

**National Action Plan**  
to  
**Combat Antimicrobial Resistance**  
In  
**Hashemite Kingdom of Jordan**  
**(2018-2022)**

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## Abbreviations and Acronyms

ACUC	Animal Care and Use Committee
AM	Antimicrobials
AMR	Antimicrobial Resistance
AMU	Antimicrobial utilization
ARI	Acute Respiratory Infections
ASP	Antibiotic Stewardship Programme
AST	Antimicrobial Susceptibility Testing
CDE	Centre for Disease Epidemiology
CLSI	Clinical Laboratory Standards Institute
CPHL	Central Public Health Laboratory
DIC	Drug information centers
EMRO	Eastern Mediterranean Regional Office of WHO
EQA	External Quality Assessment
ESBLs	Extended Spectrum Beta Lactamases
FAO	Food and Agriculture Organization of the UN
GAP	WHO Global Action Plan for AMR
GDP	Gross Domestic Product
GLASS	Global Antimicrobial Resistance Surveillance System
GMA	Greater Amman Municipality
HAIs	Hospital Associated Infections
HCAC	Health Care Accreditation Council
HCP	Health care providers
HIV	Human Immunodeficiency Virus
IEC	Information, education and communication
IPC	Infection Prevention & Control
J-RMS	Jordan Royal Military Service
JDA	Jordan Dentists Association
JFDA	Jordan Food & Drug Administration
JMA	Jordan Medical Association
JNA	Jordan Nurses Association
JOVAC	Jordan Bio Industry Centre

JPA	Jordan Pharmacists Association
JUH	Jordan University Hospital
JUST	Jordan University for Science and Technology
JVA	Jordan Veterinarians Association
KAH	King Abdullah 1 Hospital
KIMADIA	The State Company for Provision of Medicines and Medical Appliances
LIMS	Laboratory information management system
M&E	Monitoring and Evaluation
MDR	Multi Drug Resistance
MoA	Ministry of Agriculture
MoE	Ministry of Education
MoEnv	Ministry of Environment
MoH	Ministry of Health
MoMA	Ministry of Municipal Affairs
MRSA	Methicillin Resistant <i>Staphylococcus aureus</i>
NAMRU	Naval Medical Research Unit of USA
NAP	National Action Plan
NCARE	National Centre of Agriculture Research and Extension
NCC	National Coordination Centre
NEQAS	National External Quality Assessment Scheme
NFP	National Focal Point for AMR
OIE	World Organization for Animal Health
OTC	Over the Counter Sale
PPD	Plant Protection Division
PPE	Personal Protective Equipment
REQAS	Regional External Quality Assessment Scheme
SOP	Standard Operating Procedure
UHC	Universal Health Coverage
UNWRA	United Nations Relief and Works Agency for Palestine Refugees in the Near East
USAID	United States Agency for International Development
VISA	Vancomycin intermediate susceptible <i>Staphylococcus aureus</i>
WHA	World Health Assembly
WHONET	WHO software for analyses of AST data

# Foreword

Antimicrobial Resistance – the inability of antibiotics to treat infectious diseases has assumed serious proportions all over the world. It is one of the few challenges that have been ever addressed by the United Nations General Assembly. This led to a political declaration in 2016 by the World leaders to comprehensively and immediately mount an exacting response. The global community has given this call to mitigate impending impact of antimicrobial resistance on human mortality, morbidity and economic catastrophe. In that sense, it is no longer considered as a medical problem. Rather it has been recognized as a development issue that shall affect much more the emerging economies and developing countries than the developed world.

Antimicrobial resistance is a complex multidimensional problem. It has serious economic, educational, regulatory, behavioural and intersectoral coordination dimensions too. Thus, it is a complex and tricky challenge that needs well thought of actions and interventions to prevent and contain it.

In 2015, the World Health Organization had come out with a Global Action Plan to combat Antimicrobial Resistance and had asked all its Member States to develop country-specific action plans and implement these assiduously.

With extensive national consultation, and assistance from different international development partners, Jordan has developed its National Action Plan for next five years. This National Action Plan is in alignment with WHO Global Action Plan and covers all five broad objectives as enunciated in WHO Global Plan.

Jordan is committed to implement this National Action Plan through its health system and using multi-sectoral as well as One Health approach. A mechanism has been established that brings together senior officials from various sectors including human and animal health. Focus of national efforts shall be on augmenting awareness on this issue amongst professionals as well as general public; strengthening nation-wide surveillance; improving infection control practices and biosecurity at all levels of health care facilities and animal husbandry services; promoting rational use of antibiotics and supporting research especially operational research that would facilitate institution of locally-appropriate interventions in Jordan.

We recognize that battle against antimicrobial resistance shall be long-drawn. We also understand that sustained efforts at political, technical and community levels are prerequisites for mitigating impact of antimicrobial resistance and preserving as well as prolonging the efficacy of currently available affordable antibiotics.

I am sure that Jordan will not lag behind in contributing effectively to this global endeavor of ensuring a sustainable fight against infectious diseases.

Minister of Health

, Prof. Dr. Mahmoud Yassin Al-Sheyyab

## **Executive Summary**

Antimicrobial medicines (like antibiotics) save millions of lives. Modern medicine's dependence on antibiotics has been phenomenal since the development of these drugs beginning in the 1940s. But misuse and overuse of these medicines in humans and animals has facilitated the emergence and spread of antimicrobial resistance (AMR), rendering many of these drugs ineffective. Until recently, diseases such as typhoid fever and gonorrhea and most infections acquired in health-care facilities responded rapidly to affordable antibiotics. But this is no longer true. The pipeline for the development of new classes of antibiotics has also dried up, and it is unlikely that new, effective and affordable medicines will soon be available. The rise of AMR means that many common infections may again kill.

AMR is deadly and expensive. Current estimates are that AMR now kills 700,000 people worldwide every year. This number is projected to rise to 10 million by 2050. Most of these deaths will occur in developing countries. AMR may have severe adverse effects on the global economy. If AMR is not addressed now, the world may produce around US \$8 trillion less per year by 2050, and a cumulative \$100 trillion could be wiped off the world's productivity over the next 35 years. The world's GDP could drop by as much as 3.5%. Economic losses will be greatest in developing countries. The poor will be hit hardest.

AMR is thus no longer only a health issue. It has grave potential to impede economy, food security and health of the people. AMR has thus become a challenge to global development invoking its political dimensions. United Nations General Assembly and various other international agencies especially World Health Organization (WHO), Food and Agriculture Organization (FAO) and World Organisation for Animal Health (OIE) have recently witnessed strong petition by all countries to mount globally coordinated action to prevent and contain AMR.

In May 2015, the sixty-eighth World Health Assembly (WHA) endorsed the Global Action Plan on Antimicrobial Resistance (GAP-AMR) – including antibiotic resistance, the most urgent drug resistance trend. 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. WHO has developed a framework for drafting of action plans that are aligned with WHO Global Action Plan on AMR but are implementable in local context.

In accordance with the commitment in the World Health Assembly, and to contribute to global health, Jordan initiated drafting of its national action plan (NAP) that was coordinated by National Focal Point under the guidance and supervision of the National Committee.

The objectives of NAP are aligned with the global action plan based on national needs and priorities. The emphasis is on One Health approach with all sectors especially human health, animal health and environment contributing towards minimizing the emergence and impact of AMR in Jordan.

Five objectives have been identified under the NAP. These are

1. Improving awareness and understanding of AMR through effective communication, education and training;
2. Strengthening knowledge and evidence through surveillance;
3. Reducing the incidence of infection through effective infection prevention and control;
4. Optimizing the use of antimicrobial agents in health, animals and food; and
5. Promoting investments for AMR activities, research and innovations;

NAP AMR is expected to reflect the five principles based on which the global action plan on AMR strategies have been enunciated. 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 Objective 1 focuses on improving awareness and understanding of AMR through effective communication, education and training, and has three components viz. improving awareness and change behaviours regarding hygiene and the appropriate use of antibiotics among public, animal and human health care providers, farmers, and students, strengthening political commitment for AMR and improving knowledge of AMR and related topics

NAP Objective 2 aims to strengthen knowledge and evidence through surveillance of AMR, with two components viz. establishment of a national One Health surveillance system for AMR and strengthen laboratory capacity

NAP Objective 3 attempts to reduce the incidence of infection through effective infection prevention and control in healthcare to reduce the burden of infection, in animal health and food to reduce spread of AMR and antimicrobials through animals and food, and in community and environment to reduce the spread of AMR and antimicrobials in the environment with three components viz. improve the national infection control program, ensure the availability of evidence based best practices and nationality consistent standard for IPC in animal sector and Improve knowledge of AMR and related topics to raise level of hygiene.



NAP Objective 4 shall optimize the use of antimicrobial agents for human health, animals and food through strengthening regulations, ensuring access and surveillance of antimicrobial use, antimicrobial stewardship in healthcare as well as animal health and agriculture. Its components are: ensure that tailored, evidence based antibiotic prescribing guidelines are available for all sectors; ensure the availability of evidence-based, best-practice and nationally consistent approaches to AMS across human health and animal care settings; develop tailored, evidence-based resources to support the implementation of AMS programmes; review existing health care providers' qualifications and health institutions' accreditation to ensure they appropriately support and encourage compliance with best practice AMS approaches and strengthening and modifying the existing regulations to better support appropriate and careful use of antimicrobials.

NAP Objective 5 aims to promote investments for AMR activities, research and innovations through new medicines and diagnostics, innovations to develop alternative approaches to manage infectious diseases, and sustainable financing to ensure adequate resources for containment of AMR. It also aims to support research in AMR to assist policy setting in containing AMR and promoting economic studies of the AMR burden.

The 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 has also been proposed to keep track of the progress made and modifying the operational plan, if needed. Provisional costing has been done to have an overview of the resources needed which shall be mobilized from national sources and international development partners.

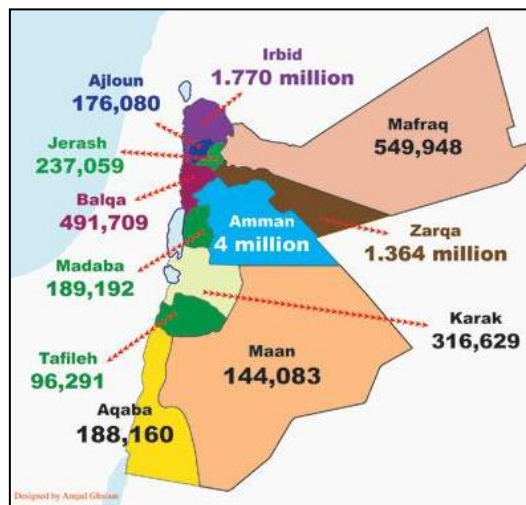
Using an efficient multi-sectoral model with One Health approach, as envisaged in this National Action Plan, Jordan aims to combat AMR in near future.

## **Chapter 1**

### **Introduction**

#### **The Country and AMR**

Jordan is a developing and Middle Eastern country with a total area of 89,342 square kilometres divided into 12 governorates. As of Nov 2016, Jordan has an estimated population of 9,781,563 million, a relatively high total fertility rate of 3.1, birth rate of 29 per 1000 population, death rate of 3.8 per 1000 populations, and median population age of 22 years.



While noncommunicable diseases are major contributors to morbidity in the country, around 13% of all deaths are caused by communicable diseases. In Jordan, neonatal disorders, diarrhea, lower respiratory, and other common infectious diseases, and maternal disorders are the most deadly communicable, maternal, neonatal, and nutritional diseases. The three commonest infectious diseases have been lower respiratory infections, intestinal infectious diseases, and measles. These make up 87.8% of all deaths from common infectious diseases in Jordan. Lower Respiratory Infections killed 10.7 people out of every 100,000. However, its mortality rate has decreased by 57% since 1990. Intestinal Infectious Diseases took the lives of another 2.0 per 100,000. Though, its mortality rate has decreased by 13% since 1990. Measles, was fatal to 1.4 per 100,000. Still, its mortality rate has decreased by 70% since 1990.

For several decades, antimicrobial resistance (AMR) has been a growing threat to effective treatment of an ever-increasing range of infections caused by bacteria, parasites, viruses and fungi. AMR results in reduced efficacy of antibacterial, anti-parasitic, antiviral and antifungal drugs, making the treatment of patients difficult, costly, or even impossible. The impact on particularly vulnerable patients is most obvious, resulting in prolonged illness and increased mortality. The magnitude of the problem worldwide and the impact of AMR on human health, on costs for the health-care sector and the wider society are still largely unknown, but several reliable estimates have generated staggering figures.

Every year AMR kills about 700,000 people worldwide – a number that is projected to rise to 10 million by 2050<sup>1</sup> as a consequence of inaction. Most of these deaths will be in the developing world, with enormous adverse social and economic effects. The economic impact of AMR may be devastating. A loss of USD \$100 trillion is estimated. Global GDP may decrease by 3.5%. the World Bank estimates that 28 million people are likely to be pushed into poverty as a direct consequence of disease due to resistant pathogens<sup>2</sup>. Global exports may see a decline of 3.8%. Livestock production may be reduced by 7.5% throughout the world, thus decreasing food security<sup>2</sup>.

Compared with patients with infections that are sensitive to antimicrobial medicines, patients infected by resistant pathogens will have longer hospital stays, undergo additional investigations, and spread infection for longer periods of time to greater numbers of contacts. Their treatment will require expensive second-line antibiotics, which may not be readily available or affordable and that may have serious adverse effects. Affected patients will lose time from work, incurring individual and societal costs. In the health sector, the costs to the individual and the health system are likely to be high, forcing national governments to divert resources from development activities to health.

AMR may jeopardize progress in health outcomes and is likely to undo the progress made against HIV, TB and malaria, after investments of billions of dollars. It could also adversely affect the ambitious goal of universal health coverage (UHC) – the most ambitious public health programme yet to alleviate human suffering and poverty.

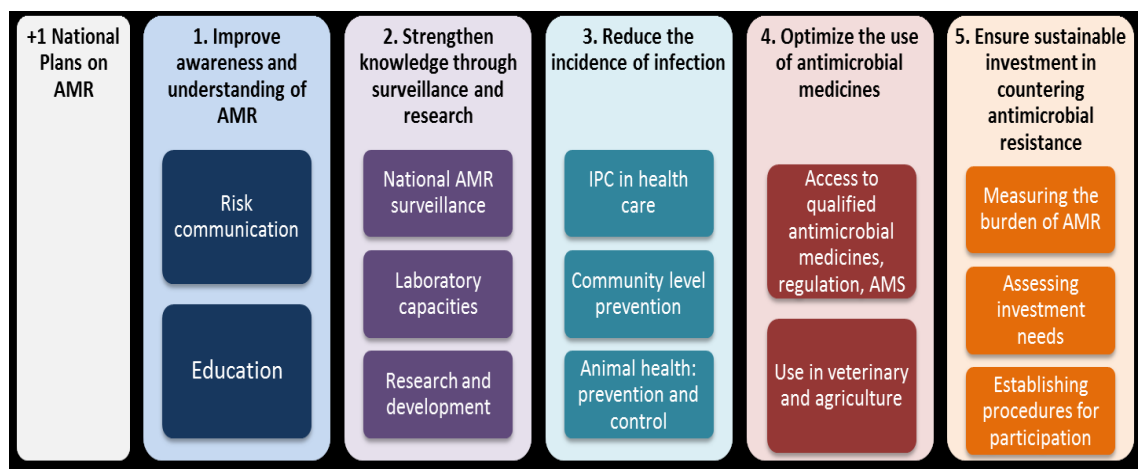
Widespread resistant bacteria in animal populations will be a major obstacle to meeting the projected 60% increase in global meat requirements by 2020<sup>3</sup>. The availability of food may diminish and the cost of available food may increase, thus hitting poor communities hardest. Consumer confidence in the safety and purity of food may diminish. Unless inappropriate use of antimicrobials is stopped, the use of antibiotics as growth-promoting agents in animals will further augment AMR. Success stories from several European countries in eliminating the nontherapeutic use of antibiotics need to be replicated globally and rapidly.

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1. <sup>1</sup>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](https://amrreview.org/sites/default/files/160525_Final%20paper_with%20cover.pdf) (Accessed on 11 August 2017)
  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 August 2017
  3. United Nations Department of Economic and Social Affairs. Food security and the MDGs. ([www.un.org/waterforlifedecade/food\\_security.shtml](http://www.un.org/waterforlifedecade/food_security.shtml) accessed on 28 March 2017)

Non-human sources of antibiotics, resistant bacteria and resistant genes found in aquaculture, wastewater from agriculture, and waste products from pharmaceutical are potential sites of emergence and horizontal transfer of resistance between several types of pathogens. The environment is key to the spread of resistance by these mechanisms that have hitherto been unknown, not well understood, or ignored.

## Genesis of National Action Plan

In response to this developing public health issue, a global action plan on antimicrobial resistance has been developed and at the 68th World Health Assembly in May 2015, Member States approved the resolution WHA68.7 The Global Action Plan (GAP) embraces the ‘One Health’ concept for integrated management of AMR in the food chain.



The Global Action Plan on AMR provides a broad framework for combating AMR. The goal of GAP-AMR is 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. The Global Action Plan 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.

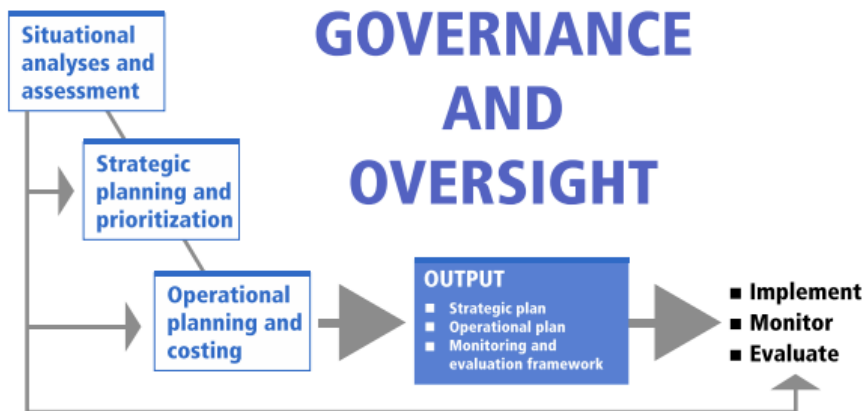
In particular, GAP suggests that all action plans should reflect the following principles:

1. Whole-of society engagement including “One Health” approach
2. Prevention first
3. Access
4. Sustainability
5. Incremental Targets for implementation.

## **Governance**

In accordance with World Health Organization Resolution WHA 68.7, all, Member States, including Jordan agreed on the importance of moving forward to develop national action plans by May 2017. These national plans would be aligned with the GAP for the use of antimicrobial medicines in animal health, agriculture and human health. (WHO, Global Action Plan for Antimicrobial Resistance, 2015).

Accordingly, in 2017 a national committee was formed, membership included representatives from different sectors (Annex 1) and report to the prime minister in Jordan. An approach – as depicted in Fig below and suggested by WHO was adapted.



The national committee was charged with following tasks:

- Select various sub-committees
- Develop, implement and communicate plans
- Develop guidance for Information, Education and Communication (IEC) materials
- Arrange the national campaigns
- Undertake advocacy role with decision makers
- Targeted communication with the professionals, regulators, community, and academia to ensure one message is conveyed.
- Develop teaching/training curricula for different faculties
- Develop continuing education programs for different target groups

It is expected that over next few years, the efforts of these committees-implemented through various institutions and organizations shall bring down the prevalence of AMR and reduce substantially its emergence in Jordan through following outcomes:

- AMR reduction
- Optimization of antibiotic use
- Availability of well-trained skilled professionals
- Implementation of regulations
- Development of new regulations to regulate the use of antibiotic under supervision of authorized individual(s).

Jordan Government designated its National Focal Point (NFP) in Ministry of Health to lead and coordinate national efforts on development of its National Action Plan on AMR. The NFP underwent orientation and sensitization in WHO intercountry meetings. A multi-sectoral high-level Committee was subsequently established by the Government of Jordan (Annex 1). This Committee produced an outline of national perspective and directions country has to follow to combat AMR. Significant technical assistance was provided by WHO and FAO in finalization of NAP which is an outcome of a multi-sectoral meeting held at Amman in November 2017 and participated by more than 100 national experts from diverse fields (Annex 2).

## **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. Ministry of Health
2. Ministry of Agriculture
3. JFDA: Jordan Food and Drug Agency
4. JPA: Jordan Pharmacists Association
5. J-RMS: Jordan Royal Military Service
6. JMA: Jordan Medical Association
7. JDA: Jordan Dentists Association
8. The Higher Health Council
9. JVA: Jordan Veterinarians Association
10. Ministry of Environment
11. HCAC: Health Care Accreditation Council

## **Situation Analysis**

### **AMR in Human beings**

The Ministry of Health of Jordan is the major health care provider in the country and is responsible for all health matters. Other major health providers include The Royal Medical Services, Jordan University Hospital (JUH), King Abdullah I Hospital (KAH) at Jordan University of Science and Technology (JUST), King Hussain Cancer Center, the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), and the private sector.

There is no resistance report shared with the Central Public Health Laboratory (CPHL) or national surveillance office in the JMOH. Until 2016, there was a surveillance program for *Salmonella* and *Shigella*; the isolates were collected from assigned sites and identification and susceptibility tests were performed at CPHL. The isolates were thereafter sent to NAMRU-3 labs for confirmation. Jordan is in process of implementing GLASS (The Global Antimicrobial Resistance Surveillance System). However, so far not much data has been generated for this purpose.

Several hospitals including university and few private hospitals perform antibiograms for standard bacterial isolates (*Staphylococcus aureus*, Coagulase negative staphylococcus, *Streptococcus pneumoniae*, enterococci, *Streptococcus viridans*, *E coli*, *Pseudomonas spp*, *Acinetobacter spp*, *Klebsiella*, and *Enterobacter*). These antibiograms are not shared with the national authorities. In general, these antibiograms show high prevalence of AMR. An example of such high rates is the rates of MRSA from *Staphylococcus aureus* which reaches a rate of 45% (Figure 1).



Table 1: Susceptibility percentage of **1072** isolates among **Gram positive** bacteria from **Jan - June 2013**

Bacteria	No. strains	Ampicillin	Oxacillin	Erythromycin	Gentamicin	Levofloxacin	Penicillin	Vancomycin	Clindamycin
Bacillus sp.	10	50%	40%	70%	100%	100%	----	90%	10%
Enterococcus	361	64%	----	13%	7%	48%	----	82%	14%
Staphylococcus aureus	223	5%	43%	60%	91%	91%	----	100%	75%
Coag Neg Staph	709	9%	25%	27%	68%	58%	----	100%	58%
Corynebacterium sp. (diphtheroids)	42	64%	5%	39%	48%	59%	----	100%	29%
Strept viridans	27	76%	5%	38%	30%	67%	----	95%	----

Strept pneumoniae: 12 isolates: PCN susceptibility 25%; Erthromycin susceptibility 25%  
Sources: sputum 3; ear 3; eye 3; blood 1; sinus 1; unknown 1

Figure 1: An antibiogram for Gram positive bacteria from one university hospital in Jordan.

Research articles from academic institutions are available although scarce on AMR. Such articles describe a high rate of resistance. Representative examples of these studies include; *Staphylococcus aureus* with intermediate susceptibility to vancomycin (VISA)<sup>4</sup>, high

<sup>4</sup>Bakri FG, Al-Hommos NA, Shehabi A, Naffa RG, Cui L, HiramatsuK. Persistent bacteraemia due to methicillin-resistant *Staphylococcus aureus* with reduced susceptibility to vancomycin in a patient with erythrodermic psoriasis. Scand J Infect Dis. 2007;39(5):457-60

resistance in Syrian refugees showing that 20 (66%) isolates were multidrug resistant (MDR) and 11 (36.7%) were carbapenem resistant<sup>5</sup>, highly resistant *Acinetobacter* with resistance rates of *A. baumannii* to imipenem reached 97% among all clinical samples in a public hospital<sup>6</sup>, methicillin resistant *Staph aureus* (MRSA) in northern Jordan detected upto 31% of all isolates<sup>7</sup>, ESBL prevalence seen upto 42%<sup>8</sup> and resistance levels of 90% and 60.4% to oxacillin and macrolides in *Strept pneumoniae*<sup>9</sup>.

Jordan is low endemic country for tuberculosis with prevalence rate approaching 7/100,000. However, at present, there is a possibility of missed cases among refugees. The disease is characterized by high stigma in Jordan which might cause noncompliance to treatment. The National TB program is the responsible entity for management of TB cases in Jordan. It provides anti-TB medicines, PPD testing, tuberculosis culture and sensitivity, and checks for resistance by GenXpert system. The TB laboratories perform sensitivity for the first line drugs: INH, rifampin, ethambutol, and streptomycin. If results are abnormal, testing is done for second line drugs namely ofloxacin, amikacin, and carbomycin. No report on resistance is shared with the national surveillance system or the central labs.

First Voluntary Counselling Center for HIV was established in Jordan in 1983. It performs counselling, provides anti-HIV medicines, and determines the statistics. No resistance tests are performed.

Regulations for the rational use of antibiotics are weak and poorly enforced. Antibiotics are sold without a prescription. Self-medication is high. Large number of patients has used one or more antibiotics when they first present to doctors. No public awareness campaign for promoting rational use of antibiotics has been undertaken. Promotional activities by pharmaceutical companies are not regulated. It facilitates prescription of high end and expensive antibiotics as “broad spectrum” medicines in contrast to specific and affordable antibiotics. No national treatment guidelines exist. No functional clearing house for development of guidelines exists. Health care providers have not been exposed to any national

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<sup>5</sup>Abbara A, Al-Harbat N, Karah N, Abo-Yahya B, El-Amin W, Hatcher J, Gabbar O. Antimicrobial Drug Resistance among Refugees from Syria, Jordan. Emerg Infect Dis. 2017 May;23(5):885-886.

<sup>6</sup>Batarseh A, Al-Sarhan A, Maayteh M, Al-Khatirei S, Alarmouti M. Antibigram of multidrug resistant *Acinetobacter baumannii* isolated from clinical specimens at King Hussein Medical Centre, Jordan: a retrospective analysis. East Mediterr Health J. 2016 Feb 1;21(11):828-34.

<sup>7</sup>Al-Zoubi MS, Al-Tayyar IA, Hussein E, Jabali AA, Khudairat S. Antimicrobial susceptibility pattern of *Staphylococcus aureus* isolated from clinical specimens in Northern area of Jordan. Iran J Microbiol. 2015 Oct;7(5):265-72.

<sup>8</sup>Hayajneh WA, Hajj A, Hulliel F, Sarkis DK, Irani-Hakimeh N, Kazan L, Badal RE. Susceptibility trends and molecular characterization of Gram-negative bacilli associated with urinary tract and intra-abdominal infections in Jordan and Lebanon: SMART 2011-2013. Int J Infect Dis. 2015 Jun;35:56-61.

<sup>9</sup>Swedan SF, Hayajneh WA, Bshara GN. Genotyping and serotyping of macrolide and multidrug resistant *Streptococcus pneumoniae* isolated from carrier children. Indian J Med Microbiol. 2016 Apr-Jun;34(2):159-65.

training on AMR. Sporadic conferences were organized concerning AMR. The national hospital accreditation body, the HCAC, has identified the problem of AMR and included it in the IPC standards.

An national infection control unit is operational from Ministry of Health. All hospitals are required to have an infection control unit, team, and committee. However, adherence to policies is questionable. Major challenges for the programs include large number of health care facilities, maintaining supply of the personal protective equipment (PPE) and other infection prevention control (IPC) materials, poor compliance with isolation measures, crowding in dialysis centers, poor vaccination uptake by healthcare providers, very few negative pressure rooms in the country, frequent use of single use devices, and in compliance with standards of infection control in the hospital structures.

Regarding innovation and research, Jordan has high quality medical centers. However, no research for developing new antimicrobials or diagnostics exists. The laboratories in public sector are rarely involved in any research. Few academic centers have performed research on AMR. most of these projects are small studies on epidemiology of AMR. However, these projects are performed according to the investigators preference and are not based on a priority selection. These studies are rarely used for decision making. Public and private sectors are not involved in research and innovation.

Strengths that appeared in the analysis include awareness of AMR does exist, the importance of infection control in health care facilities is well known and implicated, a hospital accreditation system is available and functioning, the National Public Health Laboratory is well established and provides support to communicable diseases, the private sector offers high quality services as evidenced by the presence of health tourism, and finally the presence of systems for quality and availability of drugs.

Areas that need improvement include: the absence of a national plan, the absence national AMR surveillance system, rational use of antibiotics in humans and animals, and finally the absence of treatment guidelines.

## **AMR in Animals and Agriculture**

Jordan is well served by its Agriculture Law No. 13 of 2015. Higher level administration is fully aware of the law, including relevant articles and many of the available powers to implement improvements on animal and plant health. The mandate of the Ministry of Agriculture (MoA) covers all Agriculture affairs in the Kingdom.

The Jordan Plant Health Services include the Plant Production Directorate (PPD), the Protection and Plant Health Directorate and the Land and Irrigation Directorate, Plant Laboratory Directorate and Olive Trees Directorate under the Ministry of Agriculture (MoA), the Municipalities

(including Greater Amman Municipality - GAM) under the Ministry of Municipal Affairs (MoMA), the National Centre of Agriculture Research and Extension (NCARE) & more recently, Jordan Food and Drug Administration (JFDA).

The Jordan Veterinary Services include the Veterinary Services Directorate (VSD), the Animal Production Directorate and the Licensing Department under the Ministry of Agriculture (MoA), the Municipalities (including Greater Amman Municipality - GAM) under the Ministry of Municipal Affairs (MoMA), the Food & Drug Administration (JFDA), the Centre for Disease Epidemiology (CDE) and the Tuberculosis Directorate under Ministry of Health (MoH).

Minimum National Standards in Agriculture (livestock and plant) in Jordan are available and implemented. These are structured around five core functions and nine core capabilities viz. policy development, management, service capability and capacity, information management, livestock tracing, training, communication, R&D and legislation/regulations.

Antibiotics are registered in Jordan and that responsibility falls under Pharmaceutical products registration and monitoring division at MOA (Veterinary Services Department). The division has reacted to combat AMR in Jordan through:

- Issuing recent regulations prohibit the use of antibiotics as growth promoters
- By the end of the year 2015 competent authority start putting a national plan to reduce AMR
- Some antimicrobials which were used as growth promoters have been stopped or are being strictly monitored.

The main gaps observed in animal health sector in Jordan indicate that current legislation does not clearly specify that antimicrobial agents are prescription only veterinary medicine. Veterinary prescriptions are mentioned in the current legislation for prescribing poisonous chemical products only.

The legislation grant permission for non-veterinarian (Agricultural Engineers) to sell antimicrobial products without veterinary supervision. Agricultural engineers are backbone for the sector however, agricultural engineers do not have the sufficient training nor do have the required background to dispense antimicrobials unsupervised by a veterinarian.

There are currently no formulary restrictions – (Pharmakopedia), no pre-authorization antimicrobial prescription forms and no prescription guidelines. Moreover, in spite of existence of antimicrobial stewardship committees and legislation framework, implementation at the field level or at the sector level remains inadequate.

Veterinary pharmaceutical products registration division has no reliable data on antimicrobial use, quantity imported or manufactured in the country, and has no control over regulating antimicrobial product importation to maintain a safe pool in country despite being the entity issuing

importation permits to pharmaceutical companies in Jordan. It is important that antimicrobial product registration process undergoes modernization.

## SWOT Analysis

**NAP Objective 1:** Improve awareness and understanding of antimicrobial resistance through effective communication, education, training, advocacy and behaviour change programs.

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Strong political commitment</li> <li>• Few qualified trainers, educators, promoters of rational use of antimicrobial agents available.</li> <li>• Few professionals and scientists with AMR knowledge available in country</li> <li>• The change behaviours experts available within country</li> <li>• Laws and regulations related to antibiotic use formulated</li> <li>• Digital media available and accessible</li> <li>• Internet prevalence and full coverage across the country</li> <li>• National multi-sectoral committee for AMR established with a dedicated Focal point to coordinate AMR related issues</li> <li>• Accredited health care organizations comply with infection prevention and control standards</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of financial resources to widely sponsor awareness activities e.g. donors / funder</li> <li>• Shortage of adequate number of qualified trainers and communicators in AMR issues</li> <li>• Cultural and traditional beliefs and myths related to AMR and antibiotics use</li> <li>• Inadequate implementation of laws and regulations</li> <li>• Non-availability of reliable data and trends on resistance</li> <li>• Inadequate motivation and interest among human and animal health care providers regarding the AMR</li> <li>• Lack of awareness among farmers and general public</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>• Partnership and collaboration with the relevant professional associations and related bodies</li> <li>• International agencies desirous in providing assistance in</li> </ul>	<ul style="list-style-type: none"> <li>• Sustainability of finances</li> <li>• Coordination with other sectors which do not perceive AMR as a major issue</li> </ul>

<p>AMR awareness</p> <ul style="list-style-type: none"> <li>• Making best use of global awareness and commitment including antibiotic awareness week</li> <li>• The possibility of making available natural alternative products</li> <li>• The community health committees in the primary care centres can work on AMR</li> <li>• Dedicated leaders in different levels and locations support AMR initiatives and their implementation</li> <li>• Effective enforcement of available laws and regulations</li> <li>• Implementation of laws through awareness campaign</li> </ul>	<ul style="list-style-type: none"> <li>• Waning advocacy</li> <li>• Financial benefits in private sector</li> <li>• Conflict of interest in committee</li> <li>• Conflict of interest with pharmaceutical companies to promote their awareness</li> <li>• Reaching refugees</li> </ul>
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**NAP Objective 2:** Strengthen the knowledge and evidence base through surveillance and research

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Established AMR HAI-surveillance in eight sites</li> <li>• Available epidemiological capacities</li> <li>• Established NCC organization and its ToRs available</li> <li>• CPHL nominated as national reference lab</li> <li>• Skilled personnel available</li> <li>• Agreement with veterinary college academia to strengthen the capacities (Agricultural Lab)</li> <li>• Agreement with water and environment center to enhance their capacity and share results</li> <li>• Lab in FDA For Food and drugs available for laboratories</li> <li>• Twinning establishment of Institutions (JUST) for ID and AMR in collaboration with international bodies e.g. Purdue/USA agreed</li> </ul>	<ul style="list-style-type: none"> <li>• No national Surveillance</li> <li>• NCC Not fully activated</li> <li>• Inadequate number of Trained personnel</li> <li>• Inadequate sharing of information by laboratories</li> <li>• Microbiologists with expertise in modern molecular biology techniques are very few</li> <li>• Inadequately equipped labs</li> <li>• less incentives for microbiologist</li> <li>• Lack of resources available for training personnel</li> <li>• Weak infrastructure</li> <li>• Laboratory information management system (LIMS) inadequate</li> <li>• limited capacity to detect emerging resistant pathogens (PCR,</li> </ul>

<ul style="list-style-type: none"> <li>• Electronic Surveillance system in MOH operational</li> <li>• Internal Quality control system (IQS) available</li> <li>• National external quality assessment scheme for laboratories (NEQAS) available for 47 institution (private, academia, governmental, and RMS)</li> <li>• Regional External Quality Assessment Scheme(REQAS) available</li> <li>• National biorisk management guidelines developed and available</li> <li>• Legislation and Laws on surveillance</li> <li>• Internationally accredited institutions (2 CAP accredited labs in non PHL sectors)</li> <li>• Local accreditation for hospitals (HCAC) ongoing</li> </ul>	<p>sequencing)</p> <ul style="list-style-type: none"> <li>• lack of lab networking</li> <li>• lack of collaboration with private sector</li> <li>• AMR surveillance for animal and agriculture</li> <li>• No efforts to establish correlation between antibiogram and antimicrobial consumption and correlation between antibiotic residue in animals and antimicrobial resistant</li> <li>• Absence of regulation for testing local and imported food antimicrobial residue</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Agreement with other partners to strengthen the capacities</li> <li>• Cooperation with Public and academia for Water and JFDA</li> <li>• Stable security situation in Jordan attract attention</li> </ul>	<ul style="list-style-type: none"> <li>• AMR spread is faster than the operational work</li> <li>• Refugees Problems</li> <li>• Institutional weaknesses in infrastructure and human resource</li> </ul>

**NAP Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Availability of infection control committee</li> <li>• Infection control programs in each hospital is well established and staffed</li> <li>• Availability of infection control guidelines</li> <li>• Application of Information technology</li> <li>• Surveillance program available for HAI</li> <li>• The willingness of the health sectors to establish programs</li> <li>• Safe drinking water</li> <li>• Good laws and legislation</li> <li>• Vaccination program effective, accessible and free</li> <li>• Regulated processing of hospital waste</li> <li>• School health program running efficiently</li> <li>• In large farms there is adequate biosecurity levels</li> <li>• Availability of trained vets in the field.</li> </ul>	<ul style="list-style-type: none"> <li>• Scattered efforts from each sector</li> <li>• Lack of Commitments of the leaders in some hospitals</li> <li>• Underestimation of the infection control work by other disciplines</li> <li>• Lack of follow up and monitoring for practice</li> <li>• Insufficient of infection control consumables and tools</li> <li>• Specific title and job description for IPC practitioners not available</li> <li>• Insufficient of training for other health care provider</li> <li>• Not including the infection control training in the curricula of healthcare disciplines</li> <li>• Non-availability of microbiologist, and infectious disease specialist in some hospitals</li> <li>• Non-availability of specialized IPC personnel</li> <li>• The number of veterinary clinics are very few</li> <li>• No regular surveillance system</li> <li>• Inadequate budget</li> <li>• Projects fully depending on external fund</li> <li>• Absence of formal connection between private and public sectors</li> <li>• There is no clear infection control units or practices and there is no adherence from the workers in the field</li> <li>• Many of workers don't have professional training</li> <li>• Lack of control over the vet pharmacy.</li> <li>• Lack of supervision of vets on some slaughter houses.</li> <li>• Uncontrolled antibiotics availability for all farms</li> </ul>



Opportunities	Threats
<ul style="list-style-type: none"> <li>• Support of political leaders for health system</li> <li>• International willingness for supporting infection control programs</li> <li>• For different sectors for health so, they can collaborate their efforts, best guidelines, best practices</li> <li>• Empowerment of the infection control workers</li> <li>• Centralized source of information</li> <li>• Gaining fund from international agencies to improve the infrastructure.</li> <li>• Vaccination campaigns</li> <li>• The international organizations willing to support the veterinary programs such as FAO, OIE</li> <li>• Integration between MOH and MOA</li> </ul>	<ul style="list-style-type: none"> <li>• Refugees</li> <li>• Aging population growing</li> <li>• New emerging infectious diseases</li> <li>• Rapid spread of MDROs</li> <li>• Trans boundary animal diseases</li> <li>• Imported animals</li> <li>• Illegal animal movement.</li> <li>• Livestock markets</li> </ul>

**NAP Objective 4: Optimize the use of antimicrobial medicines in human and animal health**

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Availability of rules and regulations to control both the prescribing and dispensing of antibiotics.</li> <li>• Existence of regulatory and accreditation bodies.</li> <li>• The availability of different types of antibiotics through national procurement departments</li> <li>• The availability of several local GMP pharmaceutical manufacturers which provide lower price bioequivalent generics.</li> <li>• The availability of essential drug list.</li> <li>• The presence of well-established pharmacovigilance system</li> </ul>	<ul style="list-style-type: none"> <li>• Weak implementation of existing laws and regulations</li> <li>• The absence of nationally adopted treatment guidelines.</li> <li>• The absence of prescribing and dispensing control system.</li> <li>• Under-reporting of therapeutic failures.</li> <li>• Inappropriate ordering of antibiotics by non-health care professionals or vets.</li> <li>• The lack of consultation with ID specialists and clinical pharmacists/PharmDs.</li> <li>• Healthcare professionals' malpractice in prescribing and</li> </ul>

<p>through JFDA</p>	<p>dispensing antibiotics.</p> <ul style="list-style-type: none"> <li>• The absence of universal health coverage</li> <li>• Lack of the ability to develop a newer antibiotic on a national level (Costly)</li> <li>• The lack of regulatory bodies to co-ordinate pharmaceutical registration process for AM for both humans and animals which must be in touch with AMR surveillance program.</li> <li>• Must include plants and pesticide use. Since antimicrobials can be used in plants and plants may absorb antimicrobials</li> </ul>
<p><b>Opportunities</b></p>	<p><b>Threats</b></p>
<ul style="list-style-type: none"> <li>• The support of policy makers</li> <li>• The availability of external support from NGOs and international organisations (FAO, OIE, WHO, USAID, FDA).</li> <li>• The availability of highly skilled and qualified health care providers.</li> </ul>	<ul style="list-style-type: none"> <li>• Over-prescribing and over-dispensing of antibiotics leading to the emergence of MDR pathogens.</li> <li>• Patient's non-adherence to their medications.</li> <li>• Increase of old age population and people who are more prone to infections.</li> <li>• Improper disposal of un-used or expired antimicrobials.</li> <li>• Lack of public awareness regarding the appropriate use of antimicrobials.</li> <li>• Use of same antibiotics for both humans and animals.</li> <li>• Mixing antimicrobials with the animals food</li> <li>• The absence of antimicrobial consumption data.</li> <li>• The lack of antimicrobial stewardship programs.</li> <li>• The lack of collaboration between health care providers (HCPs)</li> <li>• The dispensing of veterinary medicines by agricultural engineers</li> </ul>

**NAP Objective 5: Develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions**

<b>Strengths</b>	<b>Weaknesses</b>
<ul style="list-style-type: none"> <li>• Academic institution including medical, pharmacy, vets with available infrastructure for basic and clinical research (Infrastructure include human and laboratory resources) available</li> <li>• Collaborate with international parties.</li> <li>• Central public health centre has good capacity for basic research.</li> <li>• Presence of electronic database for human health system.</li> </ul>	<ul style="list-style-type: none"> <li>• Collaboration with international parties.</li> <li>• Central public health centre has inadequate capacity for basic research.</li> <li>• Presence of electronic database for human health system. Is inadequate</li> </ul>
<b>Opportunities</b>	<b>Threats</b>
<ul style="list-style-type: none"> <li>• Global and national concern in AMR.</li> <li>• Political support for combating AMR.</li> <li>• WHO, FAO, OIE, or other international bodies' involvement in AMR.</li> <li>• Scientific communities are concerned and support research in AMR</li> <li>• Presence of global GHSA / JEE.</li> <li>• Health tourism requirement to prevent AMR and do research and provide opportunity to study AMR in other nationalities</li> <li>• Jordan has a priority for animal food production thus it is important to keep healthy and safe through research.</li> </ul>	<ul style="list-style-type: none"> <li>• Other demanding health issues such as refugees, cancer, NCDs</li> <li>• Change of political commitment.</li> <li>• Financial support might be affected by possible economic challenges.</li> <li>• Pharmaceuticals might not be interested any more in AMR.</li> <li>• Efflux of human power / turn over.</li> <li>• Global funding support sustainability is not guaranteed.</li> <li>• AMR might become larger problem before research projects finish.</li> <li>• Research might be misused and cause harm either through poorly implemented ethical strategy.</li> </ul>

## **Chapter 2.**

# **Strategic Plan on Antimicrobial Resistance (2018-2022)**

### **Vision**

Reduction of mortality, morbidity and economic impact of AMR in Jordan

### **Mission**

Establish policies and national multi-sectoral mechanisms which support an effective and sustained AMR management system

### **Goals**

By the year 2022

1. 10% reduction in AMR morbidity
2. 20% reduction in antimicrobial consumption in humans
3. 30% reduction in antimicrobial consumption in animals
4. 30% reduction in diseases due to multidrug resistant organisms

4. 40% increase of public knowledge on AMR and awareness of appropriate use of antimicrobials

The national strategic action plan is aligned with the Global Action Plan. GAP-AMR has laid down five strategic objectives which form the basis for developing public health response to AMR globally.

## **Strategic Objectives**

These strategic objectives are:

Objective 1: Improve awareness and understanding of antimicrobial resistance through effective communication, education and training

Objective 2: Strengthen the knowledge and evidence base through surveillance and research

Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures

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

Objective 5: Develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions

## **Guiding Principles for Implementation of Strategic Objectives**

Additionally, the NAP AMR shall reflect the five principles based on which the GAP AMR strategies have been enunciated. 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 Objectives, Strategic Interventions and Activities**

### **NAP Objective 1:**

#### **Improve awareness and understanding of antimicrobial resistance through effective communication, education, training, advocacy and behaviour change programs**

The NAP AMR has identified the need to raise awareness of AMR and promote behavioural change through public communication programmes that target different audiences in human health, animal health and agricultural practices as well as a wide range of consumers related to these sectors.

The NAP AMR has also focused on making AMR a core component of the professional education training, certification, continuing education and development in the health and veterinary sectors and agricultural practice. This approach is expected to foster proper understanding and awareness amongst professionals.

Jordan has not as yet carried out any systematic national campaigns to enhance awareness. There have been scattered activities by different groups. By 2019, Jordan will carry out nationwide evidence based awareness campaigns with regular M&E. The aim is also to revise curricula in undergraduate medical and veterinary education, food industry and agriculture teaching and Continuous Professional Development courses. Revised curricula will be implemented on a limited scale but with regular audits.

The Strategic Plan is as follows:

<b>Strategic Objective No</b>	<b>Strategic Objective</b>	<b>Strategic Intervention</b>
1.1	Improve awareness and change	Creation and implementation of a national awareness and change behaviour

	behaviours regarding hygiene and the appropriate use of antibiotics among public, animal and human health care providers, farmers, and students	program for hygiene and appropriate use of antibiotics
		Understanding the needs of the stakeholders and partners with resistance to change and/or conflict of interest to encourage them to participate
1.2	Strengthening political commitment for AMR	Advocating for developing, revising and enforcing policies, legislations, and allocating resources for AMR
		Engaging media to influence political commitment and change social norms
1.3	Improve knowledge of AMR and related topics	Creation of a new generation equipped with the knowledge about the AMR and appropriate use of antibiotics
		Updating human and animal health care professionals and recent graduates of health schools about AMR and proper use of antibiotics

Activities for each strategic intervention have been described below.

**NAP Objective 1: Improve awareness and understanding of antimicrobial resistance through effective communication, education, training, advocacy and behaviour change programs.**

<b>Strategic Objective 1.1</b>	<b>Improve awareness and change behaviours regarding hygiene and the appropriate use of antibiotics among public, animal and human health care providers, farmers, and students</b>	
	<b>Strategic interventions</b>	<b>Activities</b>
	Creation and implementation of a national awareness and change behaviour program for hygiene and appropriate use of	<ul style="list-style-type: none"> <li>• Conducting mapping to identify the key relevant stakeholders and target groups and change behaviour experts</li> </ul>

	antibiotics	<ul style="list-style-type: none"> <li>• Conducting quantitative and qualitative study to understand the current situation</li> <li>• Developing multisectorial awareness and change behaviour plan with the required resources and budget</li> <li>• Capacity building for the responsible individuals/agencies implementing the plan</li> <li>• Creation of motivation and supportive environment for raising awareness and change behaviour</li> <li>• Conducting mass awareness and community campaigns regarding hygiene and the appropriate use and disposal of antibiotics for both animal and human health fields</li> <li>• Conducting targeted behaviour change activities on antibiotic use and hygiene</li> <li>• Collaborating and communicating with the associations e.g. agriculture, medical</li> <li>• Conducting field orientation visits for farmers regarding the vaccination, biosecurity, feed additives, water purifications, antibiotic use etc.</li> <li>• Developing accreditation and awarding systems with the legal bodies to recognize the compliance</li> <li>• Conducting hospital based interventions</li> <li>• Conducting activities by the community health committees targeting the public, students, mothers, youth</li> <li>• Monitoring the effectiveness of the conducted educational activities</li> </ul>
	Understanding the needs of the stakeholders and partners with resistance to change and/or conflict of interest to encourage them to participate	<ul style="list-style-type: none"> <li>▪ Conducting situational analysis to understand the resistance</li> <li>▪ Developing a strategy for engaging the conflict of interest parties</li> <li>▪ Conducting involvement activities for the conflict of interest parties</li> </ul>
<b>Strategic Objective 1.2</b>	<b>Strengthening political commitment for AMR</b>	



	<b>Strategic interventions</b>	<b>Activities</b>
	Advocating for developing, revising and enforcing policies, legislations, and allocating resources for AMR	<ul style="list-style-type: none"> <li>▪ Developing advocacy plan to support the implementation of laws and regulations</li> <li>▪ Conducting meetings with regulators and decision makers.</li> <li>▪ Producing evidence based materials regularly e.g. newsletters</li> </ul>
	Engaging media to influence political commitment and change social norms	<ul style="list-style-type: none"> <li>▪ Hosting workshops and informational meetings with media</li> <li>▪ Capacity building of media institutions through training</li> <li>▪ Producing training modules for media on hygiene and antibiotic</li> </ul>
<b>Strategic Objective 1.3</b>	<b>Improve knowledge of AMR and related topics</b>	
	<b>Strategic interventions</b>	<b>Activities</b>
	Creation of a new generation equipped with the knowledge about AMR and appropriate use of antibiotics	<ul style="list-style-type: none"> <li>▪ Conducting introductory meetings with the ministry of education and higher education leaders seeking their approvals on amending the curriculums.</li> <li>▪ Incorporating the AMR and appropriate use of antibiotics in the curriculums of school</li> <li>▪ Incorporating the AMR and appropriate use of antibiotics in the curriculums of universities</li> <li>▪ Developing web-based learning modules for under and post graduate students</li> </ul>
	Updating human and animal health care professionals and recent graduates of health schools about AMR and proper use of antibiotics	<ul style="list-style-type: none"> <li>▪ Developing continuous education programs for human and animal healthcare providers</li> <li>▪ Issuing of reports and publishing it on websites for human and animal health care providers</li> </ul>

## **NAP objective 2: Strengthen the knowledge and evidence base through surveillance and research**

The NAP AMR identifies the need to establish an evidence based surveillance for AMR in the nation and identifies the following critical information/evidence gaps:

- Descriptive epidemiology of resistant organisms as they emerge
- Understanding how resistance develops and spreads
- The ability to rapidly characterise the emergent resistant organisms
- Understanding social sciences, behavioural and other research needed for holistic fulfilment of all five strategic objectives
- Treatment and prevention of infections, especially in the low resource settings
- Basic and translational research to support the development of new treatments, diagnostic tools, vaccines and other interventions
- Alternatives to non-therapeutic uses of antimicrobial agents in the context of agriculture, aquaculture and their use in crop protection
- Economic research

The process of surveillance of AMR in Jordan has commenced. It may take slightly longer time because of limited human resource and therefore material resources capacity in the country. Limited testing of clinical isolates is carried out at few laboratories. AMR surveillance is mainly carried out in disease control programs such TB.

By 2020, Jordan will have a nationwide AMR surveillance system in place. 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 network of surveillance laboratories. By 2020, a national early warning system will be in place to identify early the emergence of resistance in priority pathogens and to critical antimicrobials.

The Strategic Plan is as follows:

<b>Strategic Objective No</b>	<b>Strategic Objective</b>	<b>Strategic Intervention</b>
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2.1	Establishment of a national One Health surveillance system for AMR	Activating National Coordination Centre
2.2	Strengthening laboratory capacity	Establishing Leadership and Governance of Laboratories for each sector
		Strengthening the development of laboratory quality management system

The Plan with specific activities will be rolled out as below:

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## NAP Objective 2: Strengthen the knowledge and evidence base through surveillance and research

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### Surveillance

Strategic Objective 2.1 Establishment of a national One Health surveillance system for AMR		
	Strategic interventions	Activities
	Activate National Coordination Centre	<ul style="list-style-type: none"> <li>▪ Reviewing and modifying TORs of National Coordination Centre</li> <li>▪ Nominating representatives from all relevant sectors (One health approach (human, animals, food and agriculture and Environmental))</li> <li>▪ Establishing Technical Steering Committee from all relevant sectors</li> <li>▪ Establishing a national system for Data collection, management, networking and dissemination of information in a real-time manner.</li> <li>▪ Specifying the list of pathogens to be reported</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Designating surveillance sites for all sectors</li> <li>▪ Promoting cross sectional collaboration and integration among all partners</li> <li>▪ Developing or adapting assessment tools for sites and labs</li> <li>▪ Developing notification system for priority pathogens</li> <li>▪ Collaborating with National research fund to guide research plan toward AMR priorities</li> </ul>
<b>Laboratory Capacity</b>		
Objective 2.2	Strengthening Laboratory Capacity	
	Strategic interventions	Activities
	Establishing leadership and governance of laboratories for each sector	<ul style="list-style-type: none"> <li>• Conducting situational analysis of the lab services across the country.</li> <li>• Unifying national laboratories standards and Guidelines in accordance with international standards (CLSI, etc...)</li> <li>• Developing laboratory networking system</li> <li>• Monitoring and Evaluation for laboratory service</li> <li>• Developing human resources policy for sustainable, sufficient and competent staff</li> <li>• Developing a System for attraction and retention of staff in laboratory services.</li> <li>• Developing and use appropriate training / competence development program</li> <li>• Establishing or strengthen nationwide integrated health laboratory network (informatics)</li> <li>• Strengthening external partnerships for technical and financial assistance</li> </ul>

		<ul style="list-style-type: none"> <li>• Providing epidemiological capacity for data analysis.</li> <li>• Participating in GLASS</li> </ul>
	Strengthening the development of laboratory quality management system	<ul style="list-style-type: none"> <li>▪ Upgrading the capacity of national reference lab to oversee the peripheral lab and to detect new emerging infectious disease.</li> <li>▪ Developing the capacity of peripheral lab to ensure proper delivery of service</li> <li>▪ Continuing improvement for lab technicians capacities</li> <li>▪ Ensuring sustainable procurement for lab supplies</li> <li>▪ Following international standard in referral shipping for panel of NEQAS</li> <li>▪ Ensuring sustainable laboratory services through adequate funding</li> <li>▪ Providing lab information management system and IT capacity</li> <li>▪ Ensuring implementation internal quality control system</li> <li>▪ Promoting participation of all labs in EQAS</li> <li>▪ Developing national EQA for One Health sectors</li> </ul>

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**NAP Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures**

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Infection prevention and control, especially in the context of hospitals, is an extremely important aspect of a strategic plan to contain AMR. This is essentially because a clinical setting represents an ecosystem of high antimicrobial usage. Within this ecosystem, exist patients, who may be immunologically impaired. These

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patients not only represent the population that is vulnerable to serious, lifethreatening infections, at the same time, they promote the emergence of resistance.

On the other hand, better hygiene (WASH) and infection prevention control (IPC) 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 biosecurity in food production systems are specific interventions that if implemented effectively, can result in better health outcomes and reduced risk of emergence of AMR.

Jordan has made considerable progress in implementing IPC measures in health settings. Further activities can be carried out by strengthening the effective role of the existing infection control committee as steering committee, formulating a technical committee, standardising the national guidelines and standardization and reporting of national health care associated infection surveillance program, also improving education and training for infection control professionals.

Strengthening hygiene best practices in animal health, which can be achieved by promoting disease prevention in animals, and Strengthening the monitoring system for AMU and AMR in poultry sector are planned.

To improve the hygiene in the community Jordan shall be increasing the level of public awareness and behaviour regarding proper hygienic procedures utilizing the widespread of media and social media, proper waste management in the community and improving the reporting of the communicable diseases in the ambulatory settings.

Improvement of infection prevention and control in healthcare shall be carried out through following strategic interventions leading to fulfilment of strategic objectives

<b>Strategic Objective No</b>	<b>Strategic Objective</b>	<b>Strategic Intervention</b>
3.1.	Improving the National infection control program	▪ Reforming and Activation of the national infection control program committee and developing infection control guidelines
		▪ National surveillance program
		▪ Improving Training and education

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3.2	Ensuring the availability of evidence based best practices and nationality consistent standard for IPC in animal sector	<ul style="list-style-type: none"> <li>▪ Strengthening hygiene best practices in animal health</li> <li>▪ Promoting disease prevention in animals</li> <li>▪ Strengthening the monitoring system for AMU and AMR in poultry sector</li> </ul>
3.3	Improving knowledge of AMR and related topics	<ul style="list-style-type: none"> <li>• Promoting personal hygiene by social mobilization and behaviour change activities</li> <li>• Promoting medical waste disposal and management at community level</li> <li>• Improving reporting system in ambulatory settings</li> </ul>

The specific activities for each intervention are given below:

<b>Objective 3.1 Improve the national infection control program</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Reforming and activating the national infection control program committee and developing infection control guidelines	<ul style="list-style-type: none"> <li>• Combining the different infection control guidelines of each sector (MOH , RMS, universities, private and Jordan hospital society, NGOs, UN) in a one national guideline</li> <li>• Strengthening the collaboration between health sectors</li> </ul>

		<ul style="list-style-type: none"> <li>• Empowering the infection control workers</li> <li>• Ensuring the availability of infection control budgets for all sectors</li> <li>• Supervising the activities of outbreaks</li> </ul>
	Establishing national surveillance program	<ul style="list-style-type: none"> <li>• Establishing a national health care associated infection surveillance</li> <li>• Developing the surveillance guidelines</li> <li>• Enforcing all health sectors to report to the national health surveillance centre</li> </ul>
	Improving Training and education	<ul style="list-style-type: none"> <li>• Developing a curriculum for infection control professional training applied for all certification bodies</li> <li>• Creating a certifying body for infection prevention and control professionals</li> </ul>

<b>Objective 3.2      Ensure the availability of evidence based best practices and nationality consistent standard for IPC in animal sector</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Strengthening hygiene best practices in animal health	<ul style="list-style-type: none"> <li>• Developing legislation and regulations for IPC</li> <li>• Reviewing recommendation for MDR</li> <li>• Developing national wide IPC policy and procedure</li> <li>• Developing vet. IPC guideline</li> <li>• Developing vet. Biosecurity guidelines</li> <li>• Raising awareness for vets and farmers</li> <li>• Training courses for veterinarians hygiene practices</li> </ul>



		<ul style="list-style-type: none"> <li>• Improving hygiene practices in slaughter houses</li> <li>• Developing hygiene curriculum for veterinary practices, under and post graduated</li> <li>• Establishing control strategies for major animal diseases</li> <li>• Providing accreditation and quality assurance program</li> <li>• Establishing robust surveillance system for animal diseases</li> </ul>
	Promoting disease prevention in animals	<ul style="list-style-type: none"> <li>• Promoting vaccines for animal health</li> <li>• Increasing vaccination awareness among the farmers</li> <li>• Improving vaccine cold chain system in animal health</li> <li>• Undertaking Post-vaccination monitoring studies</li> <li>• Training of veterinary para professionals on best practices of vaccinations</li> <li>• Studying vaccine efficacy and evaluation</li> </ul>
	Strengthening the monitoring system for AMU and AMR in poultry sector	<p>Updating and developing legislations and regulations to establish an oversight role for the government to monitor and regulate antimicrobial usage in poultry sector</p> <ul style="list-style-type: none"> <li>• Developing monitoring system for vaccination program</li> <li>• Establishing surveillance system for AMR in poultry</li> </ul>

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**Objective 3.3**

**Raise the level of hygiene and sanitation in the community:**

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	<b>Strategic interventions</b>	<b>Activities</b>
	Promoting personal hygiene by social mobilization and behaviour change activities	<ul style="list-style-type: none"> <li>▪ Enhancing community awareness on the importance of personal hygiene</li> <li>▪ Utilizing the wide spread of media and social media</li> </ul>
	Promoting medical waste disposal and management at community level	<ul style="list-style-type: none"> <li>▪ Implementing appropriate segregation for waste at the Community level</li> <li>▪ Waste recycling</li> </ul>
	Improving reporting system in ambulatory settings	<ul style="list-style-type: none"> <li>▪ Engaging the ambulatory sitting in the electronic reporting</li> <li>▪ Enforcing the implementation of the law</li> </ul>

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#### **NAP Objective 4: Optimize the use of Antimicrobial medicines in human and animal health**

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Use of antimicrobials in any form, even when rational and prudent, can precipitate resistance in target microbes. High antibiotic use may reflect over-prescription, easy access through over-the-counter sales, and more recently sales via the Internet which are widespread in many countries.

The situation analysis reveals that Jordan has a functional National Regulatory Authority that is responsible for regulation and licensing; pharmacovigilance and market authorization. Post licensing inspections including for retail pharmacies and OTC sales are carried out on limited scale. However, the country lacks important instruments and systems such as a National AMR containment policy, AMR stewardship programme for control of use of antimicrobials, AMU surveillance including sales of antimicrobial agents. Animal health sector, however, lags on all of the above fronts.

Jordan proposes to establish a robust system for regulation and surveillance of use of antimicrobial agents for control of human and veterinary use of antimicrobial substances. Some of the measures taken will include a National AMR Containment and Use Policy and related strengthened regulatory frameworks, National Drug Regulatory Authority, revised essential medicines list and 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, ambulatory and community settings as well as aquaculture and an AMU monitoring programme in humans and food animals including, residues testing in food products.

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All of the above systems to optimise use of antimicrobials, however, will be implemented on a limited scale during 2018-2020 and expanded thereafter.

Improvement to optimize use of antibiotics across the sectors shall be carried out through following strategic interventions leading to fulfilment of strategic objectives

Strategic Objective No	Strategic Objective	Strategic Intervention
4.1	Ensuring that tailored, evidence based antibiotic prescribing guidelines are available for all sectors	<ul style="list-style-type: none"> <li data-bbox="1160 470 2092 655">▪ Adapting and harmonizing the international treatment guidelines with modification in accordance to the existing local microbial resistance</li> <li data-bbox="1160 655 2092 841">▪ Improving access to and use of the available resources in all human health settings where antibiotics are prescribed should be a standard practice.</li> <li data-bbox="1160 841 2092 962">▪ Making available internationally accepted Antimicrobials prescribing guidelines for veterinary</li> </ul>
4.2	Ensuring the availability of evidence-based, best-practice and nationally consistent approaches to AMS across human health and animal care settings	<ul style="list-style-type: none"> <li data-bbox="1160 1000 2092 1106">• Implementing Antimicrobial Stewardship programmes in health care institutions for humans.</li> <li data-bbox="1160 1106 2092 1217">• Implementing Antimicrobial Stewardship programmes in health care institutions for vets.</li> <li data-bbox="1160 1217 2092 1313">• Establishing approaches that support appropriate prescribing and supply of antimicrobials outside of hospitals.</li> </ul>

		<ul style="list-style-type: none"> <li>• Developing guidelines on how veterinarians should use antibiotics critical to human medicine</li> </ul>
		<ul style="list-style-type: none"> <li>• Initiating approaches that support appropriate prescribing and supply of antimicrobials outside of hospitals.</li> </ul>
4.3	Developing tailored, evidence-based resources to support the implementation of AMS programmes	<ul style="list-style-type: none"> <li>• Applying a nationally harmonised electronic health system.</li> </ul>
		<ul style="list-style-type: none"> <li>•</li> </ul>
4.4	Reviewing existing health care providers' qualifications and health institutions' accreditation to ensure they appropriately support and encourage compliance with best practice AMS approaches	<ul style="list-style-type: none"> <li>• Developing and implement AMS programmes by local hospitals</li> </ul>
		<ul style="list-style-type: none"> <li>• Establishing a National Antimicrobial Stewardship Clinical Care Standard which aims to ensure that a patient receives optimal treatment with antibiotics, including the selection of the <u>right</u> antibiotic to treat their condition, the <u>right</u> dose, by the <u>right</u> route, at the <u>right</u> time and for the right duration.</li> </ul>
		<ul style="list-style-type: none"> <li>• Implementing an accreditation or quality assurance programmes for veterinary practices in Jordan that have specific requirements for AMS.</li> </ul>
4.5	Strengthening and modifying the existing regulations to better support appropriate and careful use of antimicrobials	<ul style="list-style-type: none"> <li>• Optimising the use of AM by making improvements to existing arrangements for the prescribing, dispensing and administering of antibiotics.</li> </ul>
		<ul style="list-style-type: none"> <li>• Building National research capacity and one health concept implementation</li> </ul>

		<ul style="list-style-type: none"> <li>• Reviewing and revising existing regulations governing access to antibiotics to ensure they effectively support appropriate and careful use.</li> </ul>
		<ul style="list-style-type: none"> <li>• Reviewing and revising the prescribing and dispensing regulations in a way that provides access of essentially needed antimicrobials to all Jordanians without extra financial burden.</li> </ul>

The specific activities for each intervention are given below:

**Objective 4.1 Ensuring that tailored, evidence based antibiotic prescribing guidelines are available for all sectors**

	<b>Strategic interventions</b>	<b>Activities</b>
	Adapt the international treatment guidelines with modification in accordance to the existing local microbial resistance	Establish a national committee from all involved sectors formed by MOH and in collaboration with MOA Revise the international and the local guidelines and protocols to establish the national ones. <ul style="list-style-type: none"> <li>• Issuing a decree to enforce implementation of the local guidelines and protocols on a national level</li> <li>• Training the relevant HCP on the newly implemented guidelines</li> </ul>
	Access to and use of the available resources in all human health settings where antibiotics are prescribed should be a standard practice.	<ul style="list-style-type: none"> <li>• Implementing a national electronic health system</li> </ul>
	Antimicrobials prescribing guidelines for veterinary practice	<ul style="list-style-type: none"> <li>• Establishing a national committee from all involved sectors</li> </ul>

	need to be standardised and optimised to improve treatment outcomes and minimize resistance. An international guideline must be adapted and modified it in accordance to what suite the country best	formed by MOH and in collaboration with MOA
<b>Objective 4.2 Ensuring the availability of evidence-based, best-practice and nationally consistent approaches to AMS across human health and animal care settings</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Implementing Antimicrobial Stewardship programmes in health care institutions for humans.	<ul style="list-style-type: none"> <li>● Assigning a designated committee to perform this action.</li> <li>● Establishing a National AMS Advisory Committee to provide strategic advice to ensure work undertaken in this area occurs in a nationally coordinated way</li> </ul>
	Implementing Antimicrobial Stewardship programmes in health care institutions for vets.	<ul style="list-style-type: none"> <li>● Participating in global health network AMS.</li> <li>● Performing regular training and qualification workshops for relevant health care professionals.</li> </ul>
	Approaches that support appropriate prescribing and supply of antimicrobials outside of hospitals.	<ul style="list-style-type: none"> <li>▪ Categorizing antimicrobials in accordance to restricted antimicrobials and set prescribing and dispensing limitations accordingly.</li> </ul>
	Guiding on how veterinarians should, in a broad and general sense, uses antibiotics critical to human medicine	<ul style="list-style-type: none"> <li>▪ Establishing a Detailed, species-specific guidelines to further support antimicrobial stewardship in animal health settings.</li> </ul>
	A policy on safe disposal of un-used and expired antibiotics	<ul style="list-style-type: none"> <li>▪ Training the relevant HCP</li> <li>▪ Implementing public awareness programs</li> <li>▪ Providing special environment safe hazards containers to pharmacies and fund for disposal</li> </ul>

<b>Objective 4.3 Develop tailored, evidence-based resources to support the implementation of AMS programmes</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Apply a nationally harmonised electronic health system.	<ul style="list-style-type: none"> <li>• Utilizing the features of EHR software (Hakeem)</li> <li>• Establishing a national AMS database</li> <li>• Training on the database software</li> <li>• Adopting and establishing the database</li> </ul>
<b>National surveillance system for antimicrobial use &amp; consumption</b>		
<b>Objective 4.4 Review existing health care providers' qualifications and health institutions' accreditation to ensure they appropriately support and encourage compliance with best practice AMS approaches</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Developing and implementing AMS programmes by local hospitals	<ul style="list-style-type: none"> <li>▪ Providing prescribers with the up-to-date antibiotic prescribing guidelines</li> <li>▪ Monitoring antibiotic usage and take action to improve the effectiveness of AMS programmes.</li> </ul>
	Establishing a National Antimicrobial Stewardship Clinical Care Standard which aims to ensure that a patient receives optimal treatment with antibiotics, including the selection of the <u>right</u> antibiotic to treat their condition, the <u>right</u> dose, by the <u>right</u> route, at the <u>right</u> time and for the right duration.	<ul style="list-style-type: none"> <li>▪ Providing the patients / owners with adequate and proper counselling on how to use the antibiotic at the time of prescribing and dispensing</li> </ul>
	Implementing an accreditation or quality assurance programmes for veterinary practices in Jordan that have specific requirements for AMS.	<ul style="list-style-type: none"> <li>▪ Enforcing the existing local laws and regulations for veterinarians related to veterinaries clinics, animal farms and slaughter houses</li> <li>▪ Training Veterinarians to be qualified to supervise slaughter houses to inspect animals before and after slaughtering. Also to ensure that there is no random slaughtering for sick animals or</li> </ul>

		animals that have not fulfilled the withdrawal period.
<b>Objective 4.5 Strengthening and modifying the existing regulations to better support appropriate and careful use of antimicrobials</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Optimising the use of antimicrobials by making improvements to existing arrangements for the prescribing, dispensing and administering of antibiotics.	<ul style="list-style-type: none"> <li>▪ Dispensing only the quantity of antibiotics prescribed; better targeting incentives for practice improvement.</li> </ul>
	Reviewing existing regulations governing access to antibiotics to ensure they effectively support appropriate and careful use.	<ul style="list-style-type: none"> <li>▪ Categorizing antibiotics in accordance to the local AMS. Certain categories or critical AMs must be only dispensed only after sensitivity test.</li> </ul>
	Reviewing and revising the prescribing and dispensing regulations in a way that provides access of essentially needed antimicrobials to all Jordanians without extra financial burden.	<ul style="list-style-type: none"> <li>▪ Implementing a national health coverage that will cover the cost of doctors' visit in public and private sectors.</li> <li>▪ Establishing a qualification programs for physicians prescribing AMs</li> </ul>
	Reviewing and revising existing regulations governing access to antibiotics to ensure they effectively support appropriate and careful use	<ul style="list-style-type: none"> <li>▪ Removing the selling right of veterinary product from non-vets such as agricultural engineers (animal product specialist)</li> <li>▪ Regulating and controlling the organic food production facilities</li> </ul>

**NAP Objective 5: Develop economic case for sustainable development based on country needs and increase investment in new vaccines, diagnostics and other interventions Ensure Sustainable Investment in countering AMR**

The NAP AMR posits that the economic case should reflect the need for capacity building and training in low resource settings, while developing evidence based interventions to reduce infections and combat AMR. The 2001 strategy for AMR containment could not achieve its goals; one of the reasons cited for the same is that there were economic assessments, which evaluated the cost of doing nothing versus the cost/benefits of action at the present.



The situation analysis in Jordan indicates that public health research in general and research on AMR has not been a priority for both policy makers and research community. Limited human resource and institutional capacity are the greatest challenge as is the competing priority of building a functional health system.

Currently the Scientific Research Fund in Jordan is partly responsible for planning research priorities in Jordan. It is proposed to integrate on priority research in AMR in humans and animals, to expand capacity for research in AMR through funding, to encourage academia (universities) to undertake research in AMR and One health approach, to establish IRB for animal research, to establish a steering body for research in AMR. to help researchers in identifying funding agencies, to facilitate access to international and national research papers, to establish an indexing service so researchers can identify previous or current research works and to partner between different stockholders including academia, government and industry for innovation and developing new antibiotics .

The Strategic Plan lays down a roadmap for establishing a strategic research agenda, with systematically prioritised research areas and knowledge gaps related to AMR that will feed into a national policy for research and innovation. By 2020, multi-stakeholder platform and research consortia will be established that will generate program and policy relevant evidence on and compare cost effectiveness of AMR control strategies. The strategic plan also envisions collaborations with national and international agencies, for implementation of strategic research agenda. This will be the main strategy for Jordan, given its limited existing institutional capacity.

Implementation of this strategic objective shall be carried out through following strategic interventions leading to fulfilment of strategic objectives

Strategic Objective No	Strategic Objective	Strategic Intervention
5.1	Supporting research in AMR to assist policy setting in containing AMR	<ul style="list-style-type: none"> <li data-bbox="1108 995 2058 1091">▪ Promoting research and international collaboration.</li> <li data-bbox="1108 1091 2058 1219">▪ National research capacity building enhancement and One Health concept implementation</li> <li data-bbox="1108 1219 2058 1347">▪ Encouraging research development, maintenance, investment, and sustainability.</li> <li data-bbox="1108 1347 2058 1386">▪</li> </ul>

5.2	Promoting economic studies of the AMR burden	<ul style="list-style-type: none"> <li>▪ Encouraging studies on economic burden for AMR.</li> </ul>
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The specific activities for each intervention are given below:

**NAP Objective 5: Develop economic case for sustainable development based on country needs and increase investment in new vaccines, diagnostics and other interventions Ensure Sustainable Investment in countering AMR**

<b>Objective 5.1 Supporting research in AMR to assist policy setting in containing AMR</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Promoting research and international collaboration.	<ul style="list-style-type: none"> <li>▪ Establishing of an NAP/AMR research sub-committee for implementation and follow up.</li> <li>▪ Communicating with national medical and agricultural journals’ editorial boards to request upgrading in journals indexing.</li> <li>▪ Establishing reward for research projects in AMR/One Health</li> <li>▪ Encouraging private sector to participate in research</li> <li>▪ Communicating with “Scientific Research Fund and other Funding Agencies” to put AMR/One Health research on their priority list.</li> <li>▪ Raising public awareness in research (through social media, Brochures, national TV and broadcasting corporation, etc)</li> </ul>
	National research capacity building enhancement and one health concept implementation	<ul style="list-style-type: none"> <li>▪ Gathering previous national research data in AMR</li> <li>▪ Undertaking laboratory and supportive research staff personal assessment in both MOH/MOA</li> </ul>

		<ul style="list-style-type: none"> <li>▪ Seeking national/international funds for research capacity building</li> <li>▪ Approaching MOA decision makers to establish national electronic database system</li> </ul>
	Encouraging research development, maintenance, investment, and sustainability.	<ul style="list-style-type: none"> <li>▪ Approaching Ministry of Agriculture (MOA) to Establish ACUC for animal research</li> <li>▪ Organizing training courses and workshops for AMR/One Health research design/methodology and international networking &amp; funding opportunities.</li> <li>▪ Supporting research findings marketing through participation in or organization of national/international conferences and symposium.</li> <li>▪ Reactivation of pre-existing vaccine production unit (MOH),and establishment of new ones to reduce use of antimicrobials</li> <li>▪ Approach Jordan Bio Industry Centre (JOVAC), as the sole national veterinary vaccine manufacturer, to produce vaccines to reduce AMR.</li> </ul>
<b>Objective 5.2 Promoting economic studies of the AMR burden</b>		
	<b>Strategic interventions</b>	<b>Activities</b>
	Encouraging studies on economic burden for AMR	<ul style="list-style-type: none"> <li>▪ Identifying experts in this field and approach them for collaboration</li> <li>▪ Encouraging undertaking small scale studies in beginning and plan on a large scale one for future</li> <li>▪ Encouraging these studies on national level through MOH, MOA, Academia, and scientific Fund”</li> </ul>

## Chapter 3

### Operational Plan

A well thought off operational plan is key to implementation of national strategic action plan. Accordingly, all activities – as envisaged in NAP have been planned out and will be undertaken in a very systematic way. A brief summary of the proposed operational plan in accordance with suggested activities for each of the five objectives is given below.

**NAP objective 1: Improve awareness and understanding of antimicrobial resistance through effective communication, education, training, advocacy and behaviour change programs.**

Activity	Date/Period	Responsible entity
Conducting mapping exercise to identify the key relevant stakeholders and target groups and change behaviour experts	Q1-Q2 2018)	AMR NC national committee
Conducting quantitative and qualitative study to understand the current situation on awareness	Q2/2018	Outsourced NGO
Developing multi-sectorial awareness and change behaviour plan with the required resources and budget	Q2/2018	National Coordinator or Head of IEC Campaigns
Developing national training programme for trainings in Objective 1	Q2/2018	National Coordinator or Head of IEC Campaigns
Capacity building for the responsible individuals/agencies implementing the plan	2018-2019	National Coordinator or Head of IEC Campaigns
Creation of motivation and supportive environment for raising awareness and change behaviour	2018-2019	National Coordinator or Head of IEC Campaigns
Conducting mass awareness and community campaigns regarding hygiene and the appropriate disposal of antibiotics for both animal and human health fields	2018-2019	National Coordinator or Head of IEC Campaigns

<p>Collaborating and communicating with the associations e.g. agriculture, medical, environment through 3-6 meetings</p> <p>Conducting field orientation visits for farmers regarding the vaccination, biosecurity, feed additives, water purifications, antibiotic use etc...</p> <p>Developing accreditation and awarding systems with the legal bodies to recognize the compliance</p> <p>Conducting activities by the community health committees targeting the public, students, mothers, youth</p> <p>Evaluating the effectiveness of the conducted educational activities</p>	<p>4 national campaigns per year (2018-2022)4x5=20</p> <p>2018-2022</p> <p>2018-2019</p> <p>Ongoing activity of trained personnel Q2-Q3 2018</p> <p>At least one activity per month per defined area and per targeted population till 2020</p>	<p>Head of IEC Campaigns National Coordinator or Head of IEC Campaigns</p> <p>National Coordinator or Head of IEC Campaigns</p> <p>National Coordinator or Head of IEC Campaigns</p> <p>National Coordinator or Head of IEC Campaigns National Coordinator or Head of IEC Campaigns Through an independent external group of experts</p>
<p>Developing a strategy for engagement with partners</p> <p>Conducting involvement activities with partners</p>	<p>Q2/2018</p> <p>Q3/2018</p>	<p>AMR national committee</p> <p>AMR National Committee</p>
<p>Developing advocacy plan to enforce implementation of laws and regulations</p> <p>Conducting meetings with regulators and decision makers</p> <p>Producing evidence based materials e.g. newsletters, presentations for various target groups</p>	<p>Q2-Q3/2018</p> <p>Ongoing</p> <p>Ongoing</p>	<p>AMR national committee</p>
<p>Incorporate the AMR and appropriate use of antibiotics in the curriculums of school and universities (health schools for doctors, dentists, pharmacists, nurses).</p>	<p>2018-2019</p>	<p>Ministry of education and Ministry of higher education</p>
<p>Publishing progress report on websites for HCP</p>	<p>Ongoing</p>	<p>AMR National Committee</p>

**NAP Objective 2: Strengthen the knowledge and evidence base through surveillance and research**

<b>Activity</b>	<b>Timeline</b>	<b>Responsible entity</b>
Establishing a high-level committee on One Health: Nominate representatives from all relevant sectors One health approach [human (private, Public, University and RMS), animals, food,agriculture and Environmental]	Q1/ 2018	Ministry of Health
Strengthening management of programme by expanding existing office of National Focal Point	Q1/2018	Ministry of Health
Reviewing and Modifying TORs of above mentioned committee	Q2/2018	Ministry of Health
Establishing a national system for Data collection, management, networking and dissemination of information in a real-time manner.	Q1-2/2018	Ministry of Health
Upgrading existing surveillance system to accommodate global needs and to integrate other relevant sectors for data management.	Q1/ 2018	NCC
Training relevant sectors on data Collection, entry and reporting on AMR	2018	NCC
Procurement for equipment and upgrade informatics need for the program subsequent to need assessment	Q1 and Q2/2018	NCC
Developing notification system for priority pathogens	Q1-2/2018	NCC
DevelopingRenovation Plan for all Laboratories in the country depending upon their needs	2018	NCC
Specifying the list of pathogens to be reported country-wide	Q3/2018	Ministry of Health

Designating lab-based surveillance sites for all sectors (health, veterinary and environment)	Q3/2018	Ministry of Health, Agriculture and Environment
Developing or adapting assessment tools for sites and labs	Q2-Q3/2018	Ministry of Health, Agriculture and Environment
Collaborating with National research fund to develop and guide research plan toward AMR priorities	Q2/ 2018	Ministry of Health, Agriculture and Environment
Activating and strengthening the national AMR laboratory Guidance Committee	Q2/2018	Laboratory Directorate - MOH
Conducting situational analysis of the lab services across the country.	Q2-Q3/2018	National Reference Lab for all sectors
Unifying national laboratories standards and Guidelines in accordance with international standards (CLSI, etc...)	Q3/2018	Technical Committee (National Laboratory Group)
Developing laboratory networking system	Q3/2018	National Laboratory Group
Monitoring and Evaluation for laboratory service	Ongoing	National Laboratory Group
Developing human resources policy for sustainable, sufficient and competent staff	Q2/ 2018	National Laboratory Group
Developing Strategic Plan for attraction and retention of staff in laboratory services.	Q2 2018	National Laboratory Group
Developing and use appropriate training / competence development program	Q2/2018	All national reference Lab. Supervised by National Lab Group
Strengthening external partnerships for technical and financial assistance	Q3/2018	National Laboratory group
Providing epidemiological capacity for data analysis.	Q2-Q4/2018	Ministry of Health

Participating in GLASS	Ongoing	NCC
Upgrading the capacity of national reference lab to oversee the peripheral lab and to detect new emerging infectious disease. And Seek accreditation	Ongoing	National and international accreditation bodies
Continuing Quality improvement for lab technicians' capacities through training	2018-2019	Tec National Laboratory group
Ensuring sustainable procurement for lab supplies	Ongoing	National Laboratory group
Promoting participation of all labs in EQAS	Ongoing	National Laboratory Group
Developing and or upgrading / EQAS for One Health partners	2018	National Lab Group

**NAP Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures**

Activity	Date	Responsible entity
Reformulating and activating a new national infection control committee representing all health sectors	Q1/2018	MOH
Reformulating a national infection control technical committee	1 Q/2018	Steering committee MOH
Ensuring standardization of the guidelines to all sectors.	4Q/2018	MOH National committee
Formation of task forces with specific term of references to audit the performance of each sector including private and dental clinics, pharmacies and ambulatory centers.	1Q/2018	National committee
Including the infection control practitioners in the licensing programs	4Q/2018	MOH



<b>Activity</b>	<b>Date</b>	<b>Responsible entity</b>
Linking the infection control workers with the general director of the health care facility	Q1/2018	National committee head
Specifying job description that requesting specialized infection control training	Q1/2018	National committee
Allocating specific IPC budget for each hospital	Annual (2018-2022)	Health care facilities
Establishing a committee or subcommittee for the surveillance program	Q2/2018	National committee MOH
Conducting training for all professional on IPC in all sectors using standardized material	Continuous	Infection control unit MOH
Developing legislation or regulation for mandating of reporting of health care associated infections	4 <sup>th</sup> Qua/2018	MOH
Disseminating legislations Requesting each hospital to report at least on health care associated infection monthly	1 <sup>st</sup> Q/2019	Surveillance centre
Developing a curriculum for infection control professional training applied for all certification bodies	3 <sup>rd</sup> Qua/2018	National committee
Creating a certificating body for infection prevention and control professionals	2019	MOH
Developing legislation and regulations for IPC	2019	Policy and legislation office, MOA
Establishing a national committee for hygiene practices in animals	Q2/2018	MOA
Reviewing and revising existing policies regarding MDR and develop new recommendations and guidelines to mitigate MDR	Q3/2018	MOA JAWA

<b>Activity</b>	<b>Date</b>	<b>Responsible entity</b>
Developing national wide IPC policy and procedure	Q4 /2018	MOA Animal Health division Quarantine division
Developing vet. IPC guideline	Q1/ 2019	MOH Poultry health Animal health division Quarantine division
Developing vet. Biosecurity guidelines	Q1/2019	JUST, VSD, JVA
Raising awareness for vets and farmers	Q2/ 2019	MOA, JUST FVM, JNA
Training courses for vets hygiene practices	Q4 /2018 to Q2 of 2020	VSD, JUST JVA, OIE FAO, WHO
Improving hygiene practices in slaughterhouses and enforce the uses of these houses.	Q2 /2019 onwards	MOA, GAM MOH, EUV
Developing hygiene curriculum for veterinary practices, under and post graduated	Q2/ 2019	JUST, FVM, JVA VSD, International consultancy
Establishing control strategies for major animal diseases	Q1/ 2019	VSD, JUST FAO, OIE
Establishing accreditation and quality assurance program on IPC	Q1/ 2019 onwards	MOA, MOH JAM, JUST PRIVATE SECTOR JVA, JFDA WHO. FAO, OIE

<b>Activity</b>	<b>Date</b>	<b>Responsible entity</b>
Establishing robust surveillance system for animal diseases	Q1/2019	VSD International, consultancy
Promoting vaccines for animal health	Q1/ 2018	VSD, JUST, JVA MOH, NCARE
Increasing animal vaccination awareness among the farmers	Q4/2018	VSD, JUST, JVA MOH, NCARE
Improving vaccine cold chain system in animal health	Q1/2019	VSD, FAO, JUST, UJ
Undertaking post-vaccination monitoring studies	2018-2019	VSD, MOH
Training of veterinary para professionals on best practices of vaccinations	Q2 2018	VSD WHO, FAO
Developing legislations and regulations to establish an oversight role for the government to monitor and regulate antimicrobial usage in poultry sector	Q4/2018	VSD Private sector FAO, OIE
Developing monitoring system for vaccination program	Q4/ 2018	VSD, FAO, OIE Private poultry sectors
Establishing surveillance system for AMR in poultry	Q4/ 2018	VSD FAO
Conducting Community hygiene education on the importance of personal hygiene	Q2/2018	MOH, NGOs, MOE
Training of school nurses in schools on community hygiene	Q2/2018	MOE
Integrating community hygiene education into the school health program mobile teams	3 <sup>rd</sup> Qua/2018	MOH

Activity	Date	Responsible entity
Utilizing the wide reach of media and social media for enhancing awareness	Ongoing	National Coordinator on IEC and awareness
Implementing appropriated segregation for waste at the Community level	Q1/ 2019	MOH, MOENV
Waste recycling	Q2/2018	Municipalities, MOENV
Engaging the ambulatory sitting in the electronic reporting	Q3/2018	MOH
Enforcing the implementation of the law	Q3/ 2018	MOH

#### **NAP Objective 4: Optimize the use of antimicrobial medicines in human and animal health**

Activity	Date	Responsible entity
Establishing a national committee from all involved sectors formed by MOH and in collaboration with MOA	Q2 2018	MOHJFDA
Reviewing and revising the international and the local guidelines and protocols to establish a national protocol	Q3/ 2019	Committee
Issuing a decree to enforce implementation of the local guidelines and protocols on a national level	Q1/ 2020	MoHJFDA
Training the relevant HCP on the newly implemented guidelines	2020-2022	NGOs and stakeholdersJFDA
Implementing national electronic health system (one Jordanian One Health Record)	2022	MOH, stakeholders and NGOs JFDA

<b>Activity</b>	<b>Date</b>	<b>Responsible entity</b>
Developing a SOPs in place in compliance with the approved guidelines	Q1/2020	Local institutions
Establishing a National AMS Advisory Committee to provide strategic advice to ensure work undertaken in this area occurs in a nationally coordinated way	2020	MOHJFDA
Assigning a designated committee to perform AMS in each hospital	2018	Local institutions
Participating in global health network AMS.	2019	AMR national focal point (MOH)
Performing regular training and qualification workshops for relevant health care professionals.	Ongoing start from 2019	Stake holdersJFDA
Categorizingantimicrobials in accordance to restricted antimicrobials and set prescribing and dispensing limitations accordingly.	2019	JFDA and MOH
Establishingdetailed, species-specific guidelines to further support antimicrobial stewardship in animal health settings.	2018	MOA
Training the relevant HCP	2018	MOH &MOEnv.
Providing special environment hazard-safe containers to pharmacies and health institutions and fund for disposal	2018	NGOs &MOEnv.
Utilizing the features of EHR software (Hakeem) for AMS	2019	MOHJFDA
Establishing a national AMS database	2020	MOHJFDA
Training relevant staff on the database software	2020	StakeholdersJFDA
Adopting and establishing the database.	2020	StakeholdersJFDA

<b>Activity</b>	<b>Date</b>	<b>Responsible entity</b>
Monitoring antibiotic usage and take action to improve the effectiveness of AMS programmes.	2020	Local institutions
Providing the patients / owners with adequate and proper counselling on how to use the antibiotic at the time of prescribing and dispensing	2018	Local institutions
Enforcing the existing local laws and regulations for veterinarians related to veterinaries clinics, animal farms and slaughter houses	2018	MOA
Training veterinarians to be qualified to supervise slaughter houses to inspect animals before and after slaughtering. To ensure that there is no random slaughtering for sick animals or animals that have not fulfilled the withdrawal period.	2019	JFDA and MOA
Ensuring dispensation of only the quantity of antibiotics prescribed by qualified veterinarian	2018	Self-monitoring
Categorizing antibiotics in accordance to the local AMS. Certain categories or critical antimicrobials must be only dispensed only after sensitivity test.	2019	MOH
Implementing a national health coverage that will cover the cost of doctors' visit in public and private sectors.	2020	MoH
Establishing a qualification programs for physicians prescribing AMs	2018	Stakeholders JFDA
Eliminating the selling right of veterinary product from non-vets such as agricultural engineers (animal product specialist)	2018	MoA
Regulating and controlling the organic food production facilities	2018	MOAJFDA

**NAP objective 5: Develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other intervention**

Activity	Period	Responsible entity
Establishing AMR NAP research advisory committee	Q1 2018	NAP AMR committee
Meeting with Ministry of Agriculture (MOA) to Establish ACUC for animal research	Q1 & Q4 2018	AMR NAP research advisory committee
Developing a proposal to compile previous research work in AMR	Q1 2018 to Q4 2019	AMR NAP research advisory committee
Organizing meeting with local medical journals to get their journals indexed in pubmed or ISI	Q1-Q4 2018	AMR NAP research advisory committee
Organizing meeting with Shouman, UJ, JUST, KHCC to arrange for such a reward for best researcher	Q1-Q4 2018	AMR NAP research advisory committee
Developing electronic database system for MOA	2018-2020	MOA and AMR NAP research advisory committee
Encouraging private sector to participate in research	2018-2020	All non-private stakeholders
Organizing meeting with “Research Scientific Fund” to put research in AMR and one health concept on their priority encourage funding	Q1-Q4 2018	AMR NAP research advisory committee
Encouraging academia to collaborate with public sector (MOA, MOH, royal medical service) in research	Q1-Q4 2018	AMR NAP research advisory committee with academia research deans
Protecting research subjects and improving current IRBs through education	Q42018-Q42022	External fund

Collaborating with concerned societies either national or international.	Q42019-Q42022	MOH
Improving public awareness in research in general	Q1-Q4/ 2018 ONGOING	MOH, UJ,MOA, JUST, KHCC,MOHE, Social Media
Imparting research training for prospective and aspiring researchers through Workshops and courses	Q1-Q4/2018 ONGOING	MOH, UJ, MOA,RMS
Organizing regular conferences on AMR/One health and includes topics on research issues	EVERY TWO YEARS 2019	MOH, WHO, Private Sector
Participating in international meeting in conferences	ANNUALLY	EXTERNAL FUND
Utilizing unique labs national capacity (enhanced BSL-2 (RMS), BSI-3 (MOH), NGS (JUST)	Q1-Q4 2018 ANNUALY	MOH, CPHL
Improving research facilities in CPHL to do work on AMR activities	Q1-Q42018	MoH, WHO



## Chapter 4

### Monitoring and Evaluation Plan

Monitoring and evaluation (M&E) are integral part of any programme. These facilitate efficient implementation of the planned activities and provide valuable information on progress made. Jordan has developed following M&E Plan in accordance with WHO template using SMART indicators. The progress made shall be periodically reviewed by the high level National Committee and necessary modifications, if any, shall be carried out. Following are the salient features of Jordan M&E Plan

**NAP objective 1: Improve awareness and understanding of antimicrobial resistance through effective communication, education, training, advocacy and behaviour change programs**

Planning element	Indicator	Type and purpose	Value (calculation)	Data source	Method	Target
<b>Objective one :</b> Improve awareness and change behaviours regarding the hygiene and appropriate use of antibiotics among public, animal and human health care providers, farmers, and students	% of target groups have their awareness increased on the appropriate use of antibiotics	Outcome	Percentage	Survey	Survey	>90% people and communities all over the country made aware of impact of AMR and possible preventive and containment measures
	% of target groups have their behaviour changed positively					>50% people demonstrated change in their behaviour favouring rational use of antibiotics

	% of community have their awareness increased on hygiene					
<b>Strategic interventions</b> Creation and implementation of a national awareness and change behaviour program for hygiene and appropriate use of antibiotics	Endorsement of the program by the official entities	Output	Yes/NO	Official documents	Official documents	National Programme for awareness and change in behaviour for rational use of antibiotics developed and implemented
Activities: Conducting mapping exercise to identify the key relevant stakeholders and target groups and change behaviour experts	Mapping report generated	Output	Yes/no	Report	Meetings, key and expert interviews	Mapping report generated
Conducting quantitative and qualitative study to understand the current situation	Study conducted communication objectives drafted	Output	Yes/no	Study Report with findings Document	Surveys and studies Expert communication team	Current situation through various studies assessed
Develop multisectoral awareness and change behaviour plan with the required resources and budget	Awareness plan developed	Output	Yes/no	Awareness plan	Expert group	Plan developed for awareness and change in behaviour

Development of a behaviour change communication and awareness raising strategy	Strategy developed for behavioural change					Strategy developed for behavioural change
Capacity building for the responsible individuals/agencies implementing the plan	No. of trainings conducted  No of trainees attended  All trainees have their knowledge and skills increased	Input  Input  Outcome	Number  Number  Percentage	Attendance sheet	Training report (focal point individual)	Capacity built for 200 stakeholders to be engaged to implement the plan through 10 training courses
Creation of motivation and supportive environment for raising awareness and change behaviour	No. of people reached during campaigns No. of campaigns conducted	Input	Yes/No	Observation/interviews		>90% of people reached for awareness and change in behaviour through appropriate number of campaigns.
Conducting mass awareness and community campaigns regarding hygiene and the appropriate use and disposal of antibiotics for both animal and human health	No. of people reached during campaigns No. of campaigns conducted	Input	Yes/No	Observation/interviews		Mass annual campaigns conducted to raise awareness

fields Number of campaigns per year						
Collaborating and communicating with the associations e.g. agriculture, medical	No of meetings conducted	Input	No of meetings	Official records	Reports	Formal collaboration mechanism established with different stakeholders
Conducting field orientation visits for farmers regarding the vaccination, biosecurity, feed additives, water purifications, antibiotic use, etc...	No. of farmers reached No. of field visits	Input	No of visits	Official records	Reports	>90% of farmers oriented on vaccination, biosecurity, feed additives etc
Developing accreditation and awarding systems with the legal bodies to recognize the compliance	Accreditation system developed	Input	Operational accreditation system	Official announcement	Report	Accreditation process developed
Conducting hospital based interventions	No. of hospitals based interventions made	input	No of interventions	Official; records	Reports	Interventions undertaken in >90% hospitals
Conducting activities by the community health committees targeting the public, students, mothers, youth	No. of activities conducted by the community health committees No. of target groups reached	Input	Number of activities	Records	Reports	>90% of target groups reached through community health committees
Monitoring the effectiveness of the conducted educational activities	Monitoring reports submitted	Input	Proforma	Assessment	Reports	Report generated on monitoring

**NAP Objective 2: Strengthen the knowledge and evidence base through surveillance and research**

Planning element	Indicator	Type and purpose	Value (calculation)	Data source	Method	Target
Establishment of national committee on One Health Nominate representatives from all relevant sectors One health approach [human (private, Public, University and RMS), animals, food ,agriculture and Environmental]	Committee Established	Supervision	First Quarter of 2018	Official notification	Report	National multisectoral committee established
Review and Modify TORs	ToR Modified	Defining work	First Quarter of 2018 to be reviewed every 2 years	Official notification	Report	TORs of National Committee developed and disseminated
Establish Technical Advisory Group from all relevant sectors to promote collaboration and integration of all relevant sectors	TAG established	Guidance and Oversight	First Quarter of 2018	Official notification	Report	Technical Advisory Group established
Establishing a national system for data collection, management, networking and dissemination of information in a real time manner.	National system developed	Surveillance inputs	2018	Official notification	Report	A Process document developed for data management

Upgrading existing surveillance system to accommodate global needs for data collection and reporting and (suggest to include the antimicrobial surveillance report with the existing MOH surveillance report).	Development of process document	Surveillance inputs	2018 last quarter	Official notification	Report	Existing surveillance system updated
Developing notification system for priority pathogens	Development of notification system for priority pathogens established	Inputs	2018 second quarter	Official notification	Report	Notification system for priority pathogens established
Designating surveillance sites for all sectors	Number of sites designated	Sites	Ongoing	Official notification	Official list	20 sites for each sector identified for surveillance
Developing or adapt assessment tools for sites and labs	Assessment tool developed	Tool	Ongoing	Tools availability	Document	Updated tool developed and approved
Activating and Strengthening the national laboratory group	Activation of national lab group	Quarterly – Continuous	2018	Official notification	Report	National Lab Group Activated
Conducting situational analysis of the lab services across the country.	Situation Analysis on labs for AMR	1	One year 2018	Lab status	Report	Situation analyses conducted
Unifying national laboratories standards and Guidelines in accordance with international	National Lab Standards available	Input	Three months	Global info	Guidelines	National Standards and guidelines available

standards (CLSI, etc...)						
Developing laboratory networking system	National lab network established	Input	One month	Official notification	Document	National laboratory system developed
Monitoring and Evaluation for laboratory service	M&E Tool developed	Input	Ongoing	Official notification	Guidelines	M&E tool developed
Developing human resources policy for sustainable, sufficient and competent staff	HR Policy developed	Input	First Quarter 2018	Official notification	Report	Policy developed and approved
Developing Strategic Plan for attraction and retention of staff in laboratory services.	HR Plan developed	Input	First Quarter 2018	Official notification	Report	Strategic plan developed and approved
Developing and use appropriate training / competence development program	Training module developed	Input	Ongoing	Official notification	Report	Training programme developed and approved
Strengthening external partnerships for technical and financial assistance	Twinning projects forged	Input	Ongoing	Official notification	Report	External partnership forged
Participating in GLASS	Participation in GLASS	Input	Ongoing	Official notification	Process	Participation in GLASS continued
Upgrading the capacity of national reference lab to oversee the peripheral lab and to detect new emerging infectious disease. Seek accreditation	Accreditation process		2019	Official notification	Accreditation certificate	National Ref Lab accredited

Continuing improvement for lab technicians capacities	Mechanism for improving capacity of lab technicians	Ongoing	2019	Notification	Report	Training for all lab technicians conducted
Sustainable procurement for lab supplies	Procurement Plan	Ongoing		Notification	report	Mechanism for sustainable S&E procurement developed
Follow international standard in referral shipping for Panel of NEQAS	Referral shipping	Input	2019	Notification	report	Instructions for international shipment of material disseminated
Ensure participation of all labs in EQAS	No of labs participating in NEQAS	Input	2019	Notification	Report	All labs participating in NEQAS
Nominated representatives from all relevant sectors One health approach [human (private, Public, University and RMS), animals, food , agriculture and Environmental]	Establishment of National committee on one health	Input	Functional	National Coordination Centre	Official letter	National committee on one health established
Establish Technical Advisory Group from all relevant sectors to promote collaboration and integration of all relevant sectors	To establish TAG	Output	Yes/no	National Coordination Centre	Official letter	Technical advisory group established
Provide epidemiological capacity for data analysis.	No. of trained FETP	Process	Percentage of trained FETP	Technical advisory group	FETP program	Trained FETP personnel



Participation in GLASS – WHONET	No of labs trained on WHONET and reported to GLASS	process	No of labs	National lab group	reports	>20 labs trained on WHONET
Upgrade the capacity of national reference lab to oversee the peripheral lab and to detect new emerging infectious disease. Seek accreditation	Number of accredited national reference labs	output	Percentage of accredited labs	National Accreditation body	Auditing	All labs in national lab network accredited
Continuous improvement for lab technicians' capacities	Number of trained lab technicians	Process output	Percentage of trained lab technicians	National Laboratory Group And National Reference lab	Documents	>100 lab technicians trained
Monitor the implementation of international standard in referral shipping for Panel of NEQAS	Compliance with international standards	Process	Yes \ no	National Reference labs	Receipt reporting	Compliance with international standards ensured
Provide lab information management system and IT capacity Training and Procurement	No of trained personnel	process	percentage	National Laboratory Group	auditing	>100 persons trained

**Objective 3: Reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures**

Planning element	Indicator	Type and purpose	Value (calculation)	Frequency of data collection	Data source	Method	Target
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Implementing of infection control program	Percentage of hospitals implementing advanced infection control program with evidence based surveillance program	output	Quantitative	Yearly	Reports	Survey	>90% hospitals implementing advanced infection control program with evidence based surveillance program
Implementing infection control program	Percentage decrease the rates of health care associated infection at the national level	Outcome	Quantitative	Biannual	Survey	Survey	>50% decrease the rates of health care associated infection at the national level
Implementing antimicrobial stewardship program	Percent Decrease the rate of multiple drug resistance organism at the national level	Outcome	Quantitative	Biannual	Survey	Survey	>50% Decrease the rate of multiple drug resistance organism at the national level
Reforming of the national committee	Reforming of Steering committee	input	qualitative	Every two years	MOH informative	Review of decision	Steering committee reformed
Establishing licensing program	Percentage of licensed practitioners	process	Quantitative	Yearly	Informative from Licensing body	Survey	>90% of licensed practitioners
Establishing a national health care associated infection surveillance	% of sites from where Surveillance data form the surveillance centre available	Output	Quantitative	Yearly	Reports	Review repots	>90% of sites from where Surveillance data form the surveillance

Centre							centre available
Understanding Pattern of resistance of microorganisms	Percentage of resistance for microbiologically important bacteria	output	Quantitative	Yearly	Reports	Review reports	>90% resistance patterns for microbiologically important bacteria analyzed
Training of school nurses in schools on prevention of community diseases	Percentage of trained nurse	process	Quantitative	Yearly	Reports	Review reports	>80% of nurses trained

#### **NAP Objective 4: Optimize the use of antimicrobial medicines in human and animal health**

Planning element	Indicator	Type and purpose	Value (calculation)	Frequency of data collection	Data source	Method	Target
Revising the international and the local guidelines and protocols to establish a national ones.	Establishment of National guidelines	INPUT	One	Once	Guideline	Guidelines	National guidelines developed by revising international guidelines and protocols

Issuing a decree to enforce implementation of the local guidelines and protocols on a national level	Formal decree issued	output	one	Once	Formal decree	Decree	Formal decree issued
Training the relevant HCP on the newly implemented guidelines	% of HCP trained	output	percentage	yearly	Attendants list	MOH and stakeholdersJ FDA	>95% of HCP trained in new guidelines
Implementing national electronic health system (one Jordanian One Health Record)	% of Jordanians in national electronic health system	Output	Percentage	yearly	MOH and stakeholders	Review of System Reports	>50% Jordanians in national electronic system
Establishing a National AMS Advisory Committee to provide strategic advice to ensure work undertaken in this area occurs in a nationally coordinated way	Formation of National AMS Advisory Committee	INPUT	One	Once	Formal letter	MOH	National AMS advisory committee formed

Participating in global health network AMS.	Participation in global health network of AMS	Input	Once	Once	MOH	MOH records	Participation in global health network
Performing regular training and qualification workshops for relevant health care professionals.	% of HCP trained	Output	percentage	Once yearly	Stakeholders	Attendance list	>90% HCP trained
Categorizing antimicrobials in accordance to restricted antimicrobials and set prescribing and dispensing limitations accordingly.	% of categorized AMs	Input	Percentage	Yearly	JFDA	JFDA records	All antimicrobials categorized
Establishing a Detailed, species-specific guidelines to further support antimicrobial stewardship in animal health settings.	Available guidelines	input	One	Once	MOA	Document	Guidelines developed

Training the relevant HCP on ASP	% of trained HCP	Output	Percentage	Yearly	Stakeholders	Attendants list	>90% HCP trained on ASP
Providing special environment hazards safe containers to pharmacies and health institutions and fund for disposal	% of covered HC units	Input	Percentage	Yearly	MOH & MOEnv,	HC units list	>80% pharmacies and health institutions provided with environment hazard safe containers
Utilizing the features of EHR software (Hakeem)	% of health institutions utilizing Hakeem	Input	Percentage	Yearly	Software provider	Report generation	>80% health institutions utilized Hakeem
Establishing a national AMS database	Development of Software for national database on AMS	Output	One	Once	MOH & stakeholders	Generating report	Software for national database on AMS developed
Training on the database software	% of trained personnel	Input	Percentage	Once	Stakeholders	Attendants list	>90% persons trained in use of software
Adopting and establish the database.	% of health institutions adopting database	Input	Percentage	Once	Stakeholders	Complied Institution	>90% health institutions adopting database

Monitoring antibiotic usage and take action to improve the effectiveness of AMS programmes.	% of complied institutions	Output	Percentage	Once	MOH and MOA	MOH & MOA records	>90% institutions complied with AMS programme
Providing the patients / owners with adequate and proper counselling on how to use the antibiotic at the time of prescribing and dispensing	% of patients counselled	Output	Percentage	Once	Stakeholders	Survey	>90% patients counselled on rational use of antibiotics
Enforcing the existing local laws and regulations for veterinarians related to veterinaries clinics, animal farms and slaughter houses	Enforcing Formal decree on professionals	output	one	Once	Formal decree	MOA	Formal decree enforcement implemented on professionals

Training Veterinarians to be qualified to supervise slaughter houses to inspect animals before and after slaughtering. Also to ensure that there is no random slaughtering for sick animals or animals that have not fulfilled the withdrawal period.	% of Veterinarians trained	output	percentage	yearly	Attendants list	MOA and stakeholders	>95% veterinarians trained on supervising slaughter houses
Ensuring dispensation only the quantity of antibiotics prescribed	% compliance with dispensing of antimicrobials	Output	Percentages	Yearly	Complied HC institutions	JFDA and MOA	>95% complains on dispensing of antimicrobials
Establishing a qualification programs for physicians prescribing AMs	% of HCP trained	Input	One	Percentages	MOH	Attendants list	>80% HCP trained in prescribing antimicrobials
Removing the selling right of veterinary product from non-vets such as agricultural	Formal creed	Input	One	Once	MOA	Issued creed	Formal decree issued



engineers (animal product specialist)							
Regulating and controlling the organic food production facilities	% facilities regulated	Input	percentages	Once	MOA	instructions	>90% organic food production facilities regulated

**NAP Objective 5: Develop the economic case for sustainable investment that takes account of the needs of all countries, and increase investment in new medicines, diagnostic tools, vaccines and other interventions**

<b>Planning element</b>	<b>Indicator</b>	<b>Type and purpose</b>	<b>Value (calculation)</b>	<b>Frequency of data collection</b>	<b>Data source</b>	<b>Method</b>	<b>Target</b>
Supporting research in AMR to assist policy setting in containing AMR	AMR research outcome policy changed	outcome	Qualitative Y/N	Every 2 y	policy makers & researchers	Survey and interviews	AMR Research Policy developed
Developing AMR NAP research advisory subcommittee	Committee established	Input	Qualitative Y/N	Q1 2018	NAP committee	Decision & TOR	AMR Research Advisory Subcommittee established

Organizing meeting with Ministry of Agriculture (MOA) to Establish IRB & ACOC for animal research	IRB establishment at MOA	Input	Qualitative Y/N	Q1 2018	MOA FP	Decision & TOR	IRB established at MoA
Writing a proposal to collect previous research work in AMR	Previous research work database	Input	Qualitative Y/N	Annually	NAP AMR subcommittee	Final project data	Database of previous research in Jordan compiled
Meeting with Shouman, UJ, JUST, KHCC to arrange for a reward for best researcher	Establish reward for best researcher	Input	Quantitative	Every 6 months	NAP AMR subcommittee	Meeting	Reward for best researchers established
Encouraging private sector to participate in AMR research	Private sector engagement in research subcommittee proposed	Input	Qualitative Y/N	Q1 2018	NAP AMR subcommittee	Meeting & TOR	Private sector engagement in research subcommittee formalized
Organizing meeting with “Research Scientific Fund” to put research in AMR and one health concept on their priority & encourage funding	Identifying AMR research priorities and fund	Input	Qualitative Y/N	Q3 2018	RSF FP & NAP AMR subcommittee	Meeting & decision	AMR research priorities and fund identified

Encouraging academia to collaborate with public sector (MOA, MOH, royal medical service) in research	Promote Intersectoral collaboration	Output	Qualitative Y/N	Q2 2018	FOs & NAP AMR subcommittee	Meeting & decision, scientific activities	Intersectoral collaboration promoted (Yes/No)
Organizing research training for prospective and aspiring researchers through Workshops and courses	Provide research training for prospective and aspiring researchers provided	Output	Quantitative	Q1-q4 2018	NAP AMR subcommittee	Workshops and courses	Research training for prospective and aspiring researchers provided
Organizing regular conferences on AMR/One health and includes topics on research issues	Organize regular national conferences on AMR including research issues organized	Input	Quantitative	Annually	NAP AMR subcommittee	Conferences includes topics on research issues	Regular national conferences on AMR including research issues organized
Encourage participation international meeting in conferences	Encourage participation international meeting and conferences	Input	Quantitative	Annually	NAP AMR subcommittee	conferences	Participation in international meeting and conferences encouraged
Improving facilities in CPHL to do work on AMR activities	Improve facilities in CPHL	Output	Qualitative Y/N	Annually	NAP AMR subcommittee	Meeting & decision,	Facilities in CPHL improved

# Chapter 5

## Costing (estimated budgets in USD)

Budgetary support to the national action plan has been estimated with the objective of utilization of existing infrastructure as far as possible. Limited human resource cost has been reflected in it to coordinate objective specific action plans. Majority of funds are proposed towards building national capacity and augmenting awareness in accordance with the NAP. A summary of the annual budgetary requirements is shown in Table below.

No	StrategicObjectives	Year1	Year2	Year3	Year4	Year5	Total
1	1	158150	170450	181900	64900	67400	642800
2	2	159600	120200	113700	101700	104200	599400
3	3	814600	875300	842100	745100	674600	3951700
4	4	<b>633100</b>	456300	423100	326100	270100	2108700
5	5	81600	61300	49400	49400	50400	292100
	<b>Total</b>	<b>1847050</b>	<b>1683550</b>	<b>1610200</b>	<b>1287200</b>	<b>1166700</b>	<b>7594700</b>

**Total USD: 7,594,700**

**Total JD: 5,424,785 (5.4 million)**

# Annex 1

## High Level Committee

### Composition

NO	NAME	DESIGNATION
1	DR.LAIL ALFAYEZ	SECRETARY GENERAL MINISTRY OF HEALTH/HEAD OF COMMITTEE
2	DR.AYOUB ALSEAEDAH	Director of Primary Health Care Administration
3	DR.HEKMAT ABO ALFOUL	Director of Hospital Administration
4	DR.MOHAMMAD ALBDALLAT	Communicable Diseases Dir.
5	DR.ASIA ALDWAN	LAB DIRECTORATE
6	DR.WAFAA ALKHATEEB	Clinical Pharmacy Dir.
7	IBRAHIM BADWAN	Chest Diseases & Immigrants Health Dir.
8	DR.HEYAM MOKHTASH	IHR FOCAL POINT
9	DR.MAJED ALHOWSHEH	MINISTRY OF AGRICULTURE
10	DR.SOUAD AQEL	MINISTRY OF AGRICULTURE
11	DR.BASEMA ALZOUBI	AMR FOCAL POINT FOR ANIMAL HEALTH MINISTRY OF AGRICULTURE
12	DR.OSAMA ABO ATTA	JORDAN MEDICAL ASSOCIATION

<b>13</b>	ISMAIL ALSSADI	Jordan Pharmaceutical Association
<b>14</b>	DR.MAHDI ALAQRBAWI	Jordan VET. Association
<b>15</b>	DR .Wael HYAGNIEH	King Abdullah University Hospital
<b>16</b>	DR.FARIS ALBAKRI	JORDAN University Hospital
<b>17</b>	MONTASEER ALBALBISI.DR	PRIVATE HOSPITAL ASSOCIATION
<b>18</b>	NEDA BOARESH	FDA
<b>19</b>	AMANI ABO ROMAN	JORDAN HOSPITALS ASSOCIATION
<b>20</b>	DR.RAMI KHASAWNEH	ROYAL MEDICAL SERVICE
<b>21</b>	DR .ZAIENAB ALSHAWBKEH	ministry of education
<b>22</b>	DR.MARAM ALBASTI	Procurement and Supply Directorate

**Terms of Reference**

1. To coordinate comprehensive national efforts in combating antimicrobial resistance
2. To draft national action plan against AMR in alignment with the global action plan
3. To coordinate, supervise and guide subsequent implementation of national action plan
4. To establish various technical advisory and subgroups to develop national activities for implementation of NAP
5. To periodically review the progress made in implementation of NAP and suggest course corrections, if needed
6. Supervising the preparation of the manual on antibiotics
7. Keep follow up .

## Annex 2

### Contributors

In addition to High Level Committee members all experts who attended the November meeting should be named

	<b>Name</b>	<b>DESIGNATION</b>
1	Dr.Hikmat Abu Alfoul	Director Of Hospital Administration
2	Dr.Ayoob Al Sayaedeh	Director Of Primary Health Care Administration
3	Dr. Mohammed Al-Abdalat	Communicable Diseases Dir.
4	Prof.NathirObeidat	Dean Of The Faculty Of Medicine/ JU
5	Dr.HusseinShalan	Rms
6	Prof.Wail Al.Hayajneh	Dean Of The Faculty Of Medicine/ Just
7	Dr.FalahShidaifat	Dean Of The Faculty Of Veterinary Medicine/Just
8	Dr.ManarNabolsi	Dean Of Faculty Of Nursing/Ju
9	Prof. Khalil Yousef	JU
10	Prof.AmerHasanien	JU
11	Prof.MohammadAlmadadha	JUH
12	Dr .FarisAlbakree	JU
13	DR.OSAMA ABO ATTA	JORDAN MEDICAL ASSOCIATION
	Eng. Salah alhyari	Dir. Of Environmental health dir.
14	Dr.Alaa bin Taref	Amr national focal point /MOH
15	Dr.BasemaZoubi	Amr national focal point /MOA
16	DR.WAFAA ALKHATEEB	Clinical Pharmacy Dir.
17	DR. IBRAHIM BADWAN	Chest Diseases & Immigrants Health Dir.
18	DR.MAJED ALHOWSHEH	MINISTRY OF AGRICULTURE



19	DR.RAMI KHASAWNEH	ROYAL MEDICAL SERVICE
20	DR.MARAM ALBASTI	Procurement and Supply Directorate
21	Dr.Sameeh Abu Tarbush	JUST
22	Dr.Ziad Al Nasser	KAUH
23	Dr. Mohammad Khalifah	JUST
24	Dr.HamedAlzoubi	JU
25	Dr. Mohammad Abu Lubad	Mutah University
26	Dr.AminAqel	<u>Mutah University</u>
27	Dr. Nabil AwniNimer	Philadelphia U
28	Dr.Sameer Naji	MOH
29	Dr.EqbalQatanani	MOA
30	Dr.Anas Al- Nabulsi	JUST
31	Dr.Ahmed Al- Rusasi	JPA
32	Dr .KhaledNajjar	Private
33	Dr.ShaherAbudalbouh	JVA
34	Dr.Saeda Salah	MOA
35	Dr.Rabie M. Noqa	UNRWA
36	Dr .FedaBarjes Saleh	MOH
37	Dr. Khalid Albohti	Zarqa MOH
38	Dr. Bassam Shadfan	MOH
39	Dr.OsamaKittaneh	MOH
40	Dr.AliaAlkhlaifat	RMS
41	Dr. Emad AzzamOdeh	MOH
42	Dr .MotasemAlsenjlawi	JFDA
43	Dr.SarabAlabbadi	JFDA
44	EnasBataineh	KAUH
45	Malik Al Fararjeh	JFDH
46	Sawsan Al Mubarak	CHC
47	Ilham Abu kader	EMPHNET
48	Suzan kouteh	Basheer H

49	Jansait Nasser	RMS
50	Ali Banilssa	KAUH
51	Fatima Abdulaziz	Zarqa H
52	ZakariaAbdelrahim	J.U.H
53	Muna Hatem	JMOH
54	Rola Ali Ghanem	CPHL
55	Dr. Mahmoud Algazo	CPHL
56	Mohammed Hawamdeh	Private
57	Eng .Maeda Al-Azzeh	MOH
58	AsmaArarawi	Jerash H
59	Mayor Hatokai	MOH
60	MohanadAlazzeh	Private
61	Aya Nabil Ramahi	Specialty H
62	Alqahira Al Kalabani	J.U.H
63	MaramHadadeen	JFDA
64	Raja Abu trabeh	PHH
65	Iyad Ibrahim Almheirat	Basheer H
66	Amani Roman	JU
67	NouraH.Alshraa	MOE
68	Ammar Sweiti	MOH
70	Omer Jamal Ateyh	MOH
71	Amani Roman	Amman H
72	Lama Bobali	Amman H
73	MajdoleenMasandeh	MO Finance
74	RubaAlomari	NCARE
75	Ghaya Al-Wahdani	CPHL
76	Alia Alkhlaifat	RMS
77	Dr.HeyamMukatesh	IHR focal point
78	OmaimaNassar	HCAC
79	Bayan Awwad	MOH
80	Sultan Elbana	Basheer H
81	Dr.RandaBagaeen	MOH

82	Dr. Yousef Alqdemat	MOH
84	Mayes Alahmad	Specialty H
85	Dr .Naser Amin	MOH
86	Bushra Al harahsheh	JMOH
87	Dr. Marwan Alzoqol	private
88	Dawood Yusef	KAVH
89	Maeda al - Azzeh	MOH
90	Alaa Omer Bader	Specialty H
91	Dr.Rakan Ahmad	MOH
92	Dr.Kariman Al- Zain	MOH
93	Ibrahim Jamal	MOH
94	Suzanne Atef	MOH
95	Rima Al-Jabari	MOH
96	Aliaa Odeh	MOH
97	NaheelHaloub	Specialty H
98	NedaaBawaresh	JFDA
99	Dr.IbrahimAlmashayek	MOH
100	Dr. Mahmoud Qaissieh	MOH
101	DR.SOUAD AQEL	MINISTRY OF AGRICULTURE
102	Ahmed Alqaryouti	MOH/ Zarqa
103	AbeerMelhem	PHH
104	Shatha Al Bsoul	Specialty H
105	Dr. Mahmoud kayed	MOH
106	Dr. Nizar Maswadi	MOH
107	Maisaalkhateeb	USAID
108	Prof.Nawjaquri	Jordan university hospital
109	John alawneh	FAO
110	Dr rajesh bhatia	Who expert

## **Annex 3:**

### **Partial details of budgetary estimates**

Objective 1

No	Activity Group	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Assessment	21750	11750	0	0	0	33500
2	Supplies and technical material	60000	90000	120000	15000	15000	300000
3	Trainings	54600	46000	29900	29900	29900	190300
4	Meetings	3800	4700	12000	0	0	20500
5	Field Surveys	20000	20000	25000	25000	10000	100000
6	Additional dedicated human resource cost	18000	18000	20000	20000	22500	98500
<b>21</b>	<b>#VALUE!</b>	<b>158150</b>	<b>170450</b>	<b>181900</b>	<b>64900</b>	<b>67400</b>	<b>642800</b>

## Objective 2

No	Activity Group	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Campaigns	92400	77400	77400	77400	77400	402000
2	Advocacy material drafting and mass production	8000	500	500	500	500	10000
3	Trainings	25800	15800	0	0	0	41600
4	Meetings	1600	4700	12000	0	0	18300
5	Field Surveys	13800	3800	3800	3800	3800	29000
6	Additional dedicated human resource cost	18000	18000	20000	20000	22500	98500
<b>21</b>	<b>#VALUE!</b>	<b>159600</b>	<b>120200</b>	<b>113700</b>	<b>101700</b>	<b>104200</b>	<b>599400</b>

### Objective 3

No	Activity Group	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Guidelines	16500	6500	0	0	0	23000
2	Supplies and technical material	500000	500000	500000	500000	500000	2500000
3	Trainings	239100	305800	275100	185100	125100	1130200
4	Meetings	16000	20000	22000	25000	17000	100000
5	Waste care	25000	25000	25000	15000	10000	100000
6	Additional dedicated human resource cost	18000	18000	20000	20000	22500	98500
<b>21</b>	<b>#VALUE!</b>	<b>814600</b>	<b>875300</b>	<b>842100</b>	<b>745100</b>	<b>674600</b>	<b>3951700</b>

### Objective 4

No	Activity Group	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Guidelines	23000	6500	0	0	0	29500
2	Supplies and technical material	60000	60000	60000	60000	60000	300000
3	Trainings	353100	332800	302100	212100	167100	1367200
4	Meetings	160000	20000	22000	25000	17000	100000
5	Waste care	25000	25000	25000	15000	10000	100000
6	Additional dedicated human resource cost	12000	12000	14000	14000	16000	68000
<b>21</b>	<b>#VALUE!</b>	<b>633100</b>	<b>456300</b>	<b>423100</b>	<b>326100</b>	<b>270100</b>	<b>2108700</b>

## Objective 5

No	Activity Group	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1	Guidelines	4500	0	0	0	0	9000
2	Research grants	20000	20000	20000	20000	20000	100000
3	Trainings	21200	11200	11200	11200	11200	66000
4	Meetings and Nat Conferences	29900	24100	11200	11200	11200	87600
6	Additional dedicated human resource cost	6000	6000	7000	7000	8000	34000
<b>#REF!</b>	<b>#VALUE!</b>	<b>81600</b>	<b>61300</b>	<b>49400</b>	<b>49400</b>	<b>50400</b>	<b>296600</b>