

NO TIME TO WAIT:
SECURING THE FUTURE
FROM DRUG-RESISTANT
INFECTIONS

**REPORT TO THE
SECRETARY-GENERAL
OF THE UNITED NATIONS**

APRIL 2019

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KEY MESSAGES IN THIS REPORT

Antimicrobial resistance is a global crisis that threatens a century of progress in health and achievement of the Sustainable Development Goals.

- Antimicrobial (including antibiotic, antiviral, antifungal and antiprotozoal) agents are critical tools for fighting diseases in humans, terrestrial and aquatic animals and plants, but they are becoming ineffective.
- Alarming levels of resistance have been reported in countries of all income levels, with the result that common diseases are becoming untreatable, and lifesaving medical procedures riskier to perform.
- Antimicrobial resistance poses a formidable challenge to achieving Universal Health Coverage and threatens progress against many of the Sustainable Development Goals, including in health, food security, clean water and sanitation, responsible consumption and production, and poverty and inequality.
- Misuse and overuse of existing antimicrobials in humans, animals and plants are accelerating the development and spread of antimicrobial resistance.
- Inadequate access to clean water, sanitation and hygiene in health care facilities, farms, schools, households and community settings; poor infection and disease prevention; lack of equitable access to affordable and quality-assured antimicrobials, vaccines and diagnostics; and weak health, food and feed production, food safety and waste management systems are increasing the burden of infectious disease in animals and humans and contributing to the emergence and spread of drug-resistant pathogens.

There is no time to wait. Unless the world acts urgently, antimicrobial resistance will have disastrous impact within a generation.

- Drug-resistant diseases already cause at least 700,000 deaths globally a year, including 230,000 deaths from multidrug-resistant tuberculosis, a figure that could increase to 10 million deaths globally per year by 2050 under the most alarming scenario if no action is taken. Around 2.4 million people could die in high-income countries between 2015 and 2050 without a sustained effort to contain antimicrobial resistance.
- The economic damage of uncontrolled antimicrobial resistance could be comparable to the shocks experienced during the 2008-2009 global financial crisis as a result of dramatically increased health care expenditures; impact on food and feed production, trade and livelihoods; and increased poverty and inequality.
- In higher-income countries, a package of simple interventions to address antimicrobial resistance could pay for itself due to costs averted. In lower-income countries, additional but still relatively modest investments are urgently needed.
- If investments and action are further delayed, the world will have to pay far more in the future to cope with the disastrous impact of uncontrolled antimicrobial resistance.

Because the drivers of antimicrobial resistance lie in humans, animals, plants, food and the environment, a sustained One Health response is essential to engage and unite all stakeholders around a shared vision and goals.

- National Antimicrobial Resistance Action Plans are at the heart of a multisectoral One Health response, but financing and capacity constraints in many countries need to be urgently addressed to accelerate implementation.
- Strengthening infection prevention and control in health care facilities and farms using available tools and ensuring access to clean water, sanitation and hygiene in health facilities, farms, schools, household and community settings are central to minimizing disease transmission and the emergence and transmission of antimicrobial resistance in humans, animals, plants, food and the environment.
- Strengthening surveillance, regulatory frameworks, professional education and oversight of antimicrobial prescription and use, and increasing awareness among all stakeholders are also significant challenges that need to be urgently addressed to ensure the responsible use of antimicrobials and to minimize resistance in humans, animals, plants, food and the environment.
- Immediately stopping the use of the antimicrobials on the WHO List of Highest Priority Critically Important Antimicrobial Agents for Human Medicine as growth promoters is an essential first step towards completely phasing out the use of antimicrobials for growth promotion.
- Additional effort, investments and incentives are needed to spur innovation in antimicrobial medicines, diagnostics, vaccines, waste management tools, safe and effective alternatives to antimicrobials and alternative practices, as well as operational and implementation research, in human, animal and plant health.
- Many people around the world still do not have access to antimicrobials. Ensuring equitable and affordable access to quality antimicrobial agents and their responsible and sustainable use is an essential component of the global response to antimicrobial resistance.
- Stronger political leadership, advocacy, coordination and accountability are needed at all levels to enable a sustained One Health response to antimicrobial resistance. All stakeholder groups – including governments, civil society and the private sector – need to be engaged and to collaborate in an unprecedented effort across the human, animal, plant, food and feed production and environmental sectors, based on a shared vision and goals.
- The challenges of antimicrobial resistance are complex and multifaceted, but they are not insurmountable. Implementation of the recommendations in this report will help to save millions of lives, maintain economic and other development gains, and secure the future from drug-resistant diseases.

SUMMARY OF IACG RECOMMENDATIONS

A. ACCELERATE PROGRESS IN COUNTRIES

A1: The IACG calls on all Member States to ensure equitable and affordable access to existing and new quality-assured antimicrobials as well as alternatives, vaccines and diagnostics, and their responsible and prudent use by competent, licensed professionals across human, animal and plant health.

A2: The IACG calls on all Member States to accelerate the development and implementation of One Health National Antimicrobial Resistance Action Plans within the context of the SDGs.

A3: The IACG calls on all Member States to phase out the use of antimicrobials for growth promotion, consistent with guidance from the Tripartite agencies (FAO, OIE and WHO) and Codex Alimentarius, starting with an immediate end to the use of antibiotics categorised as the Highest Priority Critically Important Antimicrobial Agents on the WHO List of Critically Important Antimicrobials for Human Medicine.

B. INNOVATE TO SECURE THE FUTURE

B1: The IACG calls on public, private and philanthropic donors and other funders to increase investment and innovation in quality-assured, new antimicrobials (particularly antibiotics), novel compounds, diagnostics, vaccines, waste management tools, and safe and effective alternatives to antimicrobials for human, terrestrial and aquatic animal and plant health, as well as implementation and operational research.

B2: The IACG recommends that existing and future global access initiatives should promote and support equitable and affordable access to existing and new, quality-assured antimicrobials, diagnostics, vaccines, waste management tools and safe and effective alternatives to antibiotics for human, terrestrial and aquatic animal and plant health.

B3: The IACG calls on public, private and philanthropic research funders and other stakeholders to build upon current research and development efforts for new antimicrobials, diagnostics, vaccines, waste management tools, and to strengthen implementation and operational research and research coordination and collaboration in a One Health context.

C. COLLABORATE FOR MORE EFFECTIVE ACTION

C1: The IACG calls for the systematic and meaningful engagement of civil society groups and organizations as key stakeholders in the One Health response to antimicrobial resistance at global, regional, national and local levels.

C2: The IACG calls for the systematic and meaningful engagement of and enhanced action by the private sector as key stakeholders in the One Health response to antimicrobial resistance at global, regional, national and local levels.

D. INVEST FOR A SUSTAINABLE RESPONSE

D1: The IACG calls on governments; global, regional, national, bilateral and multilateral financing and development institutions and banks; and private investors to systematically apply standards to assess risks and impacts related to antimicrobial resistance (an antimicrobial resistance and One Health “lens”) when making investments.

D2: The IACG emphasizes the need for increased investments in the response to antimicrobial resistance, including from domestic financing in all countries; urges existing and future financing mechanisms in human, animal and plant health, food and feed production and the environment to give greater priority to antimicrobial resistance in their resource allocations; calls on public, private and philanthropic donors to contribute additional funding, including to support implementation of National Antimicrobial Resistance Action Plans.

E. STRENGTHEN ACCOUNTABILITY AND GLOBAL GOVERNANCE

E1: The IACG requests the Tripartite agencies (FAO, OIE and WHO) together with UN Environment, other UN agencies and the World Bank, in the context of UN reform, to further strengthen joint One Health action, based on target-setting, country priorities and needs, by enhancing their organizational capacity and providing adequate and sustainable core funding for antimicrobial resistance-related activities.

E2: The IACG recommends the urgent establishment of a One Health Global Leadership Group on Antimicrobial Resistance, supported by a Joint Secretariat managed by the Tripartite agencies (FAO, OIE and WHO).

E3: The IACG requests the Secretary-General, in close collaboration with the Tripartite agencies (FAO, OIE and WHO), UN Environment and other international organizations, to convene an Independent Panel on Evidence for Action against Antimicrobial Resistance in a One Health context to monitor and provide Member States with regular reports on the science and evidence related to antimicrobial resistance, its impacts and future risks, and recommend options for adaptation and mitigation.

E4: The IACG recognizes the ongoing process led by Member States to develop the Global Development and Stewardship Framework to Combat Antimicrobial Resistance and urges the Tripartite agencies (FAO, OIE and WHO) and UN Environment to expedite its development in line with the scope described in the 2015 World Health Assembly resolution on antimicrobial resistance (WHA68.7). As Member States finalize this process, they should also consider the need for new international instruments.

1. CONTEXT FOR THIS REPORT

The 2016 *Political Declaration of the High-level Meeting of the United Nations General Assembly on Antimicrobial Resistance* (1) represented a landmark in the world's commitment to tackling antimicrobial resistance, calling for greater urgency and action in response to its many challenges. In the political declaration, Member States requested the Secretary-General, in consultation with the Food and Agriculture Organization of the United Nations (FAO), the World Organisation for Animal Health (OIE) and the World Health Organization (WHO) to convene an ad hoc interagency coordination group (IACG) co-chaired by the Executive Office of the Secretary-General and the Director-General of WHO to provide practical guidance for approaches needed to ensure sustained, effective global action to address antimicrobial resistance. It also requested the Secretary-General to submit a report for consideration by Member States by the seventy-third session of the General Assembly in 2019 on the implementation of the political declaration and on further developments and recommendations emanating from the IACG, including on options to improve coordination, considering the 2015 Global Action Plan on Antimicrobial Resistance (2).

This report presents the IACG's response to the request from Member States in the 2016 political declaration and makes recommendations for urgent action for consideration by the Secretary-General, Member States and other stakeholders in the global response to antimicrobial resistance.

2. PROCESS OF DEVELOPING THE IACG RECOMMENDATIONS

The IACG was convened in March 2017. Its membership consisted of representatives of United Nations and multilateral agencies and individuals with expertise across human, animal and plant health, as well as the food, animal feed, trade, development and environment sectors. The IACG's mandate was to provide practical guidance for approaches needed to ensure sustained effective global action to address antimicrobial resistance. Its terms of reference included promoting, planning and facilitating collaborative action to align activities so that gaps are closed and resources are optimally utilized; exploring the feasibility of developing global goals and targets related to antimicrobial resistance; and reporting back to the Secretary-General by the seventy-third UN General Assembly in 2019. The IACG was supported by a Secretariat hosted by WHO with staff seconded from FAO, OIE and WHO.

Between March 2017 and December 2018, the IACG met formally either in-person or by teleconference eight times, and held many other conference calls, including meetings of thematic sub-groups. To guide its activities, the IACG developed a workplan (3) and an IACG Framework for Action on Antimicrobial Resistance (4) that describes key content areas and relevant levers to address them, building on the 2016 political declaration, the Global Action Plan on Antimicrobial Resistance and the Sustainable Development Goals (SDGs). Country visits by IACG members to Argentina, Thailand and Vietnam in

2018 provided valuable insights into successes and challenges in national and local responses to antimicrobial resistance.

In the course of its deliberations, the IACG analysed critical issues in the response to antimicrobial resistance to inform its report and recommendations. In 2018, it developed discussion papers for public consultation in six thematic areas: 1) Public awareness, behaviour change, and communication; 2) National Action Plans on Antimicrobial Resistance; 3) Optimizing use of antimicrobials; 4) Innovation, research and development, and access; 5) Surveillance and monitoring; and 6) Global governance and alignment with the SDGs (5,6,7,8,9,10). Targeted outreach and consultations were conducted with key stakeholders during this analytic phase, particularly with regard to governance, access, research and development issues. A web-based public consultation process on the six discussion papers was held between June and August 2018 and received 153 submissions from a wide range of stakeholders.

The IACG conducted a wide range of stakeholder engagement activities, including discussions with FAO, OIE, WHO and UN Member States based in Rome, Paris, Geneva and New York respectively; discussions with civil society and the private sector; and inputs from more than 350 participants attending the Call to Action on Antimicrobial

Resistance event in Accra, Ghana, in November 2018. A mapping exercise and critical appraisal of recommendations made in previous global reports on antimicrobial resistance were conducted by the IACG Secretariat to provide guidance to the IACG and help ensure that its recommendations addressed key bottlenecks in the response, rather than duplicating those in previous reports. In January and February 2019, additional public discussions on the draft IACG recommendations were held with more than 400 people representing 68 Member States, 39

civil society organizations, 49 private sector groups and 11 international organizations. Concurrently, a web-based forum on the draft recommendations drew more than 80 additional written submissions from Member States, civil society organizations, the private sector and individuals.

Further information on the IACG process and relevant materials, including the written submissions received, are available on the [IACG website](#).

3. BACKGROUND TO THE IACG RECOMMENDATIONS

3.1. Antimicrobial resistance is a global crisis that risks reversing a century of progress in health

Antimicrobial agents are critical tools to fight diseases in humans, animals, plants and crops. But growing levels of resistance to these agents is placing a century of progress in human health at risk. Common infections are becoming much more difficult to treat, and lifesaving medical procedures and treatments riskier to perform. At the same time, there is a lack of scientific innovation resulting in part from market failure, with too few new antimicrobials, vaccines, diagnostics tools and alternatives to antimicrobials for use in humans, animals and plants in the research and development pipeline.

Alarming levels of antimicrobial resistance have been reported in countries of all income levels. In some member countries of the Organization for Economic Cooperation and Development (OECD), about 35 per cent of common human infections are already resistant to currently available medicines, and in some low- and middle-income countries (LMICs), resistance rates are as high as 80 to 90 per cent for some antibiotic-bacterium combinations (11). More than a third of countries providing data to WHO in 2017 reported widespread resistance to common pathogens (12). Resistance to second- and third-line antibiotics – the last lines of defence against some common diseases – are projected to almost double between 2005 and 2030 (11). Concurrently, millions of lives are lost every year due to lack of access to existing antimicrobial agents: inadequate access to antibiotics alone kills nearly 6 million people annually, including a million children who die of preventable sepsis and pneumonia (13,14,15).

Although antimicrobial resistance can develop naturally, misuse and overuse of antimicrobial

agents in humans, terrestrial and aquatic animals, plants and crops are greatly accelerating its development and spread. In human health, poor medical prescribing practices and patient adherence to therapies, weak regulation and oversight including over-the-counter sales, and the proliferation of substandard and falsified antimicrobials are all contributing to the problem.

The use of antimicrobials to promote growth and routinely prevent disease in healthy animals and crops without appropriate indication and in the absence of good agricultural practices to prevent infectious diseases on farms are further contributing to the development and spread of antimicrobial resistance (16). Drivers of the use of antimicrobials in animal health – especially in many LMICs – include the large and growing burden of animal diseases, the increasing scale of animal production, and underinvestment in veterinary services and animal health. These underlying issues require attention as part of efforts to reduce the unnecessary use of antimicrobials in animals.

3.2 There is no time to wait. Unless the world acts urgently, antimicrobial resistance will have disastrous impact within a generation

Although antimicrobial resistance is not mentioned in the SDGs, it is recognized in the Global Action Plan for Healthy Lives and Well-being for All (17) as a barrier to achievement of SDG 3 on human health and directly jeopardizes progress against other SDGs related to food security, clean water and sanitation, and responsible consumption and production. Due to cascading impacts on economic development and inequality, antimicrobial resistance also indirectly threatens progress against the SDGs that aim to reduce poverty and inequality.

The true magnitude of antimicrobial resistance in humans is not fully known, but estimates suggest that resistant infections already cause at least 700,000 deaths every year, including 230,000 deaths from multidrug-resistant tuberculosis (18,19). A worst-case scenario developed by the World Bank has suggested that this figure could rise to 10 million deaths every year by 2050, if no action is taken (20). In countries where resistance can be measured accurately, the OECD predicts that around 2.4 million people could die in Europe, North America and Australia between 2015 and 2050 without a sustained effort to contain antimicrobial resistance (11).

The economic impact of uncontrolled antimicrobial resistance would also be catastrophic. As drug-resistant pathogens spread, health care expenditures would increase dramatically, and sustainable food and feed production – including global trade in food, feed and livestock – will increasingly be at risk. As a result, the World Bank estimates that by 2030 up to 24 million people could be forced into extreme poverty, mainly in low-income countries, and annual economic damage as a result of antimicrobial resistance could be comparable to the shocks

experienced during the 2008-2009 global financial crisis – but with no end in sight (20).

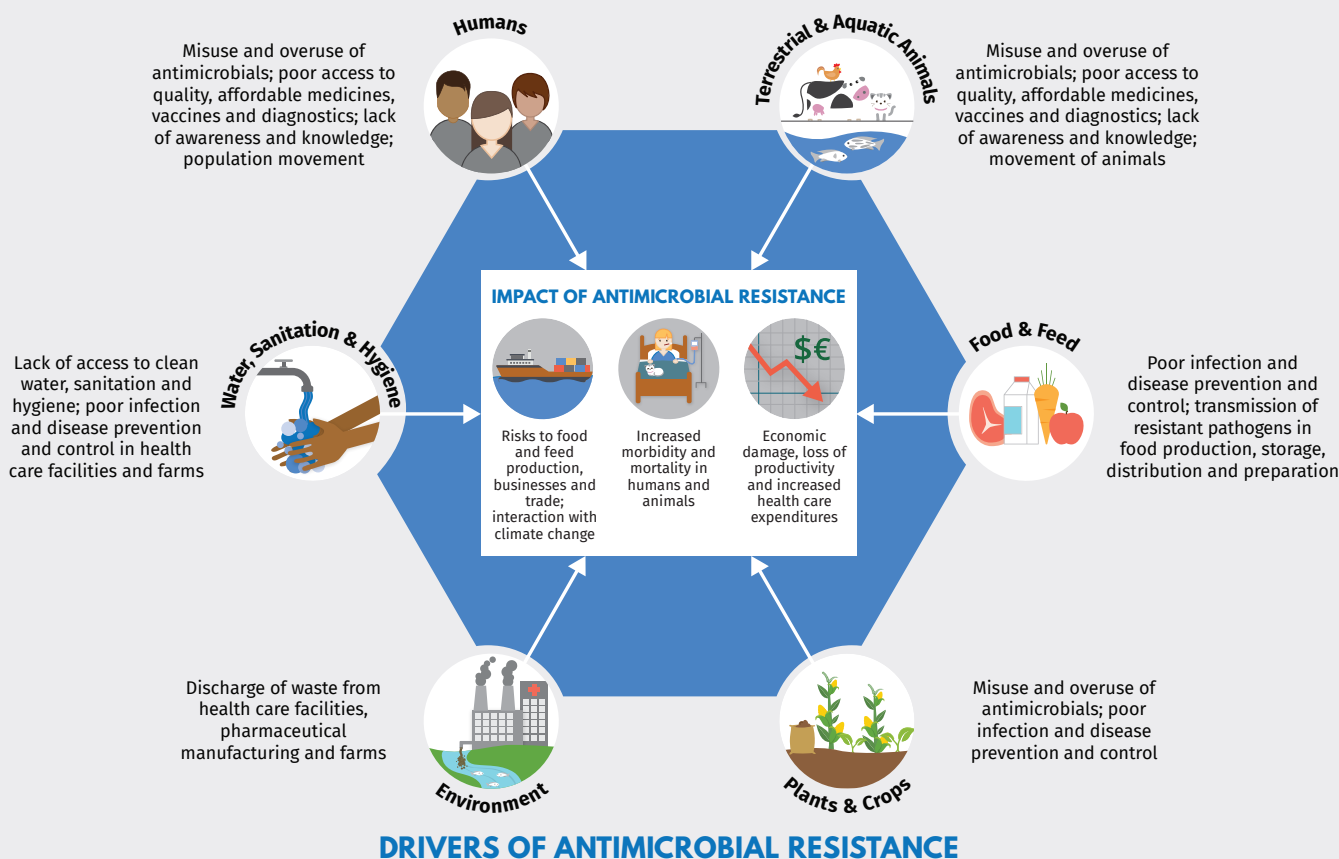
Although evidence remains limited, concerns are also growing about the impact of antimicrobial resistance on the environment and natural ecosystems due to overuse and discharge of antimicrobials and resistant micro-organisms in manure and waste from health care facilities and pharmaceutical manufacturing, commercial livestock and plant production, and fish and seafood farming, a problem that may be fuelled by changes in the world’s climate (21,22).

3.3. A sustained One Health response to antimicrobial resistance is essential to engage and unite all stakeholders around a shared vision and goals

Because the drivers and impact of antimicrobial resistance lie in humans, terrestrial and aquatic animals, plants, food, feed and the environment, and are interconnected, a One Health approach is essential to addressing it on multiple fronts (Fig.1).

Fig 1. A One Health response to address the drivers and impact of antimicrobial resistance

“One Health” refers to designing and implementing programmes, policies, legislation and research in a way that enables multiple sectors and stakeholders engaged in human, terrestrial and aquatic animal and plant health, food and feed production and the environment to communicate and work together to achieve better public health outcomes.



3.3.1. Accelerated implementation of One Health national action plans must be at the heart of the global response to antimicrobial resistance

Since the launch of the Global Action Plan on Antimicrobial Resistance in 2015, at least 100 countries have developed National Antimicrobial Resistance Action Plans, and there is a wealth of normative guidance from the Tripartite agencies (FAO, OIE and WHO) and the Codex Alimentarius to support their implementation (23). But efforts to implement national action plans are currently too slow and must be accelerated.

Although antimicrobial resistance affects all countries at all levels of development, not all countries are equally equipped to respond effectively, and national plans need to be tailored to local needs, context and capacities. Many LMICs facing a higher burden of disease and risk of antimicrobial resistance still need to improve basic water, sanitation and hygiene in health care facilities, farms, schools, households and community settings; strengthen infection prevention and control in health facilities, farms and food and feed production; and improve waste management and environmental protection. At the same time, they face significant barriers to implementation of National Antimicrobial Resistance Action Plans, including inadequate political awareness and commitment, and lack of informed people to champion a One Health approach. Many countries also lack a compelling narrative to engage policy-makers and the general public in a way that links antimicrobial resistance to core national health and economic interests. At the same time, mechanisms and capacity for One Health collaboration across Ministries and sectors are frequently inadequate or under-resourced.

Many national action plans focus mainly on the health of humans and livestock, paying insufficient attention to plants, food and feed production, waste management and the environment. Plans are often not costed or prioritized, largely because few countries have developed robust, national antimicrobial resistance investment cases that identify priorities, estimate returns on investment and costs of inaction and assess risks to the attainment of the SDGs.

Many countries require support to implement national action plans in key areas such as building and analysing the evidence base; setting targets; developing regulatory frameworks and professional capacities to support responsible use

of antimicrobials; mainstreaming antimicrobial resistance into existing programming across the SDGs; and mobilizing additional human and financial resources. Depending on country context, additional investments and capacity building are needed to develop and implement critical components such as antimicrobial stewardship programs; professional education, training, certification and development; behaviour change, awareness and communications activities; and strengthening supply chain management and legal and regulatory frameworks across the One Health spectrum.

Strengthening monitoring and surveillance is particularly important to track the use of antimicrobials and the spread of resistance in humans, animals, plants and food; build the evidence base for action; support multisectoral collaboration; and monitor progress. Implementing surveillance systems requires significant, long-term investments in personnel, training, laboratory, data collection and other infrastructure. All countries, as well as their donors and development partners, have a vital interest in building these critical capacities at the country level, ensuring that data is used to guide responses, and supporting global-level surveillance through initiatives such as WHO GLASS and AGISAR and surveillance work undertaken by OIE and FAO.

3.3.2. More innovation is needed to tackle antimicrobial resistance across the One Health spectrum

The research and development pipeline for health technologies to address priority pathogens has long been inadequate (24,25,26). A sustained effort is needed to spur increased innovation in medicines, diagnostics, vaccines and safe and effective alternatives to antimicrobials across human, terrestrial and aquatic animal and plant health, as well as waste and environmental management.

Previous reports have emphasized that the lack of incentives for manufacturers of pharmaceuticals and active pharmaceutical ingredients to invest in research and development is the major impediment to innovation to tackle antimicrobial resistance (18,27). They have also proposed a range of incentives – including push, pull and delinkage mechanisms – to address different research and development bottlenecks, optimize existing funding for research and development and attract new investments. The G20 has twice committed to further examine practical market incentive options for antimicrobial resistance-related research and development (28,29).

But more attention and effort are needed to determine which of these mechanisms will be the most effective in stimulating the pipeline for priority pathogens, while also guaranteeing access to and stewardship of new and existing antimicrobial products.

Several international initiatives launched in the last few years have helped to catalyse the pipeline of new antibiotics and accelerate products from early stages to proof of concept, as well as to direct donor funding towards priority areas. However, additional resources and incentives are needed to expand the scope and scale of these efforts and to move products more rapidly into clinical trials and through to regulatory approval. There are currently few research and development initiatives dedicated to addressing antimicrobial resistance in terrestrial and aquatic animals, or in plants, food, feed and the environment.

The benefits of scientific innovation in the response to antimicrobial resistance will be lost if new health products are not made available to everyone who needs them, and they are not used in a responsible and sustainable manner. Access to current antimicrobials and diagnostics is already inadequate in many LMICs. Use of available diagnostics and vaccines is also sub-optimal due to factors such as cost, lack of trained health care workers and veterinarians, delays in providing test results, cold chain requirements and complexity of dosing. In the animal and plant sectors, the potentially higher costs of new products may lead farmers to prefer older, less effective antimicrobials or products of unknown quality. In addition, fragile production and supply chains for existing antimicrobials due to the small number of producers, leading to frequent shortages of these products around the world and further contributing to growing rates of disease and outbreaks and an increased risk of antimicrobial resistance in both humans and animals (30).

3.3.3. The world must act and invest now to address antimicrobial resistance, or pay far more in the future

The World Bank estimates that the current cost of antimicrobial resistance containment measures is around USD 9 billion annually, but making investments now could be cost-saving, depending on country context and the proportion of costs averted (20). In human health, the OECD estimates that in high-income and many middle-income countries, the costs of implementing measures to

reduce resistance are so low – USD 2 per person per year for an effective package of measures – and the benefits so great that investments are likely to pay for themselves (11). In many lower-income countries, additional but still relatively modest investments are urgently needed. If investments and action are delayed, the world will have to pay far more in the future to cope with the catastrophic impact of uncontrolled antimicrobial resistance.

The few dedicated funds that currently address antimicrobial resistance – such as the UK's Fleming Fund and Joint Programming Initiative on Antimicrobial Resistance (JPI-AMR), which is supported by 27 Member States and the European Commission, and several research and development initiatives – have helped to catalyze action in priority areas, but they are limited in scope, duration and/or geographic coverage. There is also little appetite on the part of donors to establish new global funding instruments specifically to address antimicrobial resistance. Nevertheless, existing funding mechanisms in human health [including the Coalition for Epidemic Preparedness Innovations (CEPI); Gavi, the Vaccine Alliance; the Global Fund to Fight AIDS, Tuberculosis and Malaria; Medicines Patent Pool; and Unitaid] can be expanded and leveraged, and additional investments are needed to bring the One Health response in countries and at the global level to a scale that is truly commensurate with the threats posed by antimicrobial resistance.

3.3.4. The One Health response to antimicrobial resistance requires stronger leadership, advocacy, coordination and accountability at all levels

The current global response to antimicrobial resistance is inadequate.

Although the impact of antimicrobial resistance on human health and in food production has received considerable attention, there is still inadequate political commitment and stakeholder engagement in these areas globally and at country level. Antimicrobial resistance in animals and plants requires increased attention, advocacy, political commitment, and engagement, while efforts to address antimicrobial resistance in the environment lag far behind in attention, advocacy, political commitment, engagement and the evidence base. Stronger leadership, coordination and accountability are needed at all levels to address these challenges.

Enhanced capacity to develop normative guidance and provide technical support is also urgently

needed. The Tripartite collaboration between WHO, FAO and OIE has provided critical leadership on antimicrobial resistance in recent years but remains seriously under-resourced. The engagement of UN Environment in the work of the Tripartite agencies is also important to support its Member States in addressing antimicrobial resistance within environmental policy-making. At the same time, many other initiatives on antimicrobial resistance have emerged outside the Tripartite arrangement. The result is that no single entity is presently tasked to take on the essential functions of global One Health leadership and coordination across sectors, based on a vision and goals that are shared by all stakeholders - including governments, civil society and the private sector - and an agreed approach to setting targets and ensuring accountability for action. A more systematic and coordinated effort is also needed to synthesize the evidence base and identify knowledge gaps across sectors and disciplines to guide One Health policy and implementation.

The challenges of antimicrobial resistance are complex and multifaceted, but they are not insurmountable. Implementation of the recommendations in this report will help to save millions of lives, preserve antimicrobials for generations to come and secure the future from drug-resistant diseases.

But there is no time to wait.

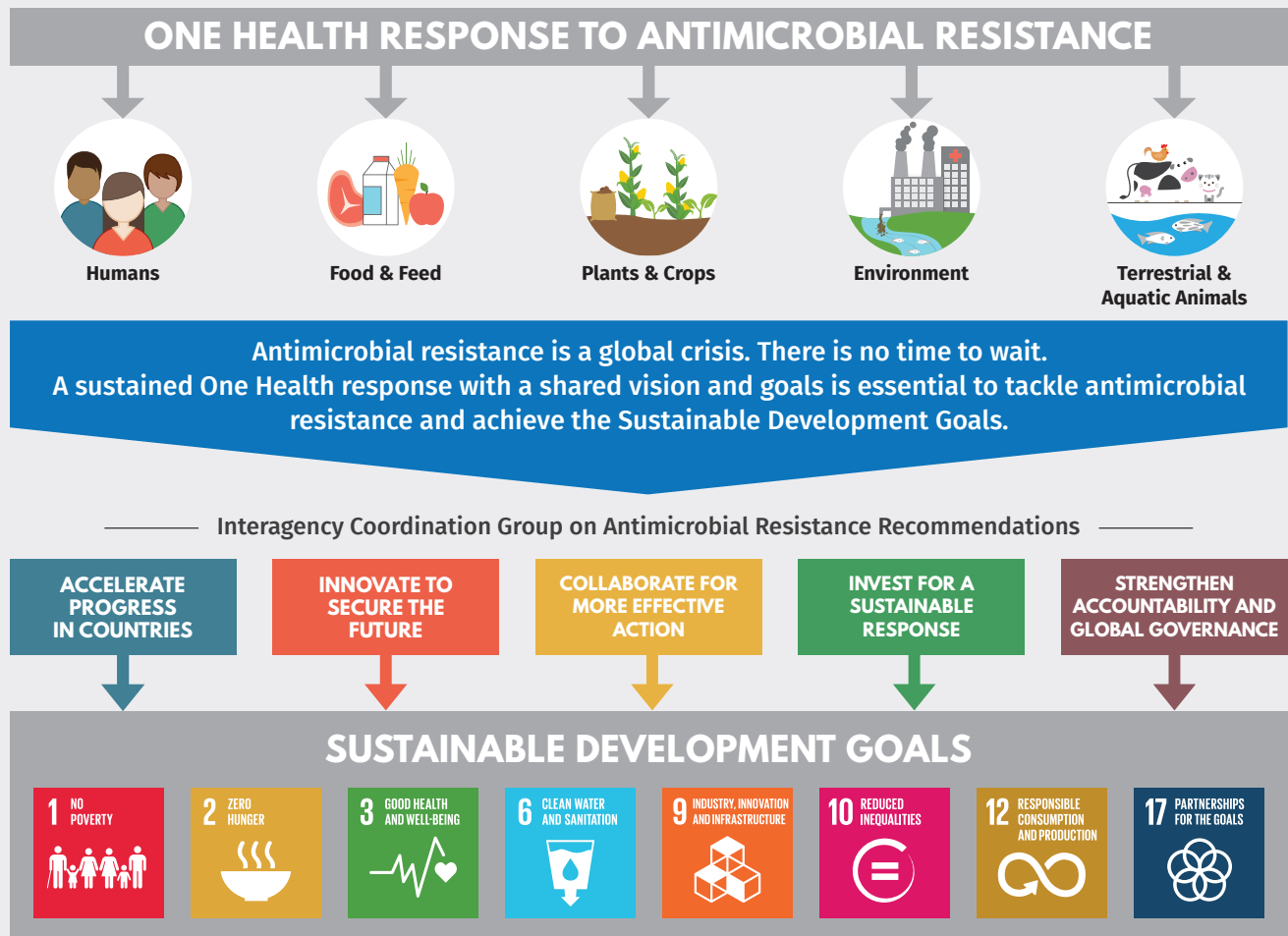
4. IACG RECOMMENDATIONS

4.1 Guiding principles for recommendations

In the course of developing its recommendations, the IACG was guided by the following principles:

- The recommendations should promote and support a One Health approach to antimicrobial resistance cutting across human, terrestrial and aquatic animal and plant health, as well as food and feed production and the environment;
- The recommendations should focus on strengthening existing systems and mainstreaming of efforts to combat antimicrobial resistance so as to leverage gains across the SDGs;
- The recommendations should address major challenges identified in addressing antimicrobial resistance and build upon best practices across health, development, financing, and research and development;
- To the extent possible, the recommendations should not duplicate those made in previous reports, but instead focus on catalyzing the implementation of earlier recommendations by addressing key gaps and bottlenecks in the current response to antimicrobial resistance;
- The recommendations should support mobilization and action by all stakeholders, including governments, international organizations, academia, civil society and the private sector, at global, regional, national and local levels, with a strong emphasis on enabling country-level action and with due consideration to country-specific context, capacity and infrastructure; and
- The recommendations should be practical and feasible to implement, support a targeted response based on country and disease-specific context, and contribute to achieving significant impact against antimicrobial resistance.

Fig. 2: One Health, IACG recommendations and the Sustainable Development Goals



A. ACCELERATE PROGRESS IN COUNTRIES

Aim of the recommendations in this section: *These recommendations emphasize the importance of building and sustaining effective and tailored national responses to address antimicrobial resistance through increased political commitment and more coordinated multisectoral efforts across the One Health spectrum, while also leveraging gains across the SDGs. Implementing these recommendations is the primary responsibility of national governments which should have the central role in developing and implementing national policies and programmes to address antimicrobial resistance based on guidance from the Tripartite agencies and other international organizations.*

Recommendation A1: The IACG calls on all Member States to ensure equitable and affordable access to existing and new, quality-assured antimicrobials as well as alternatives, vaccines and diagnostics and their responsible and prudent use by competent, licensed professionals across human, animal and plant health.

This recommendation must be supported by efforts to reduce the need for antimicrobials, enhance their responsible and prudent use and improve access through:

- a. Lowering the prevalence of infection through clean water, sanitation and hygiene in health care facilities, farms, schools and in household and community settings;
- b. Decreasing the likelihood of diseases and their spread through delivery of existing vaccines and diagnostics and through strengthening infection prevention and control measures, beginning with improved hand hygiene and strengthening laboratory and diagnostic services for human, animal and plant health;
- c. Ensuring best practices in terrestrial and aquatic animal and plant health, food and feed production and waste management;
- d. Supporting behaviour change through effective awareness creation, communication and appropriate incentives targeted at the public and professionals in human, terrestrial and aquatic animal and plant health, as well as food and feed production and the environment;
- e. Developing national processes and instruments based on international guidelines and standards to support equitable access to and responsible and prudent use of existing and new quality-assured antimicrobials in humans, animals, plants and food and feed production, as well as access to diagnostics and vaccines, waste and water management in health care, manufacturing and farming-related activities; and
- f. Strengthening and maintaining national regulatory and accountability mechanisms and integrated monitoring and surveillance systems.

Considerations for this recommendation:

- The IACG recognizes that effective systems for infection prevention and control, including vaccination, clean water, sanitation and hygiene, as well as awareness creation, good management practices, biosecurity and good animal welfare in farming, avert infections in health care and farm settings. These approaches will ensure patient safety and protect health and farm workers, as well as animals and plants, thereby reducing the future need for antimicrobials, protecting the environment and ensuring sustainable food and feed production. Furthermore, effective standards and practices in environmental protection and the proper management and handling of soil, water, health facility and pharmaceutical waste, as well as manure used as fertilizer, can further reduce the spread of antimicrobial residues along the food and feed production chain and in the environment.
- The IACG recognizes that in settings where trained prescribers are in short supply, non-physicians (such as nurses, paramedics and community health workers) and veterinary paraprofessionals may also be trained and authorized to prescribe or administer some antimicrobial agents, including under professional supervision.
- The IACG emphasizes that ensuring equitable and affordable access to and stewardship of existing and new quality-assured antimicrobial

medicines, diagnostics and vaccines is a function of effective health systems and is essential for effective national responses to antimicrobial resistance. This can be achieved in several ways, including:

- o *Addressing shortages and stockouts:* Governments should establish national medicine, vaccine and diagnostics shortage notification systems to allow them to take rapid action in relation to shortages and stockouts of these health products. WHO and OIE should provide guidance to countries on developing or improving existing national medicine and vaccine shortage notification systems for human and animal health that are harmonized and employ the same definitions, approaches and methodologies, where appropriate. This should be complemented by efforts to strengthen supply chain and health information management systems with the aim of preventing shortages and stockouts. A strong supply chain requires sustainable supplies of active pharmaceutical ingredients to avoid supply inefficiencies.
- o *Effective national-level antibiotic demand forecasts:* Improved forecasting is needed in both human and animal health to improve access to antibiotics and to strengthen procurement and supply chain management. This will in turn support efforts by WHO and OIE to develop a global demand forecast model for antibiotics that can be shared with manufacturers and procurement agencies on a regular basis and made publicly available. However, the IACG notes the complexity of and challenges associated with developing forecasts for bacterial infections, even in countries with robust public health and pharmaceutical reporting and surveillance systems.
- o *Establishing antimicrobial production facilities:* Some governments or regional entities may consider establishing production facilities or contracting manufacturers to help mitigate shortages and ensure sustainable production and supply of antimicrobials, particularly antibiotics for human and animal health, paying due consideration to manufacturing and environmental standards and quality assurance for health commodities.
- o *Providing affordable access:* Governments should establish policies, measures and mechanisms that provide existing and new antimicrobial medicines, diagnostics and vaccines at affordable prices, including to people who are unable to pay for them. This will ensure that the benefits of antimicrobials are made available to the population at large, especially those most in need of treatment, regardless of their capacity to pay.
- o *Pooled procurement mechanisms:* Leveraging and learning lessons from existing pooled procurement mechanisms in human health and potentially establishing them for animal health could help to secure both the supply of quality-assured medicines, ensure predictability of demand for manufacturers and promote sustainable procurement practices.
- o *Tackling substandard and falsified medical products* is an important component of ensuring access to quality antimicrobials, including stewardship. Strengthening national regulatory pathways and implementing complementary efforts to improve antimicrobial resistance surveillance and supply chain mechanisms – including the implementation of low-cost technologies and track-and-trace systems – could help to address this problem in low- and middle-income countries. Furthermore, efforts to ensure Universal Health Coverage also promote access to quality-assured and appropriate use of antimicrobials and play a role in reducing the development of antimicrobial resistance.
- The responsible and prudent use of antimicrobials across the human, animal and plant health sectors requires appropriate attention to and investment in professional education, training, certification and development as well as regulation of professionals, including physicians, dentists, pharmacists, veterinarians and other specialists across human, terrestrial and aquatic animal and plant health, food and feed production, and the environment.
- The IACG emphasizes that there is an urgent need to strengthen national surveillance and regulatory frameworks and enforcement capacity in all countries to support effective national responses to antimicrobial resistance, including monitoring antimicrobial resistance; access to, affordability of and the responsible and prudent use of antimicrobials and their importation and sale, particularly over-the-counter and on the internet, and sustainable practices for waste and environmental management.

Surveillance systems should include a set of specific, defined and standardized indicators to enable monitoring of access, availability and affordability of antimicrobials and related commodities.

- The IACG recognizes that efforts to achieve Universal Health Coverage and to expand basic and essential health services are critical

to ensuring equitable and affordable access to quality-assured health products and the responsible and prudent use of antimicrobials. Because achieving Universal Health Coverage depends to a significant degree on the continued effectiveness of antimicrobials, these challenges must be addressed simultaneously.

Recommendation A2: The IACG calls on all Member States to accelerate the development and implementation of One Health National Antimicrobial Resistance Action Plans within the context of the SDGs that, at a minimum, include:

- a. Prioritized actions and interventions that are specific to the national context, capacity and infrastructure, and that are costed and funded, including with adequate domestic resource allocations;
- b. Strengthening key national systems for vaccination; infection prevention and hygiene in health care and farming settings; integrated laboratory systems for human, animal and plant health; monitoring; integrated surveillance; sustainable procurement of health commodities; and waste management;
- c. Technical co-operation, capacity development, research and advocacy components, including support for champions and civil society at national and local levels to mobilize action on antimicrobial resistance; and
- d. Effective national coordination, accountability and governance mechanisms that ensures collaboration between government ministries, parliamentarians, civil society organizations, the private sector and regional and international partners.

Considerations for this recommendation:

- This recommendation is relevant to all countries. However, the IACG recognizes that approaches to tackling antimicrobial resistance and the development and implementation of National Antimicrobial Resistance Action Plans differ among countries, particularly between high-income and low- and middle-income countries. These differences are based on country-specific context, capacity and infrastructure, and will determine the type and level of actions and interventions required to address antimicrobial resistance at national and local levels.
- Furthermore, such differences between countries should inform and help to define the mainstreaming of responses to antimicrobial resistance within existing sustainable development strategies as well as social and political agendas across human, terrestrial and aquatic animal and plant health, food and feed production and the environment at country level.
- The IACG notes that national actions on antimicrobial resistance are relevant to several SDGs, including those that relate to human health, food security, clean water and sanitation, as well as responsible consumption and production, illustrating the importance of mainstreaming action on antimicrobial resistance into national efforts to achieve the SDGs.
- The IACG further recognizes that cooperation and solidarity are required among all countries for an effective global response to antimicrobial resistance, including to tackle cross-border issues and ensure that adequate financial and technical resources are available to support implementation of national action plans, including in low- and middle-income countries. Furthermore, such cooperation should consider the high burden of disease and increased risk of antimicrobial resistance in some countries, and efforts should be directed where the needs are greatest and action will have the most impact. Mechanisms to promote the exchange of best practices and experience through north-south and south-south collaboration will be useful to accelerate implementation of National Antimicrobial Resistance Action Plans in low- and middle-income countries.
- The IACG emphasizes that One Health surveillance and monitoring systems need to be established, coordinated and integrated, covering human, terrestrial and aquatic animal and plant health, food and feed production and

the environment. To the extent possible, they should also provide harmonized, verifiable or equivalent data that can be easily aggregated, compared, exchanged and appropriately used for decisions locally, nationally and globally. Building on recent efforts, the Tripartite agencies – working together with Member States and other organizations – need to develop and monitor core indicators that cut across human, animal, plant, food and environmental health.

- The IACG underlines the importance of creating and strengthening integrated laboratory platforms and services for antimicrobial resistance in collaboration with other priority human, animal and plant health programmes of a country, aligned with existing national laboratory strategic plans.

Recommendation A3: The IACG calls on all Member States to phase out the use of antimicrobials for growth promotion, consistent with guidance from the Tripartite agencies (FAO, OIE and WHO) and Codex Alimentarius, starting with an immediate end to the use of antibiotics categorised as the Highest Priority Critically Important Antimicrobial Agents on the WHO List of Critically Important Antimicrobials for Human Medicine (i.e. quinolones, third- and higher- generation cephalosporins, macrolides and ketolides, glycopeptides and polymyxins).

Considerations for this recommendation:

- The IACG recognizes that the use of antimicrobials in animal production may be as high as or exceed use in the human health sector. The IACG emphasizes that this recommendation should be implemented by Member States as a matter of urgency and that it should be complemented by the adoption of global standards and best practices established by the Tripartite agencies and other international and national authorities.
- The IACG emphasizes that eliminating the use of the Highest Priority Critically Important Antimicrobial Agents for growth promotion is only a first step towards reducing the overuse and misuse of antimicrobials in food and feed production, including in both animals and crops.
- The IACG underlines the importance of collateral measures to address challenges that could arise from the phasing out of antimicrobials in growth promotion, including using alternatives to antimicrobials; infection control and hygiene; education and provision of economic incentives to farmers as they transition from using antimicrobials as growth promoters, as well as promoting research to identify effective interventions. It also recognizes the need for enhanced capacity and technical expertise on animal husbandry to facilitate the phasing out of antimicrobials for growth promotion, particularly in LMICs.
- The IACG notes that while some countries continue to use antimicrobials for animal growth promotion and in crops, others – particularly

low-income countries – experience difficulties in accessing effective antimicrobials to treat diseases in animals. Moreover, both situations – excessive use and poor access – can co-exist in the same country. Although efforts to implement this recommendation should recognize these challenges in different countries, it is important that countries work together in a spirit of solidarity to address them. Countries authorizing antimicrobials for non-veterinary medical use, such as growth promotion, should employ appropriate risk analysis – the process of hazard identification and risk assessment, management and communication – as described in the OIE Terrestrial Animal and Aquatic Animal Health Codes. Such risk analyses should be unbiased assessments that transparently present the evidence base for findings and recommendations and be subject to peer review.

B. INNOVATE TO SECURE THE FUTURE

Aim of the recommendations in this section: *These recommendations emphasize that current efforts to support research into and development of new antimicrobials, diagnostics, vaccines, waste management tools, and safe and effective alternatives to antimicrobials across the One Health spectrum remain inadequate and need to be intensified, with sustained investment and increased scientific engagement and collaboration. They also aim to promote equitable and affordable access to and stewardship of new health products, through both existing and future global access initiatives.*

Recommendation B1: The IACG calls on public, private and philanthropic donors and other funders to increase investment and innovation in quality-assured, new antimicrobials (particularly antibiotics), novel compounds, diagnostics, vaccines, waste management tools, and safe and effective alternatives to antimicrobials for human, terrestrial and aquatic animal and plant health, as well as implementation and operational research through:

- a. Financial and non-financial incentives strategically targeting the most important research and development needs, scientific challenges, and market barriers based on the principles of affordability, effectiveness, efficiency and equity, as outlined in the *2016 UN Political Declaration on Antimicrobial Resistance*; and
- b. Building upon existing Product Development Partnerships in human health and possibly establishing more of them, particularly for terrestrial and aquatic animal and plant health.

Considerations for this recommendation:

- The IACG recognizes that the absence of quality data and the inability to generate such information in all settings across the One Health spectrum are a major barrier in the global response to antimicrobial resistance, including data to enable a complete understanding of the burden and demonstrate a strong investment case.
- The IACG notes that the limited market potential of antibiotics, diagnostics and vaccines discourages innovation, primarily due to scientific barriers, the high cost of research and development and low success rates for new compounds, as well as limited revenue due to low price and volume of new products. Accordingly, additional, sustained investments and collaborations are needed on the part of governments, the private sector and civil society to accelerate research and development, pull new products through to market and ensure effective stewardship.
- The IACG reiterates that all research and development efforts to address antimicrobial resistance should be needs-driven, evidence-based and guided by the principles of affordability, effectiveness, efficiency and equity, as well as delinking the cost of investments in research and development on antimicrobial resistance from the price and volume of sales.
- The IACG recognizes the need to develop and provide appropriate financial and non-financial market incentives for research and development to address antimicrobial resistance and recommends that these incentives should be aligned with defined research and development needs and priorities, including the WHO List of Priority Pathogens and the OIE proposed priorities for vaccine development for chicken, swine, sheep, goat, bovine and fish diseases, and appropriately targeted to address bottlenecks and market barriers across the product life cycle, from fundamental research to registration and equitable and affordable access and stewardship. This could include incentives such as grant funding and tax credits to support early stage research (push mechanisms) and rewards for new research and development products including market entry rewards, milestone prizes, advance market commitments and other market incentives (pull mechanisms).
- The IACG acknowledges the important and encouraging role of existing international mechanisms to support research and development in human health, including CARB-X, Global Antibiotic Research and Development Partnership, Innovative Medicines Initiative, JPI-AMR, TB Alliance, European and Developing Countries Clinical Trials Partnership, CEPI and others. It recommends full and sustained funding for such initiatives and other approaches to

improve innovation and affordable access to health products through public, private and philanthropic sources.

- The IACG acknowledges that terrestrial and aquatic animal health research and development are under-financed, limiting the development of tools that reduce the need for antimicrobials in animals. It emphasizes the need for increased funding for animal health research and development from public and private sources, drawing upon lessons from successful Product Development Partnerships in human health, and replicating them in terrestrial and aquatic animal and plant health.
- The IACG underlines that additional funding combined with appropriate financial and non-financial incentives is particularly required to bring innovative products from fundamental research to registration and implementation, including to accelerate clinical trials in humans and experimental work in animals and

plants, and to create a sustainable innovation ecosystem that overcomes the challenges faced in research and development by small and medium enterprises.

- The IACG recognizes that beyond product development, funding is also required for repurposing existing antimicrobials, and development of suitable drug regimens and child-friendly formulations. Similarly, implementation and operational research require adequate investment, including on burden and mechanisms of transmission of drug resistant infections; implementation of existing tools and effective approaches; innovative practices; behavior change, awareness creation and communication; infection prevention; quality improvement interventions; responsible and prudent use of antimicrobials; smart approaches to livestock management and animal husbandry practices; and effective soil, water and waste management.

Recommendation B2: The IACG recommends that existing and future global access initiatives should promote and support equitable and affordable access to existing and new, quality-assured antimicrobials, diagnostics, vaccines, waste management tools and safe and effective alternatives to antibiotics for human, terrestrial and aquatic animal and plant health.

Considerations for this recommendation:

- While the IACG recognises that governments have the central responsibility to ensure equitable and affordable access to existing and new antimicrobials, diagnostics, vaccines, waste management tools and safe and effective alternatives to antibiotics and alternative practices for human, terrestrial and aquatic animal and plant health, it notes that there are few global access initiatives, particularly to address the needs of LMICs. The IACG therefore emphasizes the need to leverage the use of existing global access and scale-up initiatives and platforms in human health wherever possible (e.g. CEPI, Gavi, the Global Fund to Fight AIDS, Tuberculosis and Malaria, Medicines Patent Pool, Unitaid) to ensure access to existing and new, quality-assured antimicrobials, diagnostics and vaccines to address antimicrobial resistance. This could be done by assessing the comparative advantage and strengths of each of these organizations and determining the levels of funding required.
- The IACG recognizes the need to develop new global initiatives to ensure access to and responsible and prudent use of existing and new antimicrobials, diagnostics, vaccines, waste management tools and safe and effective alternatives to antibiotics in terrestrial and aquatic animal and plant health, including for low-income countries.
- The IACG notes that harmonized regulatory guidance for new antimicrobials, vaccines, and alternatives to antimicrobials – possibly including strengthening global and regional mechanisms - will help to prevent existing registration and commercialization challenges resulting from divergent approval requirements and processes.

Recommendation B3: The IACG calls on public, private and philanthropic research funders and other stakeholders to build upon current research and development efforts for new antimicrobials, diagnostics, vaccines, waste management tools, and safe and effective alternatives to antimicrobials; and to strengthen implementation and operational research and research coordination and collaboration in a One Health context by:

- a. Supporting, facilitating and strengthening coordinated global mapping of research and development activities and funding to address antimicrobial resistance;
- b. Establishing and maintaining platforms for sharing information on research and products in development in both ongoing and completed research and development activities;
- c. Promoting synergies and opportunities for collaboration among funders, researchers and research platforms in human, animal and plant health, and the environment; and
- d. Promoting openness and transparency in data from all research, monitoring and surveillance sources, including overcoming data protection provisions that restrict such data sharing.

Considerations for this recommendation:

- The IACG emphasizes that lack of information, collaboration and transparency across different research and development activities, funding agencies and partners continue to act as significant barriers to advancing research and development related to antimicrobial resistance. It recognizes past and current efforts to promote and enhance research collaboration and interdisciplinary approaches to address antimicrobial resistance and particularly acknowledges ongoing efforts to map research activities, including through JPI-AMR, the Global Antimicrobial Resistance Research & Development Hub and the STAR-IDAZ International Research Consortium on Animal Health, as well as in the private sector.
- The IACG notes that information sharing, collaboration and coordination of research and development through ongoing and future initiatives across all sectors will help in identifying global research and development priorities; ensure that funding addresses those priorities along the full research and development pipeline; enable gaps to be identified and monitored; maximize the impact of research and development; facilitate the work of small and medium enterprises and contribute to reducing costs and avoiding duplication of effort.
- The IACG recommends that, wherever possible, existing research and development platforms for animal and human health, and for the environment, should formalize information-sharing and collaboration arrangements in line with relevant international agreements and ongoing discussions.

C. COLLABORATE FOR MORE EFFECTIVE ACTION

Aim of the recommendations in this section: *Multisectoral efforts involving all stakeholders are essential to tackle the many challenges posed by antimicrobial resistance. These recommendations aim to strengthen the systematic engagement of civil society and the private sector to optimize their contributions to the response to antimicrobial resistance, including working with national governments. All stakeholders should make appropriate declarations of conflicts of interest.*

Recommendation C1: The IACG calls for the systematic and meaningful engagement of civil society groups and organizations as key stakeholders in the One Health response to antimicrobial resistance at global, regional, national and local levels through:

- a. Strengthening their roles in accountability, advocacy, planning, monitoring progress and ensuring responsible and prudent use of antimicrobials;
- b. Promoting synergies with consumer and civil society groups active in other sectors, including in climate change and the environment; responses to sexual and reproductive health and rights; HIV, TB and malaria; patient safety; water, sanitation and hygiene; Universal Health Coverage; and other aspects of the SDGs; and
- c. Provision of political, financial and technical support for civil society organizations to enhance their engagement, including for work with governments while keeping their independence.

Considerations for this recommendation:

- The IACG emphasizes that closer engagement of civil society is essential to advance efforts against antimicrobial resistance at global, regional, national and local levels. This includes professional societies (e.g. medical, veterinary), organizations (e.g. non-governmental and community-based), associations (e.g. consumers, farmers, patients, service providers) trade unions and federations, academia and other non-state actors (e.g. foundations, research networks).
- The IACG notes that civil society groups have a particularly important role to play in the development of National Antimicrobial Resistance Action Plans; ensuring transparency of governance and monitoring; undertaking advocacy, awareness creation and communications; and enabling citizens to become agents of change. Depending on country context, civil society actors can be strong drivers for mobilization and action to address antimicrobial resistance. For example, consumer groups have advocated successfully for responsible and prudent antibiotic use in food production by some companies, mainly in high-income countries. In other countries, farmers' groups have mobilized to respond to the challenges that antimicrobial resistance poses to their livelihoods. The IACG notes that efforts are particularly needed to strengthen the engagement of civil society stakeholders from the environment sector and to encourage and

engage consumer groups in LMICs in efforts to address antimicrobial resistance.

- Experiences from advanced global health initiatives that address HIV, TB and malaria, and from the climate change and environment sectors that have resulted in demonstrable impact, can be drawn upon to advance this recommendation. The IACG particularly emphasizes the need for stakeholders engaged in antimicrobial resistance to work with these groups to identify synergies and opportunities to achieve shared gains by addressing antimicrobial resistance in their advocacy and programming efforts.
- The IACG highlights the importance of providing political, financial and technical support to civil society organizations to enhance their engagement, including to work effectively with governments and to ensure that their efforts are aligned with and contribute to evidence-based national policies and approaches. Innovative approaches to financing the engagement of community-based organizations include the Collaborative Fund for HIV Treatment Preparedness, Global Fund Advocates Network, the Civil Society Challenge Facility of the Stop TB Partnership, and the Global Environment Facility's Small Grants Programme. These and other initiatives have successfully mobilized community action and ownership in their respective fields and have significant potential to do the same across sectors in the response to antimicrobial resistance.

Recommendation C2: The IACG calls for the systematic and meaningful engagement of and enhanced action by the private sector as key stakeholders in the One Health response to antimicrobial resistance at global, regional, national and local levels to support:

- a. Affordable access, responsible and prudent use and stewardship of antimicrobials;
- b. Ethical production, distribution and marketing practices, including through environmentally sustainable production and waste management and the elimination of inappropriate incentives to sell antimicrobials;
- c. Engagement by the private sector in collaborative efforts to collect, analyze and use data and realign economic incentives to improve production, distribution and marketing practices; and
- d. Contributions to addressing antimicrobial resistance through testing of innovative approaches, corporate social responsibility, and similar initiatives.

Considerations for this recommendation:

- The IACG recognizes the diverse range of private sector actors that need to be engaged in the fight against antimicrobial resistance. This includes industries such as generic and non-generic manufacturers producing pharmaceuticals, health technologies and pesticides/biocides for

human, animal and plant health; commercial food and feed producers and retailers; private financial institutions and venture capital including banking, insurance, investors and investment fund managers; and private practitioners in human and animal health.

- The IACG also recognizes encouraging efforts by the private sector to engage in the response to antimicrobial resistance, including in voluntary, collaborative approaches to responsible and prudent distribution and use of antimicrobials, and through organized industry collaboration related to both human and animal health. However, the IACG emphasizes that the urgency and threat posed by antimicrobial resistance demand significantly more action by and enhanced engagement of the private sector to advance efforts against antimicrobial resistance at global, regional and national levels.
- In addition to the activities described in this recommendation, private sector actors in human, plant, and animal health, as well as in the food and feed production and retail sectors, have important contributions to make in the areas of financing and resource mobilization; information and data sharing; monitoring and surveillance; behaviour change, awareness creation and communication; advocacy and work with government on key policy issues; research and development; and effective environmental management.

D. INVEST FOR A SUSTAINABLE RESPONSE

Aim of the recommendations in this section: *Financing is a critical bottleneck to advancing the global response to antimicrobial resistance. These recommendations emphasize the need for innovative approaches to mainstream antimicrobial resistance-related activities and leverage resources from existing funding streams, as well as to mobilize new and additional funding. The recommendations further underline that domestic financing commitments by national governments are essential to advance priority actions and ensure long-term, sustainable responses to antimicrobial resistance.*

Recommendation D1: The IACG calls on governments; global, regional, national, bilateral and multilateral financing and development institutions and banks; and private investors to systematically apply standards to assess risks and impacts related to antimicrobial resistance (an antimicrobial resistance and One Health “lens”) when making investments through:

- Official Development Assistance;
- South-South cooperation;
- The International Development Association (IDA) replenishment process from IDA19 onwards;
- Financial support, grants, loans, credits and insurance for terrestrial and aquatic animals and plants; health, water and sanitation; development; food systems; manufacturing of health products; the environment; and other relevant areas.

Considerations for this recommendation:

- The IACG notes that experiences of mainstreaming gender and climate change into grants and loans of bilateral agencies, the World Bank and regional development banks demonstrate the feasibility of introducing a similar approach of applying an antimicrobial resistance and One Health “lens” to existing funding streams and approaches. Applying this “lens” entails the development and application of standards to assess antimicrobial resistance-related risks and impacts and accountability measures to ensure that that these investments do mitigate—and do not worsen—the emergence, prevalence and impact of antimicrobial resistance.
- The IACG notes that the direct and indirect costs to the health sector and food production

systems of treating and managing drug-resistant infections are already significant and are likely to increase in the absence of concerted action. These costs may be offset by adequate investments to lower the burden of infections through water, sanitation and hygiene; vaccination and infection prevention and control measures; universal health coverage; and by promoting sustainable production and supply. Overall, the IACG emphasizes the need to further leverage existing funding streams and investments, and to mobilize new and additional resources to strengthen existing efforts and ensure a more effective and sustainable global response to antimicrobial resistance. It underlines that such investments not only help to tackle the challenges currently posed by

antimicrobial resistance but will also avert the need for even greater investments in the future and will help to mitigate the economic impact of antimicrobial resistance.

- The IACG notes that there is an urgent need to elevate the challenges of antimicrobial resistance as crucial elements of the global social, economic development and financing agenda, including the SDGs. The spread of untreatable drug-resistant diseases poses a serious threat to the achievement of the SDGs, including those that relate to human health; food security; clean water and sanitation; and responsible consumption and production. The

IACG recognizes the importance and urgency of developing robust analyses and indicators that capture both the direct and indirect impact of antimicrobial resistance on efforts to achieve the SDGs.

- The IACG recognizes the indirect benefits that broader financial investments in areas related to human, terrestrial and aquatic animal and plant health, as well as food and feed production, can have in addressing antimicrobial resistance. Applying an antimicrobial resistance and One Health “lens” to and monitoring such investments will help to inform and leverage further financing for antimicrobial resistance.

Recommendation D2:

- a. The IACG emphasizes the need for additional and increased investment in the global response to antimicrobial resistance, including from domestic financing in all countries;**
- b. The IACG urges existing and future financing mechanisms in human, animal and plant health, as well as food and feed production and the environment – including Gavi, the Vaccine Alliance; the World Bank; the Global Fund to Fight AIDS, Tuberculosis and Malaria; Global Financing Facility; Multilateral Climate Funds; and Unitaid, as well as future financing streams for Universal Health Coverage; water, sanitation and hygiene; and other priority development issues, and their donors, to give antimicrobial resistance greater priority in their resource allocations, including by assessing the need to expand their scope and mandate, where appropriate.**
- c. The IACG further calls on public, private and philanthropic donors in human, animal and plant health, as well as food and feed production and the environment, to contribute additional funding to addressing antimicrobial resistance, including to support implementation of National Antimicrobial Resistance Action Plans.**

Considerations for this recommendation:

- The IACG notes that significant opportunities exist within existing human health financing mechanisms – notably Gavi, the Vaccine Alliance; the Global Fund to Fight AIDS, Tuberculosis and Malaria; and Unitaid – to contribute to the external financial needs of low-income countries in implementing National Antimicrobial Resistance Action Plans.
- The IACG acknowledges both the added value of and the need to further strengthen financing mechanisms dedicated to antimicrobial resistance, such as JPI-AMR, which is supported by 27 Member States and the European Commission, as well as the Fleming Fund of the UK government, to advance the global response, particularly through support for implementation in low-income countries while also ensuring long-term sustainability through domestic financing.
- The IACG highlights the importance of increased engagement by the private sector and other stakeholders to advance innovative financing concepts for antimicrobial resistance, including livestock insurance programs and other incentives to support the transition to sustainable food and feed production practices, as well as accredited medicine dispensing outlets and social impact bonds.
- The IACG emphasizes that efforts to leverage resources within existing funding mechanisms must be supported by effective global, regional and national governance and coordination mechanisms to help direct limited resources to agreed priorities and goals across the One Health spectrum.

E. STRENGTHEN ACCOUNTABILITY AND GLOBAL GOVERNANCE

Aim of the recommendations in this section: Stronger and sustained global leadership and advocacy and a more powerful global narrative and vision are all needed to advance the global response to antimicrobial resistance. These recommendations promote the creation of a platform that will be instrumental in raising the profile and urgency of addressing antimicrobial resistance, building and maintaining political momentum and public support, enabling more comprehensive monitoring of the science and evidence related to antimicrobial resistance, ensuring accountability among all stakeholders and recognizing the central role of national governments.

Recommendation E1: The IACG requests the Tripartite agencies (FAO, OIE and WHO) together with UN Environment, other UN agencies and the World Bank, in the context of UN reform, to further strengthen joint One Health action, based on target-setting, country priorities and needs, by enhancing their organizational capacity and providing adequate and sustainable core funding for antimicrobial resistance-related activities in order to:

- a. Integrate antimicrobial resistance into UN country-level activities, including UN Development Assistance Frameworks and Country Programme Documents;
- b. Provide and update effective normative guidance, standards and tools, where necessary;
- c. Advise on priority evidence-based interventions and actions;
- d. Provide coordinated technical co-operation and capacity building, including One Health regional platforms for technical co-operation;
- e. Guide, support, monitor and evaluate implementation, including on infection prevention and control; antimicrobial stewardship; integrated surveillance; data quality and harmonization; risk assessment; procurement and demand forecasting; and supply management;
- f. Identify priorities for research and development and facilitate implementation research in a One Health context; and
- g. Define the financial needs and gaps for national and global responses to antimicrobial resistance, including the costs of inaction and anticipated returns on investment.

Considerations for this recommendation:

- The IACG acknowledges the critical and core mandate of the Tripartite agencies (FAO, OIE and WHO) and Codex Alimentarius in providing Member States with normative guidance, standards and tools to tackle antimicrobial resistance for human, aquatic and terrestrial animal and plant health, as well as in food and feed production and food safety. The IACG also recognizes the important role of UN Environment in addressing environment-related antimicrobial resistance issues. Other UN and international agencies have key roles to play in accelerating action against antimicrobial resistance, including at country level, for example, through UN Development Assistance Frameworks and ensuring a whole-UN approach to antimicrobial resistance.
- The IACG applauds recent positive developments from the Tripartite agencies (FAO, OIE and WHO), including the signing of a Memorandum of Understanding and a joint workplan that includes UN Environment. However, the IACG believes that the response of the Tripartite agencies (FAO, OIE and WHO) needs to be stepped up and requires further consolidation and strengthening through enhanced organizational capacity and commitment of additional human and financial resources, including adequate and sustainable core funding for their activities related to antimicrobial resistance.
- The IACG emphasizes that formalizing the antimicrobial resistance-related core and shared roles and responsibilities of the Tripartite agencies (FAO, OIE and WHO) and UN Environment based on their mandate in their respective sectors will facilitate collaborative and coordinated action. For example, the Tripartite agencies (FAO, OIE and WHO) and UN Environment can collectively define key antimicrobial resistance-related activities which they will undertake separately, jointly or in collaboration with other UN and international agencies.
- The IACG recognizes that lessons can be drawn from experience and best practice models and platforms of the Tripartite agencies (FAO, OIE

and WHO) within the One Health context that were demonstrated in responses to zoonoses and emerging infections. These experiences can be used to guide and further strengthen the Tripartite agencies' response to antimicrobial resistance through building national capacity, creating a platform and repository to share best practices and materials (e.g. in awareness creation, communications, integrated surveillance, antimicrobial stewardship promoting responsible and prudent use) and developing tools to support the implementation of National Antimicrobial Resistance Action Plans.

- The IACG recommends that lessons should also be drawn from other areas with advanced global responses, such as TB, HIV, malaria and the Joint External Evaluations of the International Health Regulations. For example, the Tripartite

agencies and UN Environment in collaboration with other stakeholders including civil society and the private sector could conduct Joint Periodic Review missions on antimicrobial resistance every three to five years within a One Health context that are complemented by regular monitoring in priority countries. Such Joint Reviews provide national advocacy opportunities and a useful model for advancing action and impact at country level, including to enhance accountability. Regional models for technical cooperation and coordination can also inform efforts to address antimicrobial resistance. For example, the UNAIDS regional technical support facilities and the TBTEAM mechanism of WHO provide technical support to countries on HIV and TB, respectively.

Recommendation E2: The IACG recommends the urgent establishment of a One Health Global Leadership Group on Antimicrobial Resistance, supported by a Joint Secretariat managed by the Tripartite agencies (FAO, OIE and WHO), to:

- Maintain urgency, public support, political momentum and visibility of the antimicrobial resistance challenge on the global agenda;
- Advocate for action, including support for the expanding work of the Tripartite agencies (FAO, OIE and WHO), UN Environment and other international and regional entities;
- Monitor and report on progress, gaps and accountability in the global response to antimicrobial resistance;
- Advocate for multi-stakeholder engagement by facilitating a partnership platform with the participation of Member States, UN agencies, international and intergovernmental organisations and regional entities, civil society, the private sector, researchers and other key stakeholders to develop and work towards a shared global vision, goals and coordinated action on antimicrobial resistance;
- Provide advice and guidance on reports of the Independent Panel on Evidence for Action against Antimicrobial Resistance (recommendation E3);
- Monitor and advocate for the inclusion of antimicrobial resistance and a One Health “lens” in investments and programmes of major financing instruments for agriculture, health, development, food and feed production and other relevant areas (recommendation D1).

Considerations for this recommendation:

- The SDGs cannot be achieved if antimicrobial resistance is not addressed with greater urgency. The IACG stresses the importance of increasing and maintaining the urgency and visibility of the need to address antimicrobial resistance on the global agenda through political and public support, and target setting. The One Health Global Leadership Group on Antimicrobial Resistance will play a pivotal role in addressing these challenges.
- The IACG recognizes that its work has played an important role in ensuring that antimicrobial resistance is prominent on the global health and development agenda, including in the work

of the Tripartite agencies (FAO, OIE and WHO). However, the IACG mandate is time-limited and the scale of its efforts are insufficient considering the global threat posed by antimicrobial resistance. Therefore, the complex responses that are required need to be addressed over the long-term through the establishment of a One Health Global Leadership Group. Furthermore, the IACG notes that other models in health and development illustrate the practicality and feasibility of establishing a Global Leadership Group on Antimicrobial Resistance. Examples include:

- o *The Global Preparedness Monitoring Board for Health Emergencies* is co-convened

by WHO and the World Bank to monitor progress, identify gaps and advocate for sustained, effective action to ensure global preparedness for disease outbreaks and other health emergencies. The Board succeeded the UN Secretary-General's Global Health Crises Task Force, created in 2016 in response to the West Africa Ebola outbreak.

- o *Scaling Up Nutrition (SUN) Movement Lead Group*, which has overall responsibility for the Movement's progress towards addressing global under-nutrition. The SUN Lead Group succeeded the High-Level Task Force on Food and Nutrition Security, established by the UN Secretary-General in 2008. A high-level Lead Group was established in 2012 with membership nominated by the Secretary-General and is supported by a Coordinator and Secretariat based in Geneva. The SUN Movement Executive Committee acts on behalf of the SUN Movement Lead Group to oversee development and implementation of the Movement's strategy.
- o The *Committee on World Food Security (CFS)* reporting to the UN General Assembly through the Economic and Social Council and the FAO Conference brings together stakeholders working on food security and nutrition globally. Created in 1974 as an intergovernmental UN body, the CFS currently involves 130 Member States and includes both a Civil Society Mechanism and a Private Sector Mechanism. It is supported by a multi-agency Secretariat comprised of FAO, the International Fund for Agricultural Development and the World Food Programme, and includes a High-Level Panel of Experts.
- The IACG proposes that the One Health Global Leadership Group on Antimicrobial Resistance be composed of a small group of current and former Heads of State; Ministers of Agriculture, Environment, Finance, Health, and Water and Sanitation; Heads of the Tripartite agencies; other UN and international agencies; Heads of Regional Banks and other prominent global leaders and

eminent persons representing human, animal and plant health, as well as food and feed production and the environment, including members from the private sector and civil society, and with appropriate gender and geographic representation. Proper declarations of conflict of interest should be made. The One Health Global Leadership Group should be supported by a small Secretariat managed by the Tripartite agencies. This Secretariat can also develop and facilitate a partnership platform for global coordination and action. The One Health Global Leadership Group should oversee the preparation of a plan of action with key performance indicators, particularly to ensure that its activities are supporting country-level action.

- The IACG reiterates the urgent need to develop a shared global vision, narrative and targets to tackle antimicrobial resistance and mobilize all relevant stakeholders, including Member States; UN agencies; international and intergovernmental organisations and regional entities; civil society; the private sector; and researchers, and to support country-level action. The IACG recommends the establishment of a constituency-based partnership platform facilitated and managed by the Tripartite agencies with diverse representation (e.g. governments, private sector and civil society representing human, animal, plant and environment health, as well as agriculture and food and feed production) to develop and implement a shared global vision, narrative and targets.
- The IACG notes that such a partnership platform, with support from the Secretariat, would create opportunities to collectively address diverse areas of importance by all stakeholders, serve as a venue for information sharing and collaboration, and promote leadership by key partners around the shared global vision and narrative. This is consistent with existing models such as the End Malaria Partnership and the Partnership for Maternal, Newborn & Child Health. The Secretariat of the Global Leadership Group and partnership platform could also provide support to the Independent Panel on Evidence for Action against Antimicrobial Resistance [Recommendation E3].

Recommendation E3: The IACG requests the Secretary-General, in close collaboration with the Tripartite agencies (FAO, OIE and WHO), UN Environment and other international organizations, to convene an Independent Panel on Evidence for Action against Antimicrobial Resistance in a One Health context to monitor and provide Member States with regular reports on the science and evidence related to antimicrobial resistance, its impacts and future risks, and to recommend options for adaptation and mitigation.

Considerations for this recommendation:

- The IACG notes that limited data and the lack of targets, as well as inadequate expertise and in some cases limited consensus on approaches to addressing antimicrobial resistance and its associated threats across the One Health spectrum, present key challenges that hamper global progress. There is an urgent need to shape the global antimicrobial resistance agenda to stimulate the generation of evidence and its translation and dissemination into policy change and effective interventions.
- The IACG recognizes the need for an Independent Panel on Evidence for Action against Antimicrobial Resistance to provide robust and authoritative assessments of the science, data and evidence related to antimicrobial resistance across all sectors, assess its impacts and future risks and recommend options for adaptation and mitigation to governments and all stakeholders in the form of periodic reports.
- The IACG notes that the composition of the Independent Panel should include representation across the One Health spectrum, including experts from human, terrestrial and aquatic animal and plant health, as well as the environment, food and feed production and food safety sectors.
- The IACG notes that the Independent Panel on Evidence for Action against Antimicrobial Resistance should draw on the experiences and lessons of similar, existing entities, including the Intergovernmental Panel on Climate Change, the Joint FAO/WHO Expert Committee on Food Additives, the Joint FAO/WHO Expert Meetings on Microbiological Risk Assessment, and the International Assessment of Agricultural Knowledge, Science and Technology for Development. The costs of convening experts, commissioning expert analysis, and maintaining Secretariat functions are anticipated to be modest.

Recommendation E4: The IACG recognizes the ongoing process led by Member States to develop the Global Development and Stewardship Framework to Combat Antimicrobial Resistance and urges the Tripartite agencies (FAO, OIE and WHO) and UN Environment to expedite its development in line with the scope described in the 2015 World Health Assembly resolution on antimicrobial resistance (WHA68.7). As Member States finalize this process, they should also consider the need for new international instruments.

Considerations for this recommendation:

- The IACG acknowledges the current debates and discussions about binding or non-binding international instruments to combat antimicrobial resistance and recognises the enormous challenge of developing and negotiating such international instruments among Member States. The IACG recommends that priority be given to adopting and implementing global standards and best practices established by the Tripartite agencies (FAO, OIE and WHO) and other international and national authorities, and that the current debates and discussions should not distract from this priority.
- The IACG recognizes that the ongoing process of developing the *Global Development and Stewardship Framework to Combat Antimicrobial Resistance* led by Member States with facilitation by the Tripartite agencies (FAO, OIE and WHO) and UN Environment has not yet been finalized. The Framework was first called for in the 2015 World Health Assembly resolution on antimicrobial resistance and later in the 2016 Political Declaration on antimicrobial resistance. The IACG therefore urges Member States, the Tripartite agencies (FAO, OIE and WHO) and UN Environment to bring the development of the Framework to a conclusion as soon as possible consistent with the scope described in the 2015 World Health Assembly resolution and with all due consideration to and inclusion of relevant recommendations in this report.
- The IACG recognizes that ongoing discussions and finalization of the process to develop the *Global Development and Stewardship Framework to Combat Antimicrobial Resistance* can be used as an initial platform by Member States to advance a stepwise approach towards potential new, binding or non-binding international instruments. Such instruments need to include a stronger focus on supporting the distribution, responsible and prudent use of existing and new antimicrobial medicines, diagnostics, vaccines and other interventions, while also preserving existing antimicrobial agents, including using the WHO ACCESS, WATCH and RESERVE categorization of antibiotics.

MEMBERS OF THE AD HOC INTERAGENCY COORDINATION GROUP (IACG) ON ANTIMICROBIAL RESISTANCE

Co-Chairs

Ms Amina Mohammed
Deputy Secretary-General,
United Nations (UN)

Dr Tedros Adhanom Ghebreyesus
Director-General, World Health
Organization (WHO)

Co-conveners

Professor Junshi Chen
Senior Research Professor,
National Center for Food Safety
Risk Assessment, China

Professor Dame Sally Davies
Chief Medical Officer, United Kingdom
of Great Britain and Northern Ireland

Professor Anthony D. So
Director, IDEA (Innovation+Design
Enabling Access) Initiative, Johns
Hopkins Bloomberg School
of Public Health; Director,
Strategic Policy Program, ReAct,
United States of America

Members in individual capacity

Dr Fajer Al Salloom
Ministry of Works, Municipality
Affairs and Urban Planning –
Agriculture Affairs, Bahrain

Dr Hanan H. Balkhy
Executive Director, Infection
Prevention & Control, Ministry of
National Guard Health Affairs,
Saudi Arabia

Professor Otto Cars
Senior Professor, Infectious
Diseases, Senior Adviser - ReAct,
Uppsala University, Sweden

Dr Lyalya Gabbasova
Assistant to the Minister of Health
for AMR issues, TB, HIV/AIDS and
other infectious diseases, Ministry
of Health, Russian Federation

Ms Martha Gyansa-Lutterodt
Director of Pharmaceutical Services,
Ministry of Health, Ghana

Dr Jaana Husu-Kallio
Permanent Secretary, Ministry of
Agriculture and Forestry, Finland

Mr Martin Khor
Malaysia

Dr Marco Marzano de Marinis
Italy

Dr Gérard Moulin
Deputy Director, National Agency
for Veterinary Medicinal Products,
and Research Director, French
Agency for Food, Environmental and
Occupational Health & Safety, France

Ms Sunita Narain
Director General, Centre for
Science and Environment, India

Dr Donald A. Prater
Acting Assistant Commissioner for
Food Safety Integration, Office of
Foods and Veterinary Medicine,
Food and Drug Administration,
United States of America

Dr Mesrak Mokonnen Yetneberk
General Secretary of the Office
of Parliament, Ethiopia

Member Organization representatives

**Food and Agriculture Organization
of the United Nations (FAO)**
Ms Maria Helena Semedo,
Deputy Director-General, Climate
and Natural Resources

**The Global Fund to Fight AIDS,
Tuberculosis and Malaria**
Dr Marijke Wijnroks, Chief of Staff

**Organization for Economic
Cooperation and Development (OECD)**
Mr Mark Pearson, Deputy
Director of Employment,
Labour and Social Affairs

**World Organisation for
Animal Health (OIE)**
Dr Matthew Stone, Deputy
Director-General, International
Standards and Science

**Joint United Nations Programme
on HIV/AIDS (UNAIDS)**
Mr Simon Bland, Director,
New York Liaison Office

UN Environment
Ms Jacqueline Alvarez, Science
and Risk Unit Leader, Chemicals
and Waste Branch

Unitaid
Ms Sanne Wendes, Senior Adviser
to the Executive Director

**United Nations Children's
Fund (UNICEF)**
Dr Stefan Peterson, Associate
Director and Global Chief of Health

World Bank
Dr Enis Baris, Practice
Manager, Health, Nutrition and
Population Global Practice

World Customs Organization (WCO)
Ms Ana Hinojosa, Director,
Compliance and Facilitation

World Health Organization (WHO)
Dr Ranieri Guerra, Assistant Director-
General, Strategic Initiatives

**World Intellectual Property
Organization (WIPO)**
Mr Minelik Alemu Getahun, Assistant
Director-General, Global Issues Sector

World Trade Organization (WTO)
Ms Christiane Wolff, Head, Sanitary
and Phytosanitary Measures Section,
Secretary, Committee on Sanitary
and Phytosanitary Measures

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