CISMUN VIII

Defining our future

Chair Report

Addressing the Issue of Antimicrobial Resistance
World Health Organisation

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Introduction and Welcome Message

Greeting delegates! We are your chairs Gisela and Andrea, Y11 and Y10 students from Diocesan Girls' School and German Swiss International School respectively. On behalf of the secretariat, we welcome you to CISMUN VII's World Health Organisation! We are beyond honoured to serve as your chairs in this iteration of CISMUN.

The World Health Organisation (WHO), is a United Nations agency that focuses on addressing global health and safety. It carries the purpose of connecting different nations, populations, communities, and partners in the pursuit of achieving the highest possible level of health for all the world's people. Some main actions of the World Health Organisation include: promoting and controlling the spread of diseases, providing and improving teaching and training in public healthcare initiatives, and promoting the establishment of international standards for biological products.

The WHO will follow typical HMUN Procedure, as per most other committees. Delegates should prepare a mandatory 60 second opening speech on the topic and an optional 90 second GSL speech following that. Position papers on the topic are not mandated but if you would like to write one and submit it before the conference we will read them and provide relevant feedback. As for conference logistics, use of devices will only be permitted during resolution debate, therefore please print out any research documents that you might need. Additionally, the use of AI during the conference and speech-writing is strictly prohibited and will result in disqualification for awards.

Given that WHO is a beginner committee, we hope that delegates will use this conference as a stepping stone towards more advanced councils and gain a better understanding of diplomacy on a global stage. This chair report will guide delegates through an overview of the topic at hand and facilitate basic research. That said, we ask that all delegates conduct extensive research on both topics, as well as dive deeper into specific country stances and key clashes.

On a more casual note, please join the whatsapp group to facilitate communication before and during the conference and do not hesitate to contact us if you have any questions. We look forward to meeting you all in March and wish you the best of luck with your preparations!

Best wishes,
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Background Information

Antimicrobial drugs, such as antibiotics, have revolutionized modern medicine, significantly improving living conditions and extending lifespans worldwide. However, the efficacy of these life-saving drugs is diminishing as more microorganisms develop resistance to them. This phenomenon, known as antimicrobial resistance (AMR), poses a grave threat to global public health, economic stability, and environmental sustainability.

According to the World Health Organization (WHO), AMR is one of the top 10 global public health threats facing humanity. In 2019, 1.27 million deaths were directly attributed to drug-resistant infections globally, a number projected to rise to 10 million deaths annually by 2050 if no action is taken. The economic impact is equally alarming, with AMR expected to shave $3.4 trillion off global GDP annually and push 24 million people into extreme poverty within the next decade.

Despite its severity, AMR remains poorly understood by the general public. Many people are unaware of the dangers of antibiotic misuse or the extent of the crisis. For instance, a WHO survey revealed that 64% of respondents believe antibiotics can treat viral infections like colds and flu, highlighting widespread misconceptions. This lack of awareness exacerbates the problem, as individuals often demand antibiotics unnecessarily or fail to complete prescribed courses, contributing to the rise of resistant strains.

The effects of AMR extend beyond public health, impacting economic productivity, healthcare costs, and environmental sustainability. It also underscores global inequities, as low- and middle-income countries (LMICs) face disproportionate challenges due to limited resources, poor sanitation, and inadequate healthcare infrastructure. In some countries, up to 70% of hospital-acquired infections are caused by bacteria resistant to at least one commonly used antibiotic. Without urgent action, AMR will continue to undermine global health systems, rendering even routine medical procedures risky.

Antimicrobial Resistance occurs when microorganisms, such as bacteria, viruses, fungi, and parasites, become able to adapt and grow in the presence of medications, rendering previously effective medications useless.

Causes

In a strictly biological perspective, antimicrobial resistance is a natural process in bacteria that can be resulted due to genetic mutations, gene transfer and selective pressure. This causes the drug-resistant bacteria to multiply and thrive whereas most ‘normal’ bacteria will be targeted and removed by antibiotic drugs.

However, a number of causes may accelerate the increase of antimicrobial resistance, such as the inappropriate use of antimicrobials in the clinical setting. Some healthcare

providers may prescribe an antimicrobial just-in-case or prescribe a broad-spectrum antimicrobial to patients with an as-yet undiagnosed condition. Besides, critically-ill patients are susceptible to infections and thus often require the aid of antimicrobials. However, the heavier use of antimicrobials in these patients may potentially worsen the problem by selecting for antimicrobial-resistant microorganisms. As such the extensive use of antimicrobials and proximity of sick patients will create a fertile environment for the spread of antimicrobial-resistant germs.

Of course, the above phenomenon further hints at some underlying problems behind the misuse of antibiotics. According to a study, 59.3% of all patients received at least one dose of an antimicrobial agent during their hospital stay, which begs the question of whether such prescription is indeed necessary for the patient. Moreover, a general lack of knowledge towards antibiotics in public may pose another problem. A survey conducted by WHO revealed that nearly 70% of the 1002 South African respondents incorrectly believed that viruses such as colds and flu can be treated with antibiotics, demonstrating people's misconceptions and hence probable overreliance on antibiotics.

Another case of spread of antibiotic resistance occurs within the agriculture sector. Rather than only giving antibiotics to animals under veterinary supervision, antibiotics were fed to healthy animals for growth promotion and disease prevention.The use of antibiotics in animal farming is expected to grow by 8% within the next decade despite ongoing efforts to curtail its applications.

Status Quo

Currently, antibiotic resistance is one of the biggest public health threats worldwide, killing up to 700,000 people every year. Although antimicrobial resistance is not explicitly mentioned in the 17 Sustainable Development Goals, it is recognized in the Global Action Plan for Healthy Lives and Well-being for All as a barrier to realize the goal of SDG 3 (i.e. ensure healthy lives and promote well-being for all at all ages), and directly jeopardizes progress against other SDGs related to food security, clean water and sanitation, and responsible consumption and production. In 2001, the WHO Global Strategy for Containment of Antimicrobial Resistance laid down the framework of interventions to hinder the emergence and proliferation of antimicrobial-resistant microorganisms. In 2012, WHO published The Evolving Threat of Antimicrobial Resistance- Options for Action, proposing the strengthening of health systems and surveillance and pushing for the development of appropriate new drugs and vaccines. The first global report on surveillance of AMR published in April 2014 provided key insights in monitoring the effectiveness of policies.

However, despite the ongoing efforts to combat the issue, tackling AMR remains a major

challenge. According to a survey by the WHO, fewer than 20% of countries have comprehensive national plans to address AMR. This demonstrates how worrying the situation is and how important it is for us to recognize the impacts of AMR.

Negative Impacts

On a practical level, antimicrobial resistance increases the difficulty in treating infections, hence contributing to the increased morbidity and mortality rates especially among vulnerable populations (i.e. the elderly, younger children and people with weakened immune systems).

Resistant bacteria doubles the chance of developing a serious health issue and triple the chances of death, according to a research conducted among G7 countries in 2015. Despite the varying negative outcomes depending on the elevation of severity of resistant infections and susceptibility of the host, official reports have estimated that about 10 million people will die globally by 2050 if serious actions have not been taken.

AMR is also reducing the effectiveness of medical procedures that rely on antimicrobial drugs, such as chemotherapy, organ transplants, and major surgeries. Matter-of-fact, infections caused by multi drug-resistant bacterial strains are some of the major factors influencing morbidity and mortality in patients undergoing these procedures. Common infections in neonatal intensive care are increasingly becoming extremely difficult, even at times impossible to treat. The Staphylococcal species, most notably S. epidermidis and S. aureus, cause 60-70% of infections and numerous outbreaks of methicillin-resistant S. aureus (MRSA) have been reported in these units. As such, the ineffectiveness of present medication will lead to increased complications and hence require more complex and expensive treatments, such as longer hospital stays, additional diagnostic tests and use of more costly drugs. This will not only lead to reduced survival rates, but also increase healthcare costs for individuals, healthcare systems and the society.

The impacts of AMR do not limit only to the medical healthcare sector, its use of antimicrobial drugs in farming and raising livestock also contributes to the emergence of AMR, which can potentially endanger the safety and quality of food supply, thus threatening global health security.

In today's world, with countries intrinsically linked with one another, the consequences of AMR are way more far-reaching than anyone would have expected. AMR will potentially weaken the labour force through increased absenteeism, reducing productivity, and hindering economic activity such as trade, tourism and travel. According to a report by the CDC in the US, it has been estimated that the cost of AMR is $55 billion per year overall, with $20 billion in excess for direct healthcare costs and society costs for lost productivity as high as $35 billion per year. All these have long-lasting impacts on the economy and society as a whole.

Environmental Impact on AMR

Although global attention to AMR is largely focused on human health and agricultural industries, there has been growing evidence on the role of the environment in the development, transmission and proliferation of AMR. According to a flagship report published by the UNEP in 2023, increased use and misuse of antimicrobials and other microbial stressors, such as pollution from hospitals, community wastewater and pharmaceutical production, create favourable conditions for microorganisms to develop resistance both in humans and the environment from sources such as sewage. Bacteria in water, soil and air can acquire resistance following contact with resistant microorganisms.

While the relationship between environmental pollution and AMR has been established, its significance and impact to AMR remains largely unclear. Even so, there should be ample knowledge to implement measures to reduce the factors that influence AMR from an environmental perspective.

Key Terms

Term	Definition
Antimicrobial resistance (AMR)	Refers to the ability of microorganisms to persist or grow in the presence of drugs designed to inhibit or kill them. These drugs, called antimicrobials, are used to treat infectious diseases caused by microorganisms such as bacteria, fungi, viruses and protozoan parasites.
Low- and middle- income countries (LMICs)	For the current 2023 fiscal year, low-income economies are defined as those with a GNI per capita, calculated using the World Bank Atlas method, of $1,085 or less in 2021; lower middle-income economies are those with a GNI per capita between $1,086 and $4,255; upper middle-income economies are those with a GNI per capita between $4,256 and $13,205; high-income economies are those with a GNI per capita of $13,205 or more.
Morbidity and mortality rates	Morbidity is the state of being symptomatic or unhealthy for a disease or condition, and is usually represented or estimated using prevalence or incidence. Mortality is the number of deaths caused by the health event under investigation. Both terms are commonly used as retrospective information for continuous evaluation of the efficacy of either a specific healthcare system or an implemented intervention in place.
Stewardship	Refers to strategies such as the antimicrobial stewardship

policies	programme (AMS programme), an organizational or system-wide health-care strategy to promote appropriate use of antimicrobials through the implementation of evidence-based interventions
One Health	An integrated, unifying approach to balance and optimize the health of people, animals and the environment initiated by the WHO. The approach mobilizes multiple sectors, disciplines and communities at varying levels of society to work together to develop better ideas that address root causes and create long-term, sustainable solutions.
National Action Plans (NAPs)	An important process to aid States in their implementation of the United Nations Guiding Principles. It provides a blueprint for governments, multilateral institutions, and civil society to coordinate action and track results.

Timeline

Date	**Event**
2001	WHO Global Strategy for Containment of Antimicrobial Resistance Laid the framework for interventions to combat AMR, emphasizing surveillance, rational drug use, and infection prevention.
2012	WHO Publishes *The Evolving Threat of Antimicrobial Resistance: Options for Action* Highlighted the need for stronger health systems, surveillance, and the development of new drugs and vaccines.
2015	World Health Assembly Adopts Global Action Plan on AMR Urged member states to develop National Action Plans (NAPs) to address AMR through a One Health approach.
2016	UN High-Level Meeting on AMR Marked the first time AMR was discussed at the UN General Assembly, resulting in a political declaration to combat AMR.
2019	WHO Reports 1.27 Million Deaths Directly Linked to AMR Highlighted the growing global burden of AMR and the urgent need for action.
2023	UNEP Flagship Report on AMR and the Environment Emphasized the role of environmental pollution in the spread of AMR and called for integrated solutions.

Key Clashes

Problems with Surveillance Systems

Effective surveillance systems are critical for monitoring antimicrobial resistance (AMR) trends and evaluating the success of interventions. However, many countries, particularly low- and middle-income countries (LMICs), lack the infrastructure and resources to establish robust surveillance mechanisms. For instance, a 2019 WHO report revealed that only 22% of LMICs had functional AMR surveillance systems, compared to 60% of high-income countries. This disparity results in outdated or incomplete data on resistance patterns, leading to inappropriate antibiotic use and the proliferation of resistant strains.

The absence of global standards for AMR surveillance further complicates the issue. Without standardized methods for data collection and reporting, it is difficult to compare resistance trends across regions or coordinate international responses. For example, the WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS) has made strides in harmonizing data, but participation remains uneven, with many LMICs unable to contribute due to resource constraints. This lack of coordination undermines global efforts to combat AMR and highlights the urgent need for investment in surveillance infrastructure, particularly in resource-limited settings.

Abuse and Overuse of Antibiotics

The overuse and misuse of antibiotics are among the primary drivers of AMR. In LMICs, antibiotics are often overused due to limited access to healthcare and diagnostic tools. For example, a 2018 study found that 50-80% of antibiotics in LMICs are prescribed without proper diagnostic testing, leading to their use for viral infections like the common cold or flu, which do not respond to antibiotics. Additionally, antibiotics are frequently sold over the counter without prescriptions, further exacerbating the problem.

In high-income countries, overuse is driven by patient demand and overprescription by healthcare providers. A 2020 study in the United States found that 30% of outpatient antibiotic prescriptions were unnecessary, with antibiotics often prescribed "just in case" or to meet patient expectations. This widespread misuse accelerates the development of resistant bacteria, rendering even life-saving antibiotics ineffective. For instance, the rise of methicillin-resistant Staphylococcus aureus (MRSA) has been directly linked to the overuse of antibiotics in both clinical and community settings.

Misuse of Antibiotics

Misuse of antibiotics occurs when patients fail to complete prescribed courses or use antibiotics without medical guidance. A WHO survey found that 59.3% of hospitalized patients received at least one dose of antibiotics, raising concerns about the necessity of these prescriptions. In LMICs, poor drug quality and unhygienic conditions further compound the issue. For example, substandard or counterfeit antibiotics, which account

for 10% of the global pharmaceutical market, often contain insufficient active ingredients, allowing bacteria to survive and develop resistance.

In high-income countries, patient noncompliance is a significant issue. A 2019 study revealed that 30% of patients in Europe and North America did not complete their antibiotic courses, often stopping treatment once symptoms improved. This practice creates an environment where only the most resistant bacteria survive, leading to the emergence of "superbugs" that are difficult or impossible to treat.

Challenges in Less Developed Countries

AMR poses a particularly severe threat in LMICs, where weak healthcare systems, poor sanitation, and limited access to diagnostics create a perfect storm for the spread of resistant infections. In many LMICs, antibiotics are readily available over the counter, leading to inappropriate consumption. For example, a 2021 study in India found that 78% of households stored antibiotics at home, often using them without medical advice.

Compounding the issue is the tension between reducing antibiotic use and ensuring access to life-saving medicines. Many LMICs face a high burden of communicable diseases, such as tuberculosis and malaria, which require effective antimicrobials for treatment. However, inadequate access to quality antibiotics contributes to higher mortality rates. For instance, drug-resistant tuberculosis accounts for 30% of global TB deaths, with the majority occurring in LMICs. Addressing this challenge requires a delicate balance between promoting responsible antibiotic use and ensuring equitable access to essential medicines.

Key Stakeholders

Stakeholder	Description
Interagency Coordination Group on Antimicrobial Resistance (IACG)	Established in 2017 in accordance to paragraph 15 of the Political Declaration of the High-level Meeting on Antimicrobial Resistance, the ad hoc Interagency Coordination Group on Antimicrobial resistance is currently co-chaired by the UN Deputy Secretary-General and the Director General of the World Health Organization. The objective of the Group is to provide practical guidance for approaches needed to ensure sustained effective global action to address antimicrobial resistance, including options to improve coordination,

	taking into account the Global Action Plan on Antimicrobial Resistance. The IACG has called for a 'sustained One Health response' to address the drivers and impact of antimicrobial resistance, and engage and unite all stakeholders around a shared vision and goals.
Sweden	Sweden, represented by the Public Health Agency, is lead country and chair of the Antimicrobial Resistance expert Group (AMR-EG). The expert group is one of the seven expert groups that make up a network coordinated by the northern Dimension partnership in Public Health and Social Well-being (NDPHS), the coordinator of Policy Area Health within the EU Strategy for the Baltic Sea Region (EUSBSR).
China	The problem of AMR is particularly severe in China, associated with overuse and misuse of antibiotics in humans and animals. China was the second largest consumer of antibiotics in 2010 in the globe. The China Antimicrobial Surveillance Network (CHINET) was established in 2005 to gather nationwide data of the prevalence of bacteria and changes in rates of antimicrobial resistance.
United States of America	Currently, resistant infections afflict more than 2.8 million people a year within the United States, resulting in at least 35,,000 deaths annually. The US government has made substantial headway in supporting domestic and international AMR reduction policies. Over the last decade, the US government has redoubled its efforts to mitigate AMR, increasing monitoring and prevention activities, and supporting research and development.

Past Actions

Global Action Plan on AMR (2015)

Adopted by the World Health Assembly (WHA) in 2015, the Global Action Plan on Antimicrobial Resistance (AMR) was a landmark framework urging countries to develop National Action Plans (NAPs) to combat AMR. The plan emphasized the One Health

approach, recognizing the interconnectedness of human health, animal health, and the environment. It set five strategic objectives: improving awareness, strengthening surveillance, reducing infection rates, optimizing antimicrobial use, and increasing investment in research and development. Despite progress, fewer than 20% of countries have comprehensive NAPs, and implementation gaps persist, particularly in low- and middle-income countries (LMICs). The WHA has since passed follow-up resolutions, such as WHA71.3 (2018), which called for accelerated action and better alignment of NAPs with the Global Action Plan.

UN High-Level Meeting on AMR (2016)

In September 2016, the United Nations General Assembly (UNGA) held its first-ever High-Level Meeting on AMR, marking a historic moment as AMR was recognized as a global health and development threat. The meeting resulted in a Political Declaration committing member states to strengthen global coordination, enhance surveillance, promote responsible antimicrobial use, and increase funding for research and development. However, funding remains a critical challenge, particularly for LMICs, which often lack the resources to implement robust AMR strategies. The declaration also called for greater collaboration across sectors, including human health, animal health, and agriculture, under the One Health framework.

WHO Global Antimicrobial Resistance and Use Surveillance System (GLASS)

Launched in 2015, the Global Antimicrobial Resistance and Use Surveillance System (GLASS) was established by the World Health Organization (WHO) to standardize AMR data collection and sharing globally. GLASS has significantly improved global surveillance by providing a platform for countries to report AMR data and track trends. However, participation remains uneven, with many LMICs struggling to contribute effectively due to limited laboratory capacity, technical expertise, and funding. To address these challenges, WHO has provided technical support and capacity-building initiatives, but more investment is needed to ensure universal participation.

Tripartite Collaboration on AMR (2016)

In 2016, the Tripartite Collaboration—comprising the World Health Organization (WHO), the Food and Agriculture Organization (FAO), and the World Organisation for Animal Health (WOAH, formerly OIE)—was formalized to address AMR through a One Health approach. This collaboration has led to joint initiatives, such as the Global Framework for Development of Stewardship Programs in the Animal Sector (2019), which promotes responsible antimicrobial use in agriculture and veterinary medicine.

UN Interagency Coordination Group on AMR (IACG) (2017-2019)

Established in 2017 following the UN High-Level Meeting on AMR, the Interagency Coordination Group (IACG) was tasked with providing practical guidance to combat AMR. In 2019, the IACG published its final report, "No Time to Wait: Securing the Future

from Drug-Resistant Infections," which called for urgent action, including increased funding, stronger political commitment, and better integration of AMR into national health systems. The report also emphasized the need for innovation in diagnostics, vaccines, and alternative therapies.

UNGA Resolution 73/3 (2018)

In 2018, the UN General Assembly adopted Resolution 73/3, which reaffirmed the commitment to address AMR and called for the implementation of the IACG recommendations. The resolution highlighted the importance of multisectoral collaboration and urged member states to align their NAPs with the Global Action Plan.

WHO Global Action Plan on AMR Progress Report (2021)

In 2021, WHO published a progress report on the implementation of the Global Action Plan on AMR. The report highlighted achievements, such as increased awareness and improved surveillance, but also identified gaps, including insufficient funding, weak governance structures, and limited progress in LMICs. The report called for accelerated action and renewed political commitment.

WHO Global Strategy for Infection Prevention and Control (2021)

In 2021, WHO launched the Global Strategy for Infection Prevention and Control (IPC), which includes measures to combat AMR by reducing healthcare-associated infections and promoting responsible antimicrobial use. The strategy aligns with the Global Action Plan on AMR and emphasizes the importance of IPC in preventing the spread of resistant pathogens.

UNEP Report on Environmental Dimensions of AMR (2023)

In 2023, the United Nations Environment Programme (UNEP) published a report titled "Bracing for Superbugs: Strengthening Environmental Action in the One Health Response to Antimicrobial Resistance." The report highlighted the environmental dimensions of AMR, such as the release of antimicrobial residues into water and soil, and called for stronger environmental regulations and monitoring to address this issue.

Possible Solutions

Universal Guidelines and Standards

Establishing global standards for antibiotic use, surveillance, and control measures is essential for combating AMR. A universal framework would provide clear guidelines for countries to follow, ensuring consistency in data collection, reporting, and policy implementation. For example, the WHO Global Action Plan on AMR has already laid the groundwork for such standards, but greater international cooperation is needed to ensure widespread adoption.

However, implementing these standards will require significant political will and financial

investment, particularly in LMICs. High-income countries must take the lead in providing technical and financial support to ensure that all nations can meet these standards. Without a coordinated global effort, the effectiveness of individual country-level interventions will remain limited.

Funding for LMICs

Addressing AMR in LMICs requires substantial financial investment to strengthen healthcare infrastructure, improve surveillance systems, and train healthcare professionals. International organizations, such as the World Bank and Global Fund, should prioritize funding for AMR initiatives in LMICs, focusing on areas such as diagnostic capacity, antimicrobial stewardship programs, and public awareness campaigns.

However, funding allocation must be carefully managed to ensure that resources reach the most vulnerable populations. For example, a 2022 report by the Center for Global Development found that only 15% of AMR funding in LMICs was directed toward community-level interventions, highlighting the need for more targeted and equitable distribution of resources.

Reducing Antibiotic Use in Agriculture

The widespread use of antibiotics in agriculture is a major contributor to AMR. Globally, 73% of all antibiotics are used in livestock, often for growth promotion rather than treating infections. Policies to curb this practice, such as banning the use of antibiotics as growth promoters and promoting alternatives like vaccines and probiotics, are essential for reducing the spread of resistant bacteria.

For example, the European Union banned the use of antibiotics for growth promotion in 2006, leading to a 35% reduction in veterinary antibiotic use by 2020. Similar policies should be adopted globally, with support for farmers to transition to sustainable practices.

Raising Awareness

Public awareness campaigns are critical for reducing antibiotic misuse and overuse. For example, the UK's Antibiotic Guardian campaign reduced antibiotic prescriptions by 7.3% over five years by educating the public about the dangers of AMR. Similar initiatives should be implemented globally, with a focus on LMICs where awareness levels are particularly low.

Incorporating AMR education into school curriculums can also have a long-term impact. For instance, a pilot program in Thailand introduced AMR education in primary schools, resulting in a 20% increase in knowledge about responsible antibiotic use among students and their families. Hosting community talks, distributing informational materials, and leveraging social media can further amplify these efforts.

Research and Development

Investing in the development of new antibiotics, alternative treatments, and rapid diagnostic tools is essential for staying ahead of resistant bacteria. However, the pipeline for new antibiotics remains alarmingly thin, with only 43 antibiotics in clinical

development as of 2023. Governments and pharmaceutical companies must collaborate to incentivize research and ensure that new treatments are accessible and affordable.

Additionally, alternative therapies, such as bacteriophages and immunotherapies, show promise in treating resistant infections and should be explored further. For example, a 2022 study found that bacteriophage therapy successfully treated 82% of drug-resistant bacterial infections in a clinical trial, highlighting its potential as a viable alternative to antibiotics.

Guiding Questions

1. What are the primary causes of antimicrobial resistances? Which specific areas should be prioritized?
2. What current measures are governments implementing to address the issue? To what extent are they inadequate in tackling the issue?
3. How can countries improve surveillance systems to monitor AMR trends effectively?
4. What strategies can be implemented to reduce antibiotic misuse in both human and animal health?
5. How can global cooperation be strengthened to address AMR, particularly in LMICs?
6. What role can public awareness campaigns play in reducing antibiotic overuse?
7. How can the environmental impact of AMR be mitigated through integrated policies?What are the major challenges faced by countries, especially LMICs, that will hinder development in the issue?
8. To what extent can private and public sectors collaborate together to implement measures?

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