change and impart training to trainers (ToT)	Q4/2021	MoHE	5,000
Support and encourage **operational researc**h to understand behaviour patterns on irrational use of antibiotics amongst professionals in health and veterinary services	Q3/2021 Q3/2023	MoH/MoA Universities	5000
Develop and implement pilot on behaviour change linked with stewardship programs, IPC interventions and bio security programs.	Q2/2022 Q1/2024	MoH, MoA Universities	5000
Advocate for successful completion of course related to AMR and infection control as prerequisite to post graduate studies for student with medical, veterinarian and environmental background	Q2/2021	Awareness TWG	1000

Objective 1.3: Enhance community awareness on hygiene (especially hand hygiene), health promotion activities, biosecurity and vaccination of humans and animals

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Develop a comprehensive **vaccine promotion** programs for animal and agriculture sectors including communication via various mass media channels as well as community outreach	Q2 / 2021	MoA, AMR awareness technical working group	2000
Develop campaigns to improve a. brucellosis vaccine in animals b. Conduct awareness activities amongst animal owners and professionals	Annually	MoA, AMR Awareness technical working group	5000
Organize regular campaigns to promote hand washing in all segments of populations especially professionals, healthcare workers, animal care workers and school students	Twice a year	MoH, MoA, MoE IRCRCS UNICEF WHO	10,000
Reach out to farmers and animal care givers for ensuring biosecurity and sanitation around animals	Ongoing Continuous basis	MoA	20,000

M& E Plan

An outline of the M&E Plan is given below:

Objective	Target BY 2024	Baseline	Indicator	Frequency of measurement	Responsibility
1.1 Develop a national awareness raising, communication and education programme with focus on health promotion, infection control, vaccination and rational use of antibiotics in all sectors	20 % increase in community members that are aware of antimicrobial resistance	To be established through baseline surveys	Percent of community members that are aware of antimicrobial resistance	Every 2 years	AMR Awareness technical working group
1.2 Promote education and in-service training (continuous education) on AMR in professional curricula in medicine, pharmacy, dental, veterinary and allied sciences	100% of heads of health care facilities provide approval for antimicrobial stewardship programme	To be established through planned surveys	Percent of heads of health care facilities provide approval for anti-microbial steward-ship programme	Every 2 years	AMR Awareness Technical Working Group
1.3 Enhance community awareness on vaccine and hygiene (especially hand hygiene), health	20 % increase in community with awareness on utility of vaccination and hygiene in reducing	To be established through planned surveys	Percent of members of community that are aware of the utility of vaccination and hygiene in reducing	Every 2 years	AMR Awareness technical working group

promotion activities, biosecurity and vaccination of humans and animals	disease burden in animals		disease burden in animals		

Goal 2: Strengthen national one-health surveillance efforts for antimicrobial resistance and antimicrobial use

Surveillance of antimicrobial resistance and antimicrobial utilization (AMU) in humans and animals (livestock and poultry sectors) is fundamental for formulation of policy and development of programme to combat AMR. Recognizing the importance of surveillance, Palestine has resolved to establish an evidence-based surveillance for AMR and AMU. Although Palestine has substantial infrastructure and expertise to undertake effective surveillance, it aims to strengthen descriptive epidemiology of resistant organisms as they emerge, understand how resistance develops and spreads, improve its capacity to rapidly characterise the emergent resistant organisms, generate trends in AMR and provide quality data for developing antibiotics use policy at national and local levels. Palestine aims to become member of the WHO Global Antimicrobial Resistance Surveillance System (GLASS) and contribute its data to this global database.

By 2024, Palestine will have a nationwide AMR surveillance system in place to identify early the emergence of resistance in priority pathogens and to critical antimicrobials. Resistance profiles of priority pathogens will be reported. These efforts will be supported by quality assured national referral laboratories in human and animal health sectors and their integrated network of surveillance laboratories.

SWOT Analysis

Strengths	Weaknesses
1. Existence of two central/ human and vet labs with partial functioning of medical bacteriology labs. 2. Participation of 22 hospital medical labs in the EQAS Programs for bacteria confirmation and antibiogram. 3. Existence of infection prevention and AMS in 22 medical hospitals	1. Uneven distribution of qualified personnel **2.** Weak overall modern infrastructure of many diagnostic microbiology laboratories especially in private sector 3. Insufficient equipment maintenance support in some laboratories and non-availability of biomedical engineers and spare

4. Existence of lab experts for diagnostic microbiology labs and determining antibiogram 5. Availability of PCR technology lab. 6. Capacity for testing antibiotic residues in food and drug testing in the reference labs. 7. Electronic and Network sharing within medical bacteriology labs within MoH 8. Reference labs and some other diagnostic microbiology labs are accrediting for ISO 15189 at a national level. 9. Ongoing renovation for diagnostic microbiology laboratories which earlier had poor infrastructure	parts 4. Absence of situation analyses of national diagnostic microbiology laboratories 5. Electronic lab networking is not covering all diagnostic microbiology laboratories in human health sector 6. Frequent noncompliance of guidelines for microbiological processing 7. Lack of bio risk management.in labs 8. Lack of awareness among the lab staff on AMR 9. Insufficient number of veterinary laboratories along the country. 10. No electronic network among animal health labs. 11. Lack of AMR surveillance capabilities and specified resources in animal health sector 12. Veterinary laboratories are not contained in the practiced national quality programs of medical laboratories. 13. Lack of data sharing and communication inter and intra sectorial 14. Lack of awareness among the lab staff on AMR 15. No electronic network among animal health labs. 16. Lack of AMR surveillance in animal health sector 17. Lack of data sharing and

	communication inter and intra sectorial 18. Lack of antibiotic use surveillance in human and non-human sectors 19. Inadequate communication between food & water labs in different sectors (VET, human, environment) 20. Weak enforcement of National Laws and regulation for testing domestic food production for antibiotic residues 21. Weak enforcement of National Laws and regulation for testing imported animals for AMR
Opportunities	**Threats**
1. Acceptance of One health platform approach 2. Establishment of multisectoral national One Health technical advisory group 3. Growing International and global concern 4. Availability of new technologies for detection of AMR 5. Political desire for updating and setting new regulations in AMR articulated 6. Availability of GLASS IT platform 7. Support from UN agencies and government for AMR surveillance. 8. Committed staff from all sectors to control AMR and its surveillance	1. Political situation, no borders control (delay or not allow EQAS and ATCC material to enter through Israel side). 2. Fast spread of AMR. 3. Lack of national resources. 4. The emergence of new resistance genes 5. Lack of funding in cutting edge technology for identification of new types of resistance (viz whole genome sequencing) 6. Missing of One Health approach in other significant related aspects like zoonotic diseases, food safety, and IHR. 7. Absence of official slaughtering houses in most Palestinian provinces for both poultry and large animals hardening the surveillance activities.

Strategic Objectives of Goal 2

The Strategic Objectives are as follows:

1. Strengthening laboratory capabilities for detection and characterisation of AMR in all relevant sectors
2. Establishing and strengthening integrated surveillance system for AMR and AMU with One Health approach
3. Developing national AMR and AMU national database and mechanisms for swift sharing of lab-based surveillance with users.

Operational Plan

Objective 2.1: Strengthening laboratories capabilities for detection and characterisation of AMR in all relevant sectors

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Undertake baseline assessment and mapping of all potential diagnostic microbiology labs in veterinary and human (private and Govt) sectors	Q2/2021	MoH / MoA	15000
Develop National standard operating procedure (SOP) for antimicrobial susceptibility testing in alignment with CLSI, validate it and use it in all members of network.	Q2/ 2021	MoH / MoA	15000
Develop national protocol for ascertaining AMU in different settings, validate it and train potential users	Q 2/ 2022	MoH / MoA	10000
Develop and implement a training plan for microbiologists in national network for AST and AMU	Q2/2021	MoH	25000
Implement a lab quality management system in all laboratories of integrated surveillance network	Ongoing	MoH / MoA	20000

Establish a system that assures sustainability of supply chain for lab material	Ongoing	MoH / MoA	5000
Establish linkages between labs (inter and intersectoral) for exchange of reference materials and isolates sharing	Q2/2021	MoH	5000
Facilitate participation of reference/central laboratories in the international external quality assessment scheme (EQAS)	Q2/2021	MoH	10000
Operationalize national external quality assessment scheme (NEQAS) and make participation of all labs mandatory	Q3/ 2021	MoH	20000
Establish a national bacterial (including drug resistant) isolate repository	Q1/ 2022	MoH / MoA	100000
Strengthen mechanism for licencing & accreditation of microbiology labs in all sectors (private and governmental)	Q2/ 2021	MoH / MoA	10000

Objective 2.2: Establishing and strengthening integrated surveillance system for AMR and AMU with One Health approach

Activities

Activity	Time Frame Q / Y	Responsibility	Estimated Budget
Establish a multisectoral technical working group on integrated AMR and AMU surveillance from **all relevant sectors**	Q2/2021	MoH	1000
Develop or adopt available national guidelines for AMR and AMU surveillance systems across the different health sectors	Q3/2021	Surveillance technical working group	5000
Forge integrated national AMR surveillance network with participation of labs from human and	Q3/2021	MoH / MoA	30000

animal sectors as well as from private sector			
Prioritize testing of AMR pathogens, antibiotic residues, and antibiotics of concern in all sectors according to the National priority, WHO recommendations and global concern	Q2/2021	Surveillance TWG	1000
Organize annual meeting of members of national surveillance network for experience sharing	Annually	MoH / MoA	5000
Develop surveillance format for reporting of AMR, transmission electronically and ensure use of surveillance data in promoting rational use of antibiotics	Q3/2021	Surveillance TWG	1000
Initiate antibiotic residues surveillance in animal farms (domestic, meet production, poultry)	Q4/2020	MoA	25000
Draft legislations/standards for detection &quantification of antibiotics residues in imported and locally processed food produces	Q2/2021	Surveillance technical working group	3000

Objective 2.3: Developing AMR and AMU national database and mechanisms for swift sharing of lab-based surveillance with users.

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Develop a central network server hosted by MoH to receive AMR and AMU surveillance data	Q3/2021	MoH	40000
Establish an electronic networking between labs and Surveillance units and other relevant MoH health units	Q3/2021	MOH	10000

Develop mechanism for swift dissemination of data to potential users and publication and training	Q2/2021	MoH	10000
Submit data to WHO GLASS	Q1/ 2022	MoH	1000
Submit data to OIE WAHIS	Q2/ 2022	MoA-PVS	1000
Publish and disseminate data as advocacy tool	Annually	MoH	10000

M&E Plan for Goal 2

Objective	Target BY 2024	Baseline	Indicator	Frequency of measurement	Responsibility
2.1 Strengthening lab capabilities for detection and characterisation of AMR and AMU in all relevant sectors	**100** labs in the national network that have capability to isolate pathogens and undertake AST and AMU in a quality manner	To be determined during the baseline assessment	Number of labs in national network have capability to isolate pathogens and undertake AST in a quality manner	Annual	Surveillance TWG
2.2 Establishing and strengthening integrated surveillance system for AMR and AMU with One Health approach	80 % increase in number of Health care settings actively functioning in the surveillance system	To be determined during the baseline assessment	Percent of settings actively functioning in the national surveillance system for AMR	Annual	Surveillance TWG

	200 % increase of veterinary settings actively functioning in the national surveillance system				
2.3 Developing AMR and AMU national database and mechanisms for swift sharing of lab-based surveillance with users	National integrated database on AMR and AMU operational	No National database on AMR and AMU currently operational	Is National database on AMR and AMU operational	Every two years	Surveillance TWG

Goal 3: Implement evidence-based infection control practices to prevent the spread of resistant pathogens

Infection prevention and control (IPC) is an extremely important aspect of a strategic plan to contain AMR. Recently Palestine health system has accorded high priority to IPC practices in its health care facilities. Substantial work has been done in establishing good infection prevention and control practices in several hospitals [4][see chapter on situation analysis).

Hospitals by nature of their work are hotbeds for selection of resistant pathogens. Large numbers of patients whose defences have been compromised inhabit these facilities. Antibiotics are extensively administered to these patients to save their lives, cut short infectious diseases and at times to prevent their being infected. The health facility ecosystem is hence conducive for selection of resistant pathogens, and spread of resistance,

Better hygiene, and infection prevention control (IPC) also represent methods to cut down on the spread of infections in ambulatory human and animal care facilities, in food production systems and in the community in general.

Vaccination in humans and animals and bio security in food production systems are specific interventions belonging to IPC interventions that if implemented effectively, can result in better health outcomes and reduced risk of emergence of AMR. Palestine has excellent vaccination coverage and it needs to be sustained and expanded for better results especially amongst the animal population.

Palestine has made considerable progress in implementing IPC measures in governmental health settings. There is an urgent need to expand these activities in all health care facilities in public and private sector health facilities.

With rapidly increasing demand for food from animals, it is essential to strengthen the biosecurity in animal and poultry farms to assure supply of antibiotic and resistant pathogen free food products.

VSAH completely adopt the OIE standards in this manner, their implementation enables practicing and improving standard biosecurity measures as well as supporting animal health and welfare besides supporting public health.

[4]Infection prevention and control action plan 2017 - 2022

SWOT Analyses

Strengths	Weaknesses
1. Well established national IPC program in majority of hospitals. 2. Availability of infection control committees in most of health facilities with guidelines and procedures. 3. Surveillance program for HAI exist in most of health facilities. 4. Commitment of policy makers and other staff for infection control as priorities in health and vet centers. 5. Medical waste management in place for some health centers. 6. Availability of national guidelines on IPC and partially implemented 7. Availability of strong expanded immunization and vaccination programmes	1.Inadequate resources 2. Insufficient well-trained personnel for health and vet services for infection control. 3. Absence of infection control training in the curricula of health care students. 4. Inadequate number of microbiologists and infection diseases (ID) specialists in most hospitals and vet hospitals 5. Not full time dedicated IPC Officer in the majority of health facilities, and veterinary facilities 6. Weak surveillance of HAI 7. Lack of coordination between public and private sectors. 8. Weak supervision by public vets on some slaughterhouses. 9. Over the counter (OTC) availability of antibiotics in spite ofMoH instructions prohibiting it 10. Inadequate implementation of national standardized guidelines for biosecurity measures. 11. Inadequate implementation of national standardized guidelines for infection control measures in zoonotic diseases. 12. Shortages in financial and human resources needed to support biosecurity measures. 13.Presence of high number of

	unlicensed farms 14. Improper waste management (animal and pharmaceutical waste disposal). 15. Presence of illegal animal shelters and householders. 16. Inadequate continuous education and training opportunities for medical and vet professionals and workers
Opportunities	**Threats**
1. Policy makers support. 2. International support through UN agencies to control infectious diseases in humans and animals 3. Networking in public sector health facilities in place for uniform implementation of IPC, lab techniques and AMS. 4. Strong vaccination system in human health system in place 5. Coordination between MoH and MOA growing.	1.Political and occupation 2. Illegal animal movement. 3. Growing Aging and immunocompromised population 4. New emerging bacterial pathogens. 5. Rapid spread of MDROs for containment 6. Physical infrastructure of health facilities inadequate and not conducive for containment of AMR 7. Unavailability of many vaccines and high cost of others promoting indiscriminate use of antibiotics in animals (eg chlamydia vaccine) 8. Fast spread of AMR

Strategic objectives

Efficient IPC activities shall be carried out through following strategic objectives:

1. Promote infection control practices across all tiers of healthcare system.
2. Strengthen immunization programme for adults.
3. Improve bio security measures in veterinary settings and animal husbandry.
4. Initiate environmentally safe treatment and disposal system for hazardous waste.

Operational Plan

Objective 3.1: Promote infection control practices across all tiers of healthcare system.

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Enforce laws/guidelines related to proper implementation of IPC program in all health care facilities and biosecurity in veterinary sector	Q4/2021	IPC technical working group	5000
Make mandatory educational and training activities on the IPC measures for under and post-graduates of health specialities (medical, dental, pharmacy, nurses) and in-service professionals	Q4/2021	MoHE	30000

Objective 3.2: Strengthen immunization programme for adults

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Undertake risk assessment of the on-going immunization programs & the national capacities by immunization experts in collaboration with UNICEF	Q2/2021	MoH	1000
Review and activate adult and occupational immunization	Q1/2021	MoH	10000
Advocate for Review and Revise, if needed, National Adult & Occupational Immunization guidelines	Q2/2021	MoH	10000
Impart training and augment capacity for running the IPC programme	Q2/2021	MoH	20000

Objective 3.3: Improve bio security measures in veterinary settings and animal husbandry.

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Activate the National Advisory Committee for Biosecurity measures	Q2/2021	MoA	1000
Undertake situation analyses of the ongoing - biosecurity measures in the veterinary sector and animal husbandry and welfare	Q2/2021	MoA	5000
Review available materials and laws on biosecurity in veterinary sector and convert into draft legislation, if needed	Q4/2021	National Advisory Committee for Biosecurity measures	1000
Developing/updating of national standardized guidelines for biosecurity measures	Q3/2021	National Advisory Committee for Biosecurity measures	2000
Impart training to veterinarians on implementation of guidelines on bio security measures	Q3/2021	MoA	30000
Establish a Monitoring and evaluation system to periodically evaluate the biosecurity programme	Q3/2022	MoA	2000
Ensure sustainable vaccination of animals with appropriate vaccines (viz brucellosis)	Ongoing	MoA	100000

Objective 3.4: Initiate environmentally safe treatment and disposal system for hazardous waste*

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget UDS
Conduct situational analysis for the safe disposal and treatment system for hazardous waste	Q2/2021	MoH / EH EQA MoA MOLG PWA	20000
Develop/update national policies, strategies and plans for hazardous waste management	Q3/2021	MoH / EH MoA EQA JCS MOLG PWA	10000
Undertake capacity building and infrastructure strengthening for hygienic disposal of hazardous waste	Q1/2022	MoH / EH MoA EQA JSC	*15000*
Establish a Monitoring and evaluation system to evaluate the safe disposal and treatment system for hazardous waste	Q2/2022	MoH / EH MoA EQA JSC MOLG PWA	*15000*

** Hazardous waste includes both medical and veterinary wastes*

M&E Plan for Goal 3

Objective	Target by 2024	Baseline	Indicator	Frequency of measurement	Responsibility
3.1Promote infection control practices across all tiers of healthcare system	60 % increase of health care facilities implementing IPC national standardized program	To be determined during the baseline assessment	Percentage of health care facilities implementing IPC national standardized program	Annually	IPC Steering Group
3.2 Strengthen immunization programme for adults	75 % of adults in HIGH RISK GROUPS vaccinated with recommended vaccines	To be determined during the baseline assessment	Percent of Vaccination coverage among targeted adult groups	Annually	MoH
3.3 Improve biosecurity measures in veterinary settings and animal husbandry	70 % animals vaccinated against brucellosis	To be determined during the baseline assessment	Percentage of animals immunized against brucellosis every year	Annually	MoA

3.4 Initiate environmentally safe treatment and disposal system for hazardous waste	50 % increase in hazardous waste correctly disposed	To be determine during the baseline assessment	• Hazardous waste produced per sector per year • Hazardous waste correctly disposed	Annually	MOH MoA EQA

Goal 4: Optimize the use of antimicrobial medicines in human and animal health sectors

Emergence of resistance in microorganisms is a natural and unstoppable phenomenon. Selection pressure exerted by antimicrobial agents accelerates the emergence of resistant strains and their becoming predominant population in any setting. Use of antimicrobials in any form, even when rational and prudent, can precipitate resistance in target microbes. Easy access to these affordable medicines during past few decades has resulted in its rampant misuse leading to AMR in virtually all pathogens.

In Palestine, antibiotics have been categorized as essential medicines and constitute almost 10% of essential drugs list [EDL]. The General Directorate of Pharmacy through its seven departments ensures that effective and safe medicines of good quality are affordable, available and rationally used, through the application of regulations and instructions of the Ministry of Health.

One of the prerequisites for registering and sale of antibiotics at the Ministry of Health (MoH) is that the label on the antibiotics must clearly mention that this product is available only by prescription ("prescription only" Rx).

Palestine proposes to further strengthen its system for regulation and surveillance of use of antimicrobial agents for control of human and veterinary use of antimicrobials through activities in the National Action Plan for AMR. Some of the measures taken will include development of standard treatment guidelines with special reference to use of antimicrobial agents, evidence-based guidelines for National Antimicrobial Stewardship Programme in human and animal health care, and continuous coordination with the AMR and AMU surveillance system. All of the above systems aim to optimise use of antimicrobials.

SWOT analyses

Strengths	Weaknesses
1. Availability of rules and legislation to ensure rational use of antibiotics 2. Existence of regulatory bodies to control antibiotic misuse. 3. Availability of most common antibiotics and essential drug lists through national procurement levels.	1. Political situation and lack of borders control 2. Weak implementation of laws and regulations 3. Inappropriate antibiotic prescriptions and dispensing. 4. Under reporting of antibiotics consumption. 5. One Health approach not fully

4. Existence of drug manufactures with GMP certificates. 5. Committed policy makers and health and vet staff to control antibiotics misuse. 6. Existence of antimicrobial stewardships in some health hospitals. 7. Some well-trained doctors and health staff have experience in AMS. 8. National treatment guidelines on infectious diseases in humans available	understood and implemented 6. Lack of technical infrastructure and expertise to discover new antibiotic or vaccine against MDROs. 7. Inadequate AMS in vet sector 8. Absence of dedicated clinical pharmacists to support AMS and rational use of antibiotics 9. Unavailable national treatment guidelines for infectious diseases in animal sector.
Opportunities	**Threats**
1. Policy makers support 2. Support from UN agencies 3. Expertise on AMS available 4. Availability of central lab to check quality of antibiotics and to generate data on AMR	1. Political situation 2. Behaviour change of health, and vet professionals and public about misuse of antibiotics. 3. Growing number of high-risk, immune compromised and elderly people and their susceptibility to infectious disease. 4. Improper treatment and disposal of expired or unused antimicrobials. 5. Use of antibiotics in animal feeds. 6. Lack of antimicrobial stewardships in other health and animal sectors. 7. Lack of coordination with national sectors 8. Strong influence of pharmaceutical companies in promoting their products 9. Fast spread of AMR

Strategic objectives

Improvement to optimize use of antimicrobials across the sectors shall be carried out through following strategic objectives

1. Enhance national capacities of health care and animal care providers in rational use of antimicrobial drugs
2. Strengthen antimicrobial stewardship programme (AMS) in health care settings
3. Develop and implement antimicrobial stewardship programme in the animal sector
4. Coordinate with the national surveillance system for antibiotics use in human and animals

Operational Plan

Objective 4.1: Enhance national capacities of health care and animal care providers in rational use of antimicrobial drugs

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Establish multisectoral AMS technical working group under the overall supervision of the National AMR committee	Q2/2021	MoH	1000
Assess/Review the current legislation for regulating antimicrobial prescribing and dispensing practices, and preventing self-medication and suggest revisions, if needed	Q3/2021	AMS technical working group	5000
Conduct advocacy meetings with concerned policy/decision makers in order to enforce the implementation of existing and proposed legislations	Ongoing	AMS technical working group	2500

Assess extent of use of antibiotics as growth promoters in animals and poultry as well as mixing of animal feed with antibiotics. If significant, advocate for formulation of law to ban these practices.	Q4/2021	AMS Technical working group and MoA PVS	10000
Introduce /promote and strengthen infectious diseases teaching/training among medical and veterinary professionals	2021-2022	MoHE	5000
Incorporate the AMS within the under and post graduate curricula of all the medical, dental, pharmacy veterinary and agriculture faculties	Q3/2021	MoHE	5000
Advocate for the use of point of care rapid diagnostic tests and promote their availability and use	Q2/2021	MOH	5000
Organize frequent orientation courses for different categories of professionals in rational use of antibiotics	Annually	MoH MoA	20000
Disseminate national guidelines (standards of care) for treatment of priority infectious disease in humans, and use these in trainings/orientation programmes	Q4 2021	MoH MoA	5000
Develop and disseminate national guidelines (standards of care) for treatment of priority infectious disease in animals, and use these in trainings/orientation programmes	Q4 2021	MoA	10000

Objective 4.2: Strengthen antibiotic stewardship programme (AMS) in health care settings

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Undertake baseline assessment of existing antimicrobial stewardship programme in health facilities	Q4/2020	AMS technical working group MoH	20000
Disseminate standards, protocols and guidelines for implementation of AMS core elements in all health facilities	Q4/2020	AMS technical working group MoH	5000
Organize training of trainers for conducting training programmes to AMS teams at health care settings	Q4/2021	MoH	20000
Promote establishment of AMS committee and operationalization of their mandate in both public and private health care facilities	Q1/2022	MoH	5000
Undertake annual review of the operations of AMS in all health care facilities and initiate remedial measures	Annually	MoH	5000

Objective 4.3: Develop and implement AMS in the animal sector

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Establish national database of all farming animals, poultry sector and fish producing facilities	Q1 / 2021	MoA	20000
Undertake baseline assessment of existing antimicrobial stewardship programme & the related national capacities	Q1 / 2021	MoA	5000
Formulate and disseminate AMS guidelines in vet sector	Q3 / 2021	MoA	5000
Develop continuous professional programs on optimizing therapeutic use of antimicrobials in vet sector	Q2 / 2021	MoA	5000
Organize training of trainers for conducting training programmes to AMS teams at veterinary settings	Q1 / 2022	MoA	10000
Promote establishment of AMS committees and operationalization of their mandate in both public and private veterinary facilities	Q1 / 2022	MoA	5000
Undertake annual review of the operations of AMS in all veterinary facilities and initiate remedial measures	Annual	MoA	5000

Objective 4.4: Coordinate with the national surveillance system for antibiotics use in human and animals

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Collaborate with national integrated AMR and AMU surveillance system to obtain information in real time on use of antibiotics	Q1/ 2021	MoA MoH	1000
Develop mechanism to review and revise guidelines on antibiotics based upon data made available by the national surveillance system	Q1 / 2022	MoH MoA	1000
Establish a mechanism to rapidly disseminate information on revised guidelines to the users	Q1 / 2022	MoH MoA	1000

M&E Plan for Goal 4

Objective	Target BY 2024	Baseline	Indicator	Frequency of measurement	Responsibility
4.1 Enhance national capacities	50 % increase in health work force that has been trained in rational use of antibiotics	Ascertain number of health workforce trained in rational use of antibiotics	No of health workers undergoing training on rational use of antibiotics	Annual	MoH
4.2 Disseminate antimicrobial stewardship programme (AMS) in healthcare	50 % increase in health facilities with functional AMS	To be determined during the baseline assessment	Percent of hospitals with functional AMS Percent of	Twice a year	AMS National Committee

settings			PHC with functional AMS		
4.3 Develop and implement antimicrobial stewardship programme (AMS) in veterinary settings	20 % increase in registered farms implementing AMS	To be determined during the baseline assessment	Percent of registered farms implementing AMS	Annual	MoA
4.4 Coordinate with the national surveillance system for antibiotics use in human and animals	National coordination mechanism established for estimating antibiotic consumption in humans and animals	No mechanism to coordinate with the national surveillance system for antibiotics use in human and animals available	National coordination mechanism established for estimating antibiotic consumption in humans and animals	Annual	MoH MoA

Goal 5: Encourage and promote operational research on AMR

Research in health is an instrument that can facilitate strengthening of health system including efficient implementation of all health-related programmes. operational research (OR) can improve understanding of the challenges being faced by the health sector in implementation of their mandate and suggest suitable field-tested remedial measures and create base line data in Palestine.

High calibre medical and veterinary schools are functional in Palestine. These should be encouraged and mandated to undertake research applicable to solve national health problems. A strong collaboration between the Ministry of Health, Ministry of Agriculture and Ministry of Higher Education can help in identifying research priorities. Suitable grants and oversight on funded research shall further strengthen this collaboration.

Implementation of national action plan to combat antimicrobial resistance shall raise several issues and is likely to encounter impediments at local level. These can be addressed by Palestinian researchers to ensure smooth operations of activities in the NAP.

SWOT Analyses

Strengths	**Weaknesses**
1. Existence of limited research academia available 2. Support from public and UN agencies available for research. 3. Labs are available to support research and field studies. 4. Committed policy makers and staff for research 5. Some published data on AMR are available to use it for policy actions.	1. Weak infrastructure for research in medical and veterinary institutes 2. Inadequate coordination between health, vet, environment and academia 3. Public health and vet labs have limited capacity to contribute significantly in the research and field-studies. 4. AMR not a priority with the researchers in veterinary sector
Opportunities	**Threats**
1. Global, UN agencies and national interests for AMR in place. It may result in access to additional funds for research 2. Political support to control AMR.	1. Political situation and occupation 2. Lack of resources and funding for research in AMR. 3. Fast spread of AMR, 4. Delayed and complicated publication procedures.

Strategic Objectives:

This goal will have following strategic objectives

1. Advocacy with researchers' community to initiate operational research on priority areas of research in AMR in support of NAP.
2. Explore use of approved alternatives antimicrobials.

Operational Plan

Strategic Objective 5.1 Advocacy with researchers' community to initiate operational research on priority areas of research in AMR in support of NAP

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Establish a Technical Working Group on Research in AMR with membership of MoH, MoA, MoHE, and prominent researchers	Q2/2021	MoH	1000
Identify national priorities for research in AMR	Q2/2021	TWG on Research	5000
Encourage studies that elucidate economic impact of AMR on country and generate baseline data for Goals 1 to 4 of NAP	2021 onwards	TWG on Research	10000*
Support mobilization of resources to support priority research areas in AMR	2021 onwards	TWG on Research	50,000
Organize annual meetings with researchers for sharing information and utilization of research findings to improve implementation of NAP	Annually	TWG on Research	10,000

*For baseline studies, funds have already been proposed in respective Goals

Strategic Objective 5.2: Explore use of approved alternatives antimicrobials

Activities

Activity	Time Frame Q/Y	Responsibility	Estimated Budget USD
Undertake a realistic review of available and approved medicines in country and adjoining areas that can act as alternative to antibiotics	Q3/2021	MoH MoHE/ Universities	10000
Generate evidence on utility of approved alternative medicine and share with global experts	Q1/2022	MoHE/ Universities	15000
Total Budget			

M&E Plan for Goal 5

Objective	Target by 2024	Baseline	Indicator	Frequency of measurement	Responsibility
5.1:Advocacy with researchers' community to initiate operational research on priority areas of research in AMR in support of NAP	At least 10 national research priorities on AMR identified, supported and studies completed	Number of research activities to support NAP ongoing	Number of research activities to support NAP identified, supported and completed	Annual	TWG on Research
5.2: Explore use of approved alternatives antimicrobials	At least 3 alternatives to antibiotics identified and studied	Number of alternatives to antibiotics in use	Number of alternatives to antibiotics identified and studied	Annual	TWG on Research

Estimated Budget

The following Table shows the consolidation of estimated budget for implementation of NAP for 2020 to 2024 in Palestine in respect of each goal and for each year.

All figures in USD

Goal	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	109000	94000	91000	85000	85000	464000
2	101000	200000	151000	40000	40000	532000
3	31000	134000	37000	20000	20000	242000
4	79500	115000	47000	30000	30000	301500
5	16000	95000	10000	10000	10000	141000
M&E	10000	10000	10000	10000	10000	50000
Total	**346500**	**648000**	**346000**	**195000**	**195000**	**1730500**

(Total USD one million seventy-three thousand and five hundred)

The estimated budget is primarily the running and maintenance cost of the operations as enunciated in the NAP. The available human resource and infrastructure available within the country shall be mobilized to implement the NAP. This will also ensure sustainability of the operations beyond the proposed time frame for this NAP.

ANNEXES

ANNEX 1: CONTRIBUTORS TO DRAFTING OF NATIONAL ACTION PLAN

The following members of five Technical Working Group contributed to discussions and drafting of NAP**.**

AMR Awareness Technical Working Group

Name	Institution	Position
Ms. Lobna sader	MoH	Director of health education and promotion department
Dr. Walid Khatib	MoH	School health department director
Ms. Kafa Yamin	MoH	health education and promotion department
Dr. Elena Awwad	MOA	General Directorate of vet services Head of Ramallah Veterinary Laboratory
Dr. Saed Barguthi	MOA	General Directorate of vet services Head of Ramallah Veterinary Laboratory
Dr. Reem Abu Arqoub	MoH	oral and dental health unit
Dr. Fatina Naser	MoH	Quality planning department
Ms. Hanan Abed	MOE	Head of school health division
Dr. Ahmad Saleh	UNRWA	Physician
Ms. Jamila Dababneh	MoH	School health department
Dr. Mohammad Obeid Allah	UNRWA	Physician

Surveillance Technical Working Group

Name	Institution	Position
Dr. Dia Hijaja	MOH	Director of preventive medicine department
Dr. Mousa Hindiah	Caritas Baby Hospital CBH	Lab director and national microbiologist consultant
Dr. Elena Awwad	MoA	General directorate of vet services Head of Ramallah Veterinary Laboratory
Dr. Mohammad Manasra	MoA	General directorate of vet services / central vet lab
Mr. Abed Al ra'oof Saleem	MoH	Director of quality planning department
Mr. Nidal Alawneh	MoH	Director of medical laboratories
Mr. Nimer Aldaghamin	MoH	Quality planning department
Mr. Mohammad Bakir	MoH	preventive medicine department
Mr. Mamoun Obeidiah	MoH	Medical Arab complex / microbiologists
Dr. Samar Adas	MoH	General directorate of pharmacy
Ms. Nawras Mashafi	MoH	General directorate of pharmacy
Mr. Essa Shtieh	MoH	Central public health laboratory
Ms. Naveen Arnaout	UNRWA	Lab technician
Ms. Fida Zidan	UNRWA	Director of labs
Mr. Rizeq diab	UNRWA	Head of lab

Infection prevention and control Technical Working Group

Name	Institution	Position
Mr. Abed Ra'oof Saleem	MoH	Director of quality planning department
Dr. Rabeeh Odwan	Makased & Istishari hospitals	Infection prevention &AMS national consultant
Dr. Ali Sabateen	Augusta Victoria Hospital	Infection prevention & AMS national consultant
Dr. Elena Awwad	MoA	General directorate of vet services Head of Ramallah Veterinary Laboratory
Dr. khalida khaled	MoH	School health department
Ms. Dina Essa	MoH	General director of nursing
Dr. Hebat Manaa	MoA	General directorate of vet services Head of Nablus Veterinary Laboratory
Mr. Nimer Daghamin	MoH	Quality planning department
Mr. Khalid Shalabi	Municipality of Qalqilya	Qalqilya environment unit
Mr. Mahmoud Othman	MoH	Environment health department
Dr. Reem Abu Arqoub	MoH	oral and dental health unit
Dr. Fatina Naser	MoH	Quality Planning department
Dr. Samar Adas	MoH	General directorate of pharmacy
Mr. Mohammad Bakir	MoH	preventive medicine department
Dr. Ali Abed Rabo	MoH	IHR Focal point
Dr. Abeer Khandakji	MoH	Primary health care general directorate

AMS Technical Working Group

Name	Institution	Position

Dr. Samar Adas	MoH	General directorate of pharmacy
Dr. Rabeeh Odwan	Makased & Istishari hospitals	Infection prevention &AMS national consultant
Dr. Ali Sabateen	Augusta Victoria Hospital	Infection prevention &AMS national consultant
Dr. Elena Awwad	MoA	General directorate of vet services Head of Ramallah Veterinary Laboratory
Dr. khalida khaled	MoH	School health department
Ms. Dina Essa	MoH	General directorate of nursing
Dr. Rawhi Numoor	MoA	General directorate of vet services Head of Jerusalem field services department
Mr. Nimer Daghamine	MoH	Quality planning department
Mr. Khalid Shalabi	Municipality of Qalqilya	Qalqilya environment unit
Mr. Mahmoud Othman	MoH	Environment health department
Dr. Reem Abu Arqoub	MoH	oral and dental health unit
Dr. Fatina Naser	MoH	Quality Planning department
Mr. Abed Ra'oof Saleem	MoH	Director of quality planning department
Mr. Mohammad Bakir	MoH	preventive medicine department
Dr. Ali Abed Rabo	MoH	IHR Focal point
Dr. Abeer khandakji	MoH	General directorate of primary health care

Research Technical Working Group:

Name	Institution	Position

Dr. Yaser Boziah	MoH	Public health general director
Dr. Elena Awwad	MoA	General directorate of vet services Head of Ramallah Veterinary Laboratory
Dr. Mohammad Manasra	MoA	General directorate of vet services / central vet lab
Dr. Dia hijaja	MoH	Director of preventive medicine department
Dr. Ali Abed Rabo	MoH	IHR Focal point
Dr. Samar Adas	MoH	Genera; directorate of pharmacy
Ms. Lobna Sader	MoH	Director of health education and promotion department
Dr. AbeerK handakji	MoH	Primary health care general directorate
Mr. Abed AL Ra'oof Saleem	MoH	Director of quality planning department
Dr. Fatina Naser	MoH	quality planning department
Mr. Mohammad bakir	MoH	Preventive medicine department
Ms. Fida Zidan	UNRWA	Head of Labs

ANNEX 2: TERMS OF REFERENCE OF DIFFERENT COMMITTEES

National Focal Point (NFP) for AMR – Palestine To:

- Build sustained partnerships and work nationally and internationally on containment of AMR.
- Identify stakeholders and facilitate formation of a national AMR committee.
- Lead and coordinate drafting of a national action plan for containment of AMR with a help from the national AMR committee.
- Facilitate and oversee implementation, M&E of the plan by the help of the National AMR committee.
- Ensure regular data collection and information sharing by instituting effective communication and coordination among all stakeholders, the members of national committee and their constituencies, sectors.
- Coordinate the national activities for establishment of AMR surveillance systems.
- Report on the prevalence, surveillance of and trends in AMR to the global AMR surveillance system (GLASS).
- Supervise the activities of the technical working groups in AMR.
- Advocacy with the national AMR Committee to high policy makers for support, sustainability of AMR activities and fund raising.
- Contact other consultants and experts to help in technical issues needed during preparation of the national action plan of AMR, its implementation and evaluation and also in research and studies.

National Committee of AMR

- Working closely with AMR national focal point.
- Sharing AMR -NFP for advocacy to high policy makers for applying legislative and regulatory issues, sustainability of the plan, implementation of the action plan and funding.
- Attending of the all meetings in the committee with AMR-NFP.
- Sharing AMR-NFP for the preparation of the drafts of national action plan and preparing the final version with the technical and logistic help.

- Sharing AMR-NFP for the steps of monitoring and evaluation of the national action plan activities.
- Supervising the technical groups working and advice according the member expertise and specialty.
- Supervise and share the activities of technical working groups according specilaity .

Technical working groups for Goals of NAP

- Providing technical input related to their expertise to the national AMR committee.
- Helping in the country situation analysis for each goal before preparation the action plan.
- Preparing and developing national action plan drafts and the final version with the committee members and NFP.
- Participating in the meetings within a group and share the meeting with national committee and the NFP.
- Applying the instructions and what is needed from the NFP and the national committee members.
- Providing technical advice and the reports needed to the NFP and national AMR committee.
- Monitoring and Implementing all activities of AMR goals and objectives according the technical working group speciality .

References

1. The review on antimicrobial resistance. The antimicrobial resistance: tackling a crisis for the health and wealth of countries, 2014. Available at https://amrreview.org/sites/default/files/160525_Final%20paper_with%20cover.pdf (Accessed on 11 October 2019)
2. World Bank (2016). http://www.worldbank.org/en/news/press-release/2016/09/18/by-2050-drug-resistant-infections-could-cause-global-economic-damage-on-par-with-2008-financial-crisis . Accessed on 10 October 2019
3. World Health Organization. At UN, global leaders commit to act on antimicrobial resistance. Geneva, World Health Organization, 2016. Available at. http://www.who.int/mediacentre/news/releases/2016/commitment-antimicrobial-resistance/en/ (Accessed on 13 October 2019)
4. World Health Organization; Global Action Plan on AMR, 2015. Available at http://www.wpro.who.int/entity/drug_resistance/resources/global_action_plan_eng.pdf. Accessed on 7 October 2019
5. Al-Dawodi R, Farraj MA, Essawi T. Antimicrobial resistance in non-typhi Salmonella enterica isolated from humans and poultry in Palestine.*J Infect Dev Ctries*.**2012**;13;6(2):132-6.
6. RupaKanapathipillai et al. Antibiotic resistance in Palestine: an emerging part of a larger crisis. *BMJ***2018;**363:k4273
7. AlyacoubiS, AbuowdaY, AlbarqouniL, BöttcherB, ElessiK. Inpatient management of community-acquired pneumonia at the European Gaza Hospital: a clinical audit. *Lancet***2018;**391(Suppl 2):S40.
8. ElmanamaAA, LahamNA, TayhGA. Antimicrobial susceptibility of bacterial isolates from burn units in Gaza. *Burns***2013;**39:1612-8.
9. Al JaroushaAM, El JadbaAH, Al AfifiAS, El QouqaIA. Nosocomial multidrug-resistant *Acinetobacterbaumannii* in the neonatal intensive care unit in Gaza City, Palestine. *Int J Infect Dis***2009;**13:623-8.
10. Sweileh WM, Al-Jabi SW, Zyoud SH, Sawalha AF, Abu-Taha AS. Global research output in antimicrobial resistance among uropathogens: A bibliometric analysis (2002-2016).*J Glob Antimicrob Resist*.**2018**;13:104-114.
11. Qabajah M, Awwad E, Ashhab Y. 2014. Molecular characterization of Escherichia coli from dead broiler chickens with signs of colibacillosis and ready-to-market chicken meat in the West Bank. Br Poult Sci. 2014; 55(4):442-51.
12. Wright PA. Diarrhoea; a specific treatment programme in Palestinian refugee camps. *Nurs Times*.**1971**;67(30):915-8.
13. Albarqouni L, Elessi K, Abu-Rmeileh NME. A comparison between health research output and burden of disease in Arab countries: evidence from Palestine.*Health Res Policy Syst*.**2018**;16(1):25.
14. Abu Amr SS, Yassin MM. Microbial contamination of the drinking water distribution system and its impact on human health in Khan Yunis

Governorate, Gaza Strip: seven years of monitoring (2000-2006).*Public Health.***2008**;122(11):1275-83.

15. Azaizeh H, Saad B, Cooper E, Said O.Traditional Arabic and Islamic Medicine, a Re-emerging Health Aid.*Evid Based Complement Alternat Med*.**2010** ;7(4):419-24.
16. Handal et al. Characterization of carbapenem-*resistant Acinetobacterbaumannii strains* isolated from hospitalized patients in Palestine. *Antimicrobial Resistance and Infection Control***2015**, 4(Suppl 1):P136
17. Adham S. Abu Taha and Waleed M. Sweileh. Antibiotic Resistance of Bacterial Strains Isolated from Patients with Community-Acquired Urinary Tract Infections: An Exploratory Study in Palestine. *Current Clinical Pharmacology***2011**;6:304-307

Acknowledgements

Palestine (MoH, MoA) and other health providers thanks the support provided by WHO and FAO in drafting the National Action Plan. Technical assistance provided by Dr Rajesh Bhatia, former Director Communicable Diseases, WHO Regional Office for South East Asia, New Delhi India is also acknowledged and appreciated.