

## **SPECIAL EDITION BULLETIN**

(FORMERLY NEWSLETTER) ON

## **ANTIMICROBIAL RESISTANCE**

World Medical Association Junior Doctors' Network

www.wma.net/junior-doctors/

**APRIL 2025** 

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Special Edition Bulletin on Antimicrobial Resistance April 2025

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## **About Us**

#### What is World Medical Association?

The World Medical Association (WMA) is an international organization representing physicians. It was founded on 17 September 1947, when physicians from 27 different countries met at the First General Assembly of the WMA in Paris. The organization was created to ensure the independence of physicians, and to work for the highest possible standards of ethical behaviour and care by physicians, at all times. This was particularly important to physicians after the Second World War, and therefore the WMA has always been an independent confederation of free professional associations. Funding has been by the annual contributions of its members, which has now grown to 115 National Medical Associations.

### What is the Junior Doctors Network?

The Junior Doctors Network (JDN) serves as an international platform for junior doctors to facilitate an open dialogue of global events and activities that are relevant to their postgraduate training and the World Medical Association (WMA).

It was created at the 61st WMA General Assembly (October 2010) in Vancouver, Canada and the inaugural JDN meeting was held at the 62nd WMA General Assembly (October 2011) in Montevideo, Uruguay. The network, which started from a few motivated junior doctors, now has a total of over 900 members from more than 90 countries from all regions of the world. Junior doctors are defined as physicians, within 10 years after their medical graduation or who are still in an ongoing postgraduate medical education program.

### What is the mission?

The purpose of the JDN is to empower young physicians to work together towards a healthier world through advocacy, education, and international collaboration.

#### What do we do?

#### **Networking:**

During the regular JDN meetings, members get to know each other, discuss global health issues, share challenges, and start collaborations on global health issues. The JDN meets on several occasions during the year, both in-person and via online teleconferences:

- Biannual meetings in conjunction with the Council Meeting and the General Assembly of the WMA (April & October).
- Monthly general membership and management team teleconferences
- Ad-hoc online and webinars organized by the JDN





## Meet the WMA JDN Leadership 2024 - 2025



DR PABLO ESTRELLA PORTER CHAIRPERSON



DR BALKISS ABDELMULA DEPUTY CHAIRPERSON



DR SAZI NZAMA SECRETARY



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DR.SHIV JOSHI MEDICAL ETHICS DIRECTOR



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DR VENKATESH KARTHIKEYAN PUBLICATIONS DIRECTOR





DR MARIE-CLAIRE WANGARI IMMEDIATE PAST CHAIR





## **Meet the WMA JDN Publications Team - Special Edition**



EDITOR IN CHIEF







DR JEAZUL PONCE ADVISOR





DR.ARENS JEAN RICARDO MEDEUS





DR. AQSA SHAFIQUE













## **Foreword by Chair**

Dear Junior Doctors colleagues,

As the Chair of the Junior Doctors Network (JDN), it is an honor to contribute this foreword to our WMA JDN Bulletin, focusing on antimicrobial resistance (AMR), a defining challenge of our time.

Antimicrobial drugs revolutionized medicine, saving countless lives. Yet, their misuse across human, animal, and agricultural domains has driven a silent crisis: AMR. Recognized among the top 10 global health threats, AMR caused nearly 1.14 million deaths in 2021 alone. The year 2024 has presented critical milestones such as the High-Level Meeting on AMR and the Fourth Global Ministerial Conference in Jeddah that have spotlighted this issue. However, translating dialogue into sustainable action remains crucial, particularly in Low- and Middle-Income Countries (LMICs), where the burden is most acute.

JDN's commitment to AMR advocacy through campaigns, policy engagement, and awareness initiatives underscores our key role. Together, we must amplify the voices of junior doctors worldwide, ensuring equitable access to antimicrobials, strengthening surveillance systems, and promoting stewardship. The One Health approach is vital, integrating human, animal, and environmental health to address this multidimensional threat.

I extend heartfelt gratitude to the Publications Team and contributing members for this special edition. Your insights inspire us to confront AMR boldly, united in our vision for a healthier future.

Warm regards, Dr Pablo Estrella Porter Chair 2024-25, Junior Doctors Network, World Medical Association.







## **Foreword by Deputy Chair**

Dear Colleagues,

I am honored to address you in this special edition of our JDN Bulletin, dedicated to the urgent issue of Antimicrobial Resistance (AMR). This publication wouldn't have been possible without the invaluable contributions of all our authors, whose dedication to advancing our understanding of AMR and its implications for healthcare shines through in each article.

In this edition, we explore the complex issues surrounding AMR, a growing global threat to public health. We examine the scientific, clinical, and policy challenges that we, as junior doctors, encounter in our day-to-day practice while dealing with resistant infections. We also discuss the significance of responsible antibiotic use, infection prevention measures, and the role of surveillance in fighting AMR at both local and global levels.

As caretakers of human lives, we are entrusted with the responsibility and privilege of providing the best care possible to our patients while also safeguarding the effectiveness of antibiotics. Tackling AMR is not only a professional duty but also an ethical imperative. Staying informed about resistance trends, treatment alternatives, and the latest public health strategies is essential to ensure we are equipped to combat this growing issue.

As junior doctors, we are at the frontline of this challenge, and the choices we make today will have lasting impacts on the future of medicine. By approaching our practice with awareness, responsibility, and ethical commitment, we not only honor the profession we have chosen but also contribute to the global effort to preserve the efficacy of antibiotics for generations to come.

Once again, I would like to express my sincere gratitude to the authors of this edition for their exceptional contributions, and to the JDN Publications Director for coordinating this important project. I am confident that our JDN members will continue to show unwavering commitment to combating AMR through our AMR Working Group advocacy efforts.

Best regards,

Dr. Balkiss Abdelmoula, MD. MPH. Deputy Chairperson 2024-2025 Junior Doctors Network World Medical Association





## **Foreword by Secretary**

Through the thoughts and experiences of junior doctors world-wide, we have been able to gain insight into the evolution of medicine in varying degrees across the different fields of medical practice. Through this, individual thought processes have broadened, further developed and in some instances, aided in an individual's ability to innovate and generate ideas that positively impact their practice of medicine.

The Junior Doctors Network (JDN) provides a platform for young physicians to share and acquire insights by fellow colleagues from across the world. This news bulletin focuses on a topic that has over the years, garnered much attention in the medical community for its far-reaching effects not only on humans, but animals and the environment as well : Antimicrobial Resistance.

The World Medical Association (WMA) echoed the thoughts of many physicians in their Statement on Antimicrobial Resistance; "Addressing the threat of antimicrobial resistance is a fundamental global health priority, and the responsibility of all countries." Showcasing the Multi-sectoral approach utilized in India, seeing AMR through the eyes of Junior doctors in the Philippines and even briefly spotlights the importance and benefits of integrating digital health in antimicrobial stewardship & patient care.

It is my hope that this publication provides you with interesting viewpoints, highlights strategies that may aid in developing or advancing your practice of medicine and inspires you to continue or join in combatting antimicrobial resistance.

I look forward to interacting with you all at the upcoming JDN Spring Meeting in Montevideo, ahead of the WMA's 229th Council Session.

Happy Reading!

Dr Sazi Z Nzama MBChB(UKZN) Secretary Junior Doctors Network World Medical Association







## **Foreword by Publications Director**

Dear Junior Doctors,

It is with great pride and enthusiasm that I present to you the Special Edition of the WMA Junior Doctors' Network (JDN) "**Bulletin**"—formerly known as the "Newsletter"—marking a significant evolution in how we engage with scientific discourse. This transformation reflects our commitment to upholding international publication standards, ensuring that our work not only informs but also inspires action on pressing global health challenges.

Underscoring the significance of Antimicrobial Resistance (AMR), this Special Edition brings together diverse perspectives from junior doctors across the world. AMR is not just a clinical issue —it is a multifaceted crisis threatening the very foundation of modern medicine. As young physicians, we stand at the frontline, witnessing firsthand the devastating consequences of resistant infections. This Bulletin serves as both a call to action and a repository of knowledge, highlighting innovative approaches, policy insights, and grassroots efforts aimed at tackling this silent pandemic.

I extend my heartfelt gratitude to all contributors, peer reviewers, the Management Team and the Publications Team for their unwavering dedication to this issue. The overwhelming support from junior doctors worldwide is a testament to our collective resolve in addressing AMR through advocacy, education, and multidisciplinary collaboration.

As we embark on this new phase of our publication journey, I invite you all to actively engage with the Bulletin, contribute your insights, and champion the fight against AMR. Together, we can drive meaningful change and safeguard the future of antimicrobial stewardship.

Regards, Dr. Venkatesh Karthikeyan MD (AIIMS), FRSPH (London), Publications Director, Junior Doctors Network, World Medical Association.





## Foreword by Past Chair

As the immediate past Chair of the Junior Doctors Network (JDN), it is my privilege to introduce this edition of our newsletter, which focuses on a pressing global health challenge: Antimicrobial Resistance (AMR). This issue transcends borders, disciplines, and specialities, threatening to undo decades of progress in medicine and public health. For junior doctors, it represents both an enormous challenge and an unparalleled opportunity to lead change.

AMR arises when microorganisms such as bacteria, viruses, and fungi evolve to resist the drugs designed to kill them. As frontline health workers, junior doctors frequently witness the human cost of treatment failures, longer hospital stays, and the devastating loss of lives due to drug-resistant infections. The World Health Organization (WHO) has identified AMR as one of the top ten global public health threats. For us, this is a call to action.

In this edition, we spotlight innovations in AMR stewardship, stories from junior doctors advocating for better prescribing practices, and insights on how to bridge the gap between policy and practice. As custodians of future healthcare systems, we must embrace multisectoral collaboration, advocate for robust health policies, and integrate AMR awareness into daily clinical practice.

The fight against AMR demands resilience, innovation, and commitment. I hope the articles in this newsletter inspire you to champion change in your communities and beyond. Together, we can turn the tide against AMR and secure a healthier, safer world for generations to come.

Dr. Marie-Claire Wangari Immediate Past Chair, Junior Doctors Network, World Medical Association.





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### Antimicrobial Resistance: Challenges and Solutions in Primary Health Care

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Antimicrobial resistance (AMR) poses a growing global health threat, undermining decades of medical progress. The misuse and overuse of antibiotics, particularly in low- and middle-income countries (LMICs). are key drivers of this crisis (1). Contributing factors include unregulated access to medications. insufficient healthcare infrastructure. inadequate training for healthcare providers, and weak regulatory frameworks. Addressing AMR demands a comprehensive, multi-pronged approach, with primary healthcare (PHC) at the forefront as the first point of contact for many communities (2).

Research underscores neglecting that treatment guidelines, particularly in managing infectious diseases, amplifies AMR prevalence (1). Tackling this issue requires increased use and analysis of antimicrobial consumption data. the adoption of stricter prescription-only access laws, enhanced practitioner training in evidence-based care, and active public engagement in medication stewardship (2).

#### **Challenges in PHC**

Primary healthcare plays a pivotal role in delivering essential care and disease prevention at the community level, especially in LMICs. However, numerous challenges hinder its ability to combat AMR effectively.

#### **Workforce Constraints**

In rural areas, the shortage of physicians often forces reliance on integrated health workers (nurses and community health workers), who provide consultations and prescribe medications (2). While this strategy increases access to care, many of these health workers lack comprehensive training in the proper use of antibiotics

and without adequate knowledge, they inadvertently contribute to antibiotic misuse. Addressing this gap through targeted education is critical for equipping this strata of healthcare workers to tackle AMR effectively (2).

#### **Unregulated Medication Access**

In many LMICs, community pharmacies and patent medicine stores dispense antibiotics without requiring prescriptions, bypassing regulatory oversight (3, 4). Patients often prefer these unregulated outlets due to high costs, long waiting times, and bureaucratic hurdles at hospitals. The absence of proper investigations before dispensing antibiotics is a common practice, further fueling inappropriate usage, including incomplete courses (3, 4).

#### **Economic Barriers**

Affordability is a significant concern in LMICs, where many patients cannot bear the financial burden of healthcare services in formal settings (4). This highlights the urgent need for Universal Health Coverage (UHC) to ensure equitable access to affordable healthcare and reduce dependence on unregulated medication sources (4).

## Weak Regulatory and Training Frameworks

lack of robust guidelines The and enforcement mechanisms exacerbates AMR in LMICs. Weak regulations enable PHC dispense antibiotics pharmacies to Strengthening these irresponsibly. frameworks and engaging pharmacy attendants in antimicrobial stewardship campaigns are essential for reducing

inappropriate dispensing practices (3, 4).

With disease outbreaks, climate challenges and political instability further destabilizing the PHC systems of LMICs, there is a critical need for continuous training of healthcare workers and the integration of AMR education into undergraduate and ongoing professional development programs to ensure practices appropriately cater to dynamic global health needs (4).

#### Limitations in Diagnostics and Digital Health

Integrating advanced diagnostic tools and digital health technologies into PHC systems offers significant potential for combating AMR. Early disease detection and surveillance reduce unnecessary antibiotic prescriptions, with advanced diagnostic tools playing key roles in infection management and targeted interventions. However, these innovations face barriers such as high costs, limited infrastructure, and a lack of trained personnel in LMICs (5).

Digital health technologies showcased their transformative power during the COVID-19 pandemic, particularly in sub-Saharan Africa, where they streamlined surveillance, telehealth services, and logistics. Despite these successes, challenges like poor internet connectivity and inadequate funding hinder broader adoption (6).

Scaling up investments in accessible, affordable diagnostic tools and integrating them into PHC settings remains essential to improve and strengthen PHC response to mitigate AMR.

#### The Path Forward

To effectively address AMR, LMICs must prioritize the following actions:

1.Strengthening regulations that strictly enforce prescription-only access to antibiotics and enhance guidelines to curb misuse.

2.Education and training programs that empower PHC workers, including integrated health workers and pharmacy attendants, with evidence-based knowledge on antimicrobial stewardship.

3.Enhancing diagnostics and investing in accessible diagnostic and surveillance tools in PHC to reduce unnecessary antibiotic prescriptions.

4.Advancing UHC to ensure that financial barriers do not force patients to seek unregulated care.

With PHC serving as the cornerstone of community healthcare, strengthening its capacity to address AMR is essential. Through robust regulations, improved diagnostics and surveillance, and enhanced training for healthcare providers, LMICs can play a vital role in mitigating the AMR crisis at the grassroots level of healthcare delivery.

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# Empowering Youth in the Fight Against Antimicrobial Resistance

Pablo Estrella Porter



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Antimicrobial resistance (AMR) is a silent vet escalating global health crisis. Its impact is disproportionately felt in Low- and Middle-Income Countries (LMICs), where access to resources and healthcare is often limited. In response, the Ouadripartite, comprising the World Health Organization (WHO), Food and Agriculture Organization (FAO). United Nations Environment Programme (UNEP), and World Organization for Animal Health (WOAH), launched the Youth Engagement for AMR Working Group back in October 2023. This initiative underscores the transformative power of youth in tackling one of the most pressing challenges of our era with the support of 14 representatives from youth-led and youthorganizations. including the serving representation of the Junior Doctors Network (JDN) (1).

As of November 2024, I have the privilege of chairing this dynamic working group. Over the past year, our collective efforts have amplified youth voices and solidified their role in shaping global AMR strategies. A cornerstone of our work is the Youth AMR Manifesto, developed after a youth online consultation at the start of 2024 (2). This manifesto emphasizes the inclusion of young people in decision-making, advocacy, and education to tackle AMR. Key priorities include creating youth-led and youthserving platforms, integrating AMR awareness into education systems, and promoting a One Health approach to foster interdisciplinary collaboration and equitable solutions.

#### Key Milestones in 2024

#### **1.Youth Manifesto Launch and Advocacy:**

In May 2024, we launched the Youth AMR Manifesto alongside the Quadripartite's multi-stakeholder hearings. This has served as a vital tool to articulate the priorities and

perspectives of young people worldwide, urging policymakers to integrate youth contributions into National Action Plans on AMR.

## 2.Engagement at the UN General Assembly:

During the September 2024 High-Level Meeting on AMR, two working group members represented the youth perspective, stressing the need for bold, multisectoral commitments. Our efforts highlighted the critical role of young advocates in bridging the gap between global discussions and actionable outcome.

## 3.World Antimicrobial Awareness Week (WAAW) 2024:

WAAW 2024, themed "Educate. Advocate. Act Now" highlighted youth as key players in combating AMR. We led a global consultation, engaging over 100 young participants to shape strategies like developing culturally relevant tools and fostering youth-policy collaborations. They also supported the AMR Youth Summit, amplifying youth voices worldwide and inspiring innovative advocacy efforts as well as hosting the youth events database.

## 4.Participation in the Jeddah Ministerial Meeting:

The Fourth Global High-Level Conference on AMR in Jeddah, Saudi Arabia, showcased youth engagement at its best. Through interactive sessions and our Youth Quote Cards Initiative, the representatives shared powerful messages on the importance of collective action against AMR.

## The Importance of Youth Engagement in Sustaining AMR Advocacy

Youth engagement is not a mere addition to the AMR agenda but it is central to ensuring its success. Young people bring energy, innovation, and the ability to mobilize communities and that is why engaging junior doctors is part of our aim as JDN. In October 2024, the working group met in Nairobi, Kenya to assess the previous year and plan the 2025 term (3).



**Image 1.** Quadripartite Working Group on Youth Engagement for AMR: Second annual meeting, Nairobi, Kenya 19–20 September 2024.

In 2025, the working group aims to:

- Expand outreach through multilingual campaigns, ensuring no community is left behind.
- Strengthen partnerships with National Action Plans to institutionalize youth participation.
- Promote the new Quadripartite <u>AMR Toolkit for</u> <u>Youth Engagement</u>

#### A Call to Action for Junior Doctors

As junior doctors, our role is essential. Whether through clinical practice, research, or community advocacy, we have the power to influence the responsible use of antimicrobials and to educate others on the dangers of resistance. By joining forces with initiatives like the Quadripartite Youth Engagement Working Group and the JDN working group on AMR, we can magnify our impact, ensuring that youth voices remain integral to global AMR strategies.

Together, let us commit to making 2025 a year of action and innovation. The fight against AMR demands the contributions of all, and as junior doctors, we are uniquely positioned to lead this change. Let's gather our collective expertise, passion, and determination to safeguard the efficacy of antimicrobials for generations to come.

## Stay connected, stay engaged, and join the movement.

For more information about the working group, follow @YouthVoices4AMR on Social Media or visit the <u>Quadripartite's AMR Youth Engagement webpage</u>.

For joining the JDN AMR Working Group email: <u>pestrellaporter@gmail.com</u>

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## Building Effective Partnerships for AMR Strategy Implementation

Julian Nyamupachitu



Julian Nyamupachitu Deputy Director ReAct Africa Antimicrobial Resistance (AMR) is a critical global health challenge that necessitates a united, multidisciplinary approach (1). ReAct Africa, a pioneer in AMR advocacy and intervention, has been at the forefront of facilitating collaborative efforts to combat AMR across Sub-Saharan Africa bv supporting countries in the implementation, prioritization, and revision of the AMR National Action Plans. Recognizing the vital role of young people in shaping the future of public health, ReAct Africa has made youth engagement a key pillar of its AMR mitigation strategies (2). Since 2015, ReAct vouth-focused initiatives Africa's have cultivated a generation of champions who are equipped to lead and advocate for sustainable AMR solutions.

The flagship AMR Leaders Programme for Tertiary Students in Africa (AMRLEP) has been instrumental in building the capacity of young people (3). This program provides participants with in-depth knowledge of AMR, mentorship, and practical skills to apply a One Health approach in their communities. 200 respective Over participants from eight African nations have been part of the program, contributing significantly to AMR mitigation efforts. Participants have developed leadership skills, enhanced their understanding of AMR's cross-sectoral nature, and initiated community engagement projects. Many graduates of AMRLEP have gone on to influence policy at the national and regional levels, including contributing to the drafting and validation of National Action Plans.

ReAct Africa is the main convener of the African Youth Antimicrobial Resistance Alliance Task Force (AYARA-TF). AYARA-TF is a consortium of youth-led organisations that further strengthens the voices of young people by fostering collaboration and advocacy. AYARA-TF serves as an independent platform for youth to engage in multidisciplinary dialogues and shape AMR interventions. ReAct Africa is also developing an AMR Youth Coordination Hub, a virtual space where young leaders can network, collaborate, and share best practices. These initiatives have led to the establishment of youth-led organizations which exemplify the ripple effects of empowering youth. Through mentorship and capacity-building sessions, ReAct Africa equips youth with leadership, advocacy, and project management skills. These skills enable young people to conduct impactful community awareness campaigns, engage with diverse stakeholders, and sustainable AMR interventions. initiate Beyond individual growth, ReAct Africa's programs emphasize the importance of peer learning and collaboration. Platforms such as the ReAct Africa and South Centre annual conferences encourage the exchange of ideas and experiences.

Moreover, participants have used these opportunities to publish research, contribute to policy discussions, and organize grassroots initiatives that address AMR from a holistic perspective.

ReAct Africa has also seen the value in aligning its youth engagement work with the regional priorities of the Quadripartite and the Africa CDC. This alignment ensures that its efforts are integrated into broader frameworks addressing AMR at regional and global levels, enhancing the relevance and impact of its youth initiatives. As I was leading the youth portfolio, I was delighted to have been one of the contributors to the Quadripartite Antimicrobial Resistance Toolkit for youth engagement (4).

ReAct Africa's commitment to youth engagement is not only empowering a new generation of public health leaders but also amplifying the reach and impact of AMR interventions. By providing young people resources, mentorship. with the and platforms to take ownership of AMR challenges, ReAct Africa is building a resilient and proactive response to this global health threat.

#### WMA JDN Special Edition Bulletin on AMR

While youth engagement remains a central focus, ReAct Africa also collaborates with governments and technical working groups to support the implementation and revision of National Action Plans. These collaborations ensure that AMR strategies are actionable and contextually relevant, aligning with One principles Health (5). By engaging diverse stakeholders, ReAct Africa fosters a multidisciplinary approach to AMR mitigation.

ReAct Africa's youth-centered approach and collaborative initiatives exemplify the power of partnerships in addressing AMR. Through sustained commitment and innovative strategies, ReAct Africa continues to lead the charge against AMR and amplify the importance of collective action in safeguarding the efficacy of antibiotics for future generations.

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# One Health, One Fight: Junior Doctors in the Battle Against AMR

Dr. Janita Zarrish<sup>1</sup>



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Greetings to you all on this special edition of WMA-JDN newsletter on antimicrobial resistance (AMR). My name is Dr. Janita Zarrish, I am a medical doctor from Pakistan, currently studying MSc Public Health at London School of Hygiene and Tropical Medicine. I have been working with IFMSA and InciSioN as a medical student and now working with WMA as a junior doctor. I have participated in several global health events. Attending these events in understanding global public health threats, governance, challenges, policy decisions, strategies, and how healthcare systems function at both national and international levels. As we step into our practical lives, these events provide opportunities to connect with experts, policymakers, and peers from around the world, fostering professional relationships that can support future collaborations and career growth. Our participation as the junior doctor at the WMA, brings clinical expertise to the discussion, helping ensure that policies and decisions are grounded in real-world medical practice and evidence.

As doctors, we first hand witness the consequences of AMR in the human population. Infectious pathogens that were once responsive to the simplest antibiotics have now grown into big giants, completely resistant to the most effective and strongest antibiotics. AMR is a natural phenomenon but misuse and overuse of antibiotics has accelerated the process(1). Poor hygiene and public awareness. ineffective governance, and limited investments in research and development of new antibiotics has further fuelled the threat(2).

Earlier this year, Dr. Caline Mattar from WMA-JDN participated in the 2nd UN highlevel meeting on AMR at the 79th UN General Assembly. During the meeting, WMA advocated for increased investment and support to the workforce and health systems strengthening to allow for improved antibiotic prescribing, infection prevention and control practices. The meeting highlighted the importance of international collaboration to tackle AMR, with countries sharing data, strategies, and best practices to mitigate resistance globally. It became clear that AMR is a shared problem that transcends borders, and collective action is essential for meaningful progress. A political declaration on AMR was approved, where leaders from all member states committed to reduce the Bacterial AMR associated deaths by 10% by 2030(3). The meeting emphasized on following action points:

- AMR requires collaboration across environmental, agricultural, veterinary, industrial, and health sectors to address the issue effectively.
- Developing new antibiotics, alternative therapies, and rapid diagnostics is crucial for combating AMR.
- Infection prevention through improved hygiene, vaccination, clean water, and sanitation reduces the need for antibiotics.
- Public campaigns should raise awareness about the risks of selfmedication, misuse of antibiotics, and the importance of completing prescriptions.
- LMICs face greater challenges due to limited resources and weaker systems, requiring targeted support. Antimicrobial stewardship programs must be implemented in all sectors to ensure responsible antibiotic use.

As junior doctors, attending such meetings highlights the invaluable role of integrating clinical perspectives into global health policy. During the year, Junior doctors in the WMA-JDN AMR working group played a significant role in our fight against AMR. Before the UN high-level meeting, we celebrated AMR Wednesdays to raise AMR awareness on social media. During World AMR Awareness Week (WAAW), we collaborated with World Organization for Family Doctors (WONCA) - Young Doctors Movement for a social media campaign targeted for young professionals to advocate for behavioral change towards antibiotics prescription practices and misuse. We also participated in the Youth AMR Manifesto and are part of Quadripartite Working Group on Youth Engagement on AMR.

We, as part of the WMA-JDN AMR working group, have the opportunity to contribute significantly by advocating for patient-centered approaches and raising awareness about AMR within our local communities. Our strength lies in our diverse, multicultural, and multinational perspectives, which we can bring together to inform policies and design AMR advocacy campaigns. effective These campaigns should be inclusive, ensuring that all voices are heard and represented. Moving forward, our focus should be on raising awareness among the general population and collaborating with national member associations to disseminate information about the intersection of hygiene, infection control, and AMR. This should be done in accessible and culturally relevant ways, using local languages to ensure the message resonates with communities and promotes lasting change.

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### Indian Medical Association's Efforts in Combating Antimicrobial Resistance and Junior Doctors' Engagement

Dr Shiv Hiren Joshi<sup>1</sup>, Dr Narendra Saini<sup>2</sup>, Dr Venkatesh Karthikeyan<sup>3</sup>, Dr Meenakshi Gopimohan<sup>4</sup>

Antimicrobial Resistance (AMR) is a silent pandemic that threatens global public health, making infections harder to treat and increasing the risk of disease spread, severe illness,and death. In India, the Indian Medical Association (IMA) has emerged as a key driver of efforts to combat AMR, leveraging its network and influence to implement innovative programs and foster collaboration across sectors and nations. Through its Standing Committee for Antimicrobial Resistance, IMA has spearheaded numerous initiatives that highlight the importance of education, advocacy, and action in addressing this critical challenge.

#### **National Alliance of Medical Professionals** on AMR (NAMP-AMR)

Recognizing the urgent need for a united response to AMR, IMA established the National Alliance of Medical Professionals on (NAMP-AMR)(1). AMR This landmark initiative brought together 52 medical associations and organizations, including representatives from the NITI Aayog, Ministry of Health and Family Welfare, World Health Organization (WHO), National Centre Control, for Disease and National Accreditation Board for Hospitals. The alliance held its inaugural consultation on July 7, 2024, at IMA House, Delhi, marking National Chairman (AMR) & the beginning of a coordinated effort to address AMR at a national level. The consultation resulted in actionable strategies to enhance awareness and drive policy reforms.

#### Commonwealth Alliance of Medical Professionals on AMR (CAMP-AMR)

Expanding its impact beyond national borders, IMA played a pivotal role in forming the Commonwealth Alliance of Medical Professionals on AMR (CAMP-AMR)(2). This alliance, comprising 10 Commonwealth countries, underscores the importance of global collaboration in combating AMR.

The release of the Commonwealth Declaration on Antimicrobial Resistance further cemented the alliance's commitment to collective action. A panel discussion at the Commonwealth Medical Association conference facilitated knowledge exchange, with leaders from seven countries sharing insights on their respective AMR strategies and targets.

#### Professional Engagement Events and **Capacity Building**

In November 2024, the IMA AMR Standing Committee hosted а high-profile roundtable discussion in Delhi themed "Educate - Advocate - Act Now." Organized ahead of World Antimicrobial Awareness Week, this event brought together stakeholders from over 30 distinguished organizations. Discussions cantered on the United Nations General Assembly High-Level Meeting Political Declaration on AMR, highlighting the need for concerted efforts at all levels.

IMA's commitment Additionally, to capacity building was exemplified through a workshop held in Ahmedabad on December 1. 2024. Organized in collaboration with the WHO and IMA Ahmedabad, the "Capacity Building Workshop on AMR for IMA Doctors" equipped healthcare professionals, particularly junior doctors, with the knowledge and skills to tackle AMR effectively. By targeting early-career professionals including junior doctors, this workshop emphasized the importance of cultivating a new generation of leaders who are well-versed in antimicrobial stewardship.

#### **The IMA AMR Smart Hospital Project**

One of the standout initiatives under IMA's AMR strategy is the IMA AMR Smart Hospital Project. Designed to mentor

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hospitals and nursing homes in implementing and enhancing Antimicrobial Stewardship and Infection Prevention and Control practices, the project provides guidance to help healthcare facilities achieve accreditation standards. Hospitals that successfully meet these standards are awarded the "IMA AMR Smart Hospital" certificate, serving as a model for best practices in AMR mitigation. Junior doctors play a vital role in this initiative by acting as key agents of change within their institutions, ensuring that stewardship and infection control measures are adhered to and continuously improved.

#### **Digital Campaigns and Awareness Initiatives**

conducted a Leveraging digital platforms, IMA nationwide for World Antimicrobial campaign Awareness Week 2024. More than 250 doctors participated in this campaign. Other awareness activities included Go Blue Day campaigns, poster competitions for students, and extensive engagement with junior doctors through IMA's networks. The IMA Medical Students' Network and Junior Doctors' Network have been instrumental in these campaigns. fostering grassroots advocacy and building awareness among young medical professionals. Their participation ensures that the message of AMR awareness resonates with future generations of healthcare providers.

#### **Publications and Knowledge Dissemination**

IMA has also focused on knowledge dissemination through impactful publications. Books such as "When Not to Use Antibiotics" and "Rational Use of Antibiotics" serve as valuable resources for healthcare providers. Additionally, the NAMP-AMR initiative's outcomes were documented in an article titled "Multidisciplinary Collaboration in Combatting Antimicrobial Resistance," providing insights into the power of collective action (3). These publications have been widely shared among junior doctors and medical students, fostering an evidence-based approach to antimicrobial use.

#### Where are we headed?

The Indian Medical Association's multifaceted approach to combating AMR underscores the importance of collaboration, education, and advocacy. By prioritizing the engagement of junior doctors and medical students, IMA has ensured that the fight against AMR is both sustainable and future focused. From forming alliances like NAMP-AMR & CAMP-AMR

to implementing innovative projects like the AMR Smart Hospital initiative, IMA has demonstrated that combating AMR requires a united front. As the global community continues to grapple with the challenges posed by AMR, IMA's efforts provide a model for impactful and sustainable action. By fostering partnerships, building capacity, and raising awareness among young medical professionals, IMA is laying the groundwork for a healthier, more resilient future.

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# World AMR Awareness Week: A Talk on Antimicrobial Resistance at my workplace

#### Dr. Merlinda Shazellenne

Antimicrobial World Resistance (AMR) Awareness Week, observed annually from November 18 to 24, serves as a crucial global initiative to educate individuals, healthcare professionals, and organizations about the growing threat of antimicrobial resistance. This week aims to foster discussions and increase awareness regarding the misuse and overuse of antibiotics and other antimicrobials, which has led to the alarming rise in resistant infections. On November 22. 2024, I had the honour of organizing and delivering a talk to the staff of the Department of Occupational Safety and Health (DOSH) Negeri Sembilan during a talk on health program which was also organised by my team. This talk was attended by engineers. senior management. and administrative personnel. For many of the attendees, this was the first time they had encountered the concept of AMR and its profound implications on both human health and the broader global ecosystem.

In addition to the healthcare implications, I highlighted the economic and societal costs associated with AMR. Resistant infections burden healthcare systems, necessitating more expensive treatments and longer recovery periods. This, in turn, leads to higher healthcare expenditures and diminished productivity in healthcare settings and the workforce. The broader economic impact of AMR is staggering: it is estimated that, by 2050, AMR could cost the global economy up to \$100 trillion.

During the session with DOSH Negeri Sembilan, I stressed that AMR's effects are far-reaching and extend beyond human impact economic health to stability. agricultural productivity, and environmental sustainability. In healthcare settings, AMR leads to longer hospital stays, the need for more intensive care, and increased medical costs. In agriculture, the use of antibiotics in livestock farming contributes significantly to the rise in resistant bacteria, which can be transmitted to humans through the food supply. This interconnectedness of sectors

was a key point that resonated with the diverse group of professionals attending the session.

The DOSH staff, primarily involved in occupational safety, were particularly attentive to how AMR can impact workplace health and safety. Many engineers were surprised to learn about the links between AMR and industrial hygiene, including the potential for resistant infections to affect workers in various sectors, from food production to healthcare and pharmaceuticals. By integrating AMR awareness into workplace safety standards and health protocols, DOSH can help reduce the risk of infection outbreaks in workplaces and ensure better protection for workers.

In addition to the healthcare implications, I highlighted the economic and societal costs associated with AMR. Resistant infections burden healthcare systems, necessitating more expensive treatments and longer recovery periods. This, in turn, leads to higher healthcare expenditures and diminished productivity in healthcare settings and the workforce. The broader economic impact of AMR is staggering: it is estimated that, by 2050, AMR could cost the global economy up to \$100 trillion.

One of the most impactful aspects of my talk was the emphasis on prevention and responsible antimicrobial use. Vaccination programs, proper sanitation, infection control measures, and the prudent use of antibiotics are vital strategies to mitigate the spread of resistance. However, AMR is a multifaceted issue that requires cooperation at all levels-from individuals and healthcare providers to governments and industries. I urged the attendees to see their roles as professionals in their respective fields and as key players in a collective global effort to combat AMR.

The session concluded with a discussion on how we can contribute to the fight against

AMR, from reducing unnecessary antibiotic use in healthcare and agriculture to promoting hygiene and sanitation practices in our communities and workplaces. Many participants expressed a desire for more information and training on the topic, a clear indication that the awareness week had sparked a genuine interest in tackling this global health threat. It was encouraging to see such enthusiasm for a topic that, until now, had remained mainly outside their radar.

In summary, World AMR Awareness Week is a powerful reminder of the need for collective action to combat antimicrobial resistance. The talk with DOSH Negeri Sembilan was a significant milestone in spreading awareness about this urgent issue. The engagement and enthusiasm of the attendees highlighted the importance of incorporating AMR awareness into a wide range of sectors, from healthcare to engineering. With continued education and action, we can work together to ensure that antimicrobial resistance does not jeopardize the future of public health, our economies, or our quality of life.

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# Revolutionizing Antimicrobial Resistance Management with Digital Health

#### Dr Kalaivane Kannadasan

Antimicrobial resistance (AMR) has emerged as a critical global health challenge, turning once-treatable infections into life-threatening conditions. AMR occurs when bacteria evolve to resist the effects of antibiotics, rendering standard treatments ineffective. A major contributor to this issue

inappropriate is the prescription of antibiotics, often influenced by patient demands or delays in obtaining accurate diagnostic results. Additionally, in many regions, the availability of antibiotics without a prescription further exacerbates their misuse, compounding the problem(1). Addressing AMR requires a comprehensive approach, combining traditional strategies with innovative technologies, particularly the digitalization of healthcare services, which can enhance diagnostics, optimize antibiotic use, and promote education for patients and healthcare providers(1).

Digital platforms equipped with rapid diagnostic technologies can swiftly identify the bacteria causing an infection and determine its resistance profile. This enables healthcare providers to prescribe the most appropriate antibiotic, avoiding unnecessary treatments and minimizing the risk of resistance. In resource-limited settings, mobile health applications and telemedicine platforms can bridge the gap by connecting healthcare providers with diagnostic experts, granting access to tools that might otherwise be unavailable(2).

In addition to diagnostics, digital health tools play a pivotal role in monitoring antibiotic use to ensure adherence to treatment guidelines. Electronic health records can track prescriptions in real-time, alerting healthcare providers to potential overuse or misuse. This systematic monitoring not only supports the responsible prescription of antibiotics but also aids in identifying patients at higher risk for resistant infections, allowing for timely intervention(3).

Telemedicine, a cornerstone of digital health, offers significant advantages in addressing AMR, particularly in regions with limited access to healthcare facilities. Remote consultations can provide patients with appropriate guidance on whether antibiotics are necessary, reducing the likelihood of unwarranted prescriptions. By making expert advice more accessible, telemedicine promotes the responsible use of antibiotics, even in underserved areas(4).

Equally important is the role of digital health in patient education. A widespread lack of understanding about the dangers of antibiotic misuse underpins much of the global AMR crisis. Digital platforms. including mobile applications, websites, and online educational tools, can inform patients about the importance of following prescribed treatments. completing antibiotic courses, and avoiding selfmedication. These platforms can also serve as reminders, reinforcing adherence to treatment regimens discouraging and harmful practices(1).

Digital health initiatives can further enhance education by incorporating behavioural frameworks such as the Health Belief Model (HBM). This model emphasizes that individuals are more likely to adopt healthy behaviours when they perceive a significant threat, recognize the benefits of action, and feel confident in their ability to act. By integrating personalized education into digital tools. patients can be empowered to understand the consequences of AMR, motivated to follow treatment plans, and encouraged to take greater responsibility for their health.

Moreover, digital health technologies contribute significantly to the surveillance of AMR. Real-time data on resistance trends can be collected through digital platforms and shared with public health authorities, facilitating the monitoring of emerging resistant strains and informing targeted responses to outbreaks. For instance, mobile health apps and cloudbased systems can gather and transmit data to global networks like the World Health Organization's Global Antimicrobial Resistance Surveillance System (GLASS), strengthening global efforts to combat AMR (5).

Finally, digital health can accelerate the discovery of new antibiotics and alternative treatments. AIpowered platforms, for example, can analyse vast datasets to identify promising drug candidates or optimize the use of existing antibiotics. These advancements ensure that current antibiotics are utilized in the most effective way possible while supporting the development of innovative therapies to address resistance.

In gist, digital health represents a powerful tool in the fight against AMR by revolutionizing diagnostics, antibiotic stewardship, enhancing improving surveillance, and fostering education for both patients and healthcare professionals. However, to unlock its full potential, substantial investments in digital infrastructure and literacy are crucial. Collaboration among governments, healthcare providers, and the global health community is essential to ensure that these technologies are accessible, equitable, and effective. By embracing digital health, we can strengthen the fight against AMR and safeguard the efficacy of antibiotics for future generations.

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### Anti-Microbial Resistance: A platonic peer

Nilaa chandrasekar

Anti-microbial resistance, caused bv misuse or overuse of drugs to cure a disease in a short period, is none the less, core component of professional а education and training. The microbes like bacteria and virus evolve through various genetic changes that occur when the antimicrobials are consumed in surplus amounts. The various genetic changes include mutations, gene transfer, selective pressure, etc. It is a topic that kindles the mind to think about how equipoise Works in the medical field. The impact made by this revolutionary outbreak needs attention from the very root. Hence, integrating this to the curriculum of MBBS would be of substantial value.

The misuse of antibiotics is increasing especially in human, and animal health, as well as in agriculture and it contributes to the spread of gene resistance, creating a "Silent Pandemic" that could surpass other causes of mortality by 2050. AMR affects both humans and animals, with resistant pathogens posing challenges in treating infections. Various mechanisms, such as modification and biofilm enzvmatic formation, enable microbes to withstand the effects of antibiotics. The lack of effective antibiotics threatens routine medical procedures and could lead to millions of deaths annually if left unchecked.

AMR has arisen as a multifaceted issue that impacts the health of both humans and animals. The excessive and improper utilization of antibiotics in various domains, such as healthcare facilities. agricultural practices, and veterinary medicine, has expedited the emergence of drug-resistant strains of microorganisms. The excessive dependence on antibiotics has resulted in the emergence of antibiotic-resistant bacteria, commonly known as superbugs, which pose significant challenges in treatment efficacy and can lead to severe infections. Furthermore, the inadequate progress in developing novel antimicrobial medications exacerbates the issue.

as the rate at which resistance develops surpasses the rate at which effective antibiotics are being developed.

Patients should know the consequences of the misuse of microbicides and for that the doctors and most importantly future doctors should gain a grip on this subject. collaboration With the of various departments such as microbiology, biochemistry. pharmacology, and community medicine awareness towards AMR can be easily inculcated in the students from the very beginning of their course in a pulchritudinous way.

Microbiology would help the students learn the structure and assets the microbes are holding in our body that are involved in the development of resistance to the drugs. Pharmacology deals with the composition of medicines which are manufactured by various pharmaceutical companies whether ieopardises with the doses it of antimicrobials in the medicine itself or how many doses of a particular medicine should be consumed by the patient for the ailment to heal in the normal period as it should. Community medicine is yet another significant subject that helps in spreading awareness and engaging the students in active learning of AMR in a fun manner. All of this helps the students experiencing jouska learn about AMR in a fast and efficient fashion along with other scientific reasoning. It is a scintillating process of substantial development which when incorporated in a systematic way in the undergraduate medical curriculum can be passed on. It not only builds assets to society but also eliminates the liability of antimicrobials abuse. This can additionally iron out the quid-pro-quo happening over the counter which heterophemizes the performance of medication in the future.

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### Strengthening the Fight Against Antimicrobial Resistance by Web-based monitoring system

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Antimicrobial resistance (AMR) is a critical global health challenge that undermines of treatments the efficacy against infections, leading to increased morbidity, mortality, and healthcare costs. The discovery of antibiotics by Alexander Fleming in 1928 marked a revolutionary advancement in medicine (1); However, the extensive and often indiscriminate use of antibiotics has paved the way for the emergence of drug resistance and the looming threat of super-resistant bacteria (2). AMR, characterized by the reduced effectiveness of antibiotics, antivirals, antifungals, and antiparasitics, poses a significant threat. with projections indicating it could cause 10 million deaths annually by 2050 and cost the global economy \$100 trillion(3). India, as one of the largest consumers of antibiotics, is particularly vulnerable, with an estimated 2 million annual deaths by 2050 attributed to AMR(4). Contributing factors include overuse. inadequate dosing. poor adherence to treatment guidelines, and antimicrobial courses. incomplete Addressing these challenges demands a systematic, innovative, and multistakeholder approach.

Inspired by the success of Ni-kshay, India's digital tuberculosis management system, a similar digital platform can be developed to through combat AMR enhanced antimicrobial stewardship. This dashboard could provide actionable insights into adherence trends, geographic hotspots for high antimicrobial usage, and instances of incomplete treatments. These insights would enable policymakers and healthcare administrators to target interventions effectively. Furthermore, integrating this system with mobile-based applications allow patients to self-report could adherence, access educational resources, and receive reminders, thereby fostering a sense of ownership and accountability in treatment(5). Public-private their partnerships (PPPs) would play a crucial

role in scaling this initiative by involving private practitioners and pharmacies, complemented by robust regulatory frameworks and training programs for healthcare providers.

Implementation strategies for such a system include stakeholder collaboration to foster synergy among government bodies, healthcare providers, and technology developers. Community engagement and awareness campaigns would ensure adherence and foster accountability in antimicrobial use. Training programs would equip healthcare providers with knowledge and tools for effective antimicrobial stewardship, while regulatory frameworks would monitor and control antimicrobial prescriptions and sales.

The expected outcomes of this initiative include significant improvements in treatment adherence, a reduction in the prevalence of incomplete antimicrobial courses, and a decrease in the global burden of AMR. Real-time monitoring through the dashboard would enable policymakers to develop targeted strategies, addressing geographic and demographic vulnerabilities. Additionally, the integration of mobile technology would enhance patient engagement, promoting a of ownership over sense treatment adherence. The economic benefits are equally substantial, with reduced healthcare costs stemming from improved treatment outcomes and lower rates of resistance-related complications.

Future directions for this initiative involve scaling the platform to encompass a broader range of antimicrobial agents and incorporating advanced technologies such as artificial intelligence (AI) for predictive modelling. AI algorithms could identify resistance hotspots and optimize interventions by analyzing patterns in realtime data. Expanding the initiative's scope to include international collaborations would facilitate the sharing of data and best practices, fostering a unified global response to AMR. Evaluation metrics, including adherence rates, reduction in resistance trends, and economic impact assessments, will be critical for assessing the program's efficacy and guiding future refinements.

By leveraging lessons from Ni-kshay and integrating technological, community-driven, and policy-based approaches, this model offers a promising solution to the AMR crisis. The success of such a system will depend on sustained collaboration among stakeholders, the adaptability of the platform to diverse healthcare contexts, and continued investment in research and development. This initiative could serve as a cornerstone in the global effort to combat AMR, ultimately reducing the burden of resistance and safeguarding the efficacy of life-saving antimicrobials.

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### Antimicrobial Resistance in the Philippines: Perspectives from Junior Doctors

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greatest threats to global health, food security, and development today. It affects everyone, everywhere, and it requires a coordinated and sustained response at the global, national, and local levels," – United Nations (UN)

The World Health Organization (WHO) has declared antimicrobial resistance (AMR) as one of the top 10 global public health risks. In 2019 alone, drug-resistant infections resulted in nearly 4.95 million deaths worldwide, with a significant 1.27 million of those deaths being directly attributed to AMR. These numbers highlight the devastating impact AMR has on human health and the need for urgent action. AMR occurs when microorganisms such as bacteria, viruses, fungi, and parasites evolve to resist the drugs that once killed them or inhibited their growth. This resistance can render common infections. including pneumonia, tuberculosis, and urinary tract infections, more difficult to treat, leading to longer hospital stays, more complicated surgeries, and higher mortality rates. The increasing threat of AMR calls for a global, coordinated response to protect the effectiveness of antibiotics and other antimicrobial agents.

In the Philippines, the impact of AMR is alarmingly high, with the country accounting for a significant number of AMR-related deaths in Southeast Asia. According to reports, 15,700 deaths in the Philippines in 2019 were directly caused by AMR, with an additional 56,700 deaths linked to its effects. This places the Philippines at the forefront of AMR-related health burdens in the Southeast Asia region, where it ranks fourth in age-standardized mortality rates across 13 countries. The consequences of AMR in the Philippines are not only seen in mortality rates but also in the strain it and the Department of the Interior and places on the country's healthcare system.

"Antimicrobial resistance is one of the The number of deaths attributed to AMR exceeds those caused bv chronic respiratory diseases, digestive diseases, maternal and neonatal disorders, and even self-harm and interpersonal violence. This stark reality underscores the urgent need comprehensive interventions for and strategies to combat AMR in the country.

> Addressing the growing problem of AMR in the Philippines requires a well-coordinated, multi-faceted approach that involve education, regulation, healthcare reform, and international collaboration. Public education is essential to raising awareness about the dangers of improper antibiotic use and the importance of antimicrobial stewardship. It is crucial for both healthcare providers and the public to understand that overuse and misuse of antibiotics contribute significantly to the rise of resistant strains.

> Additionally. stricter regulation and enforcement of policies on the sale and distribution of antibiotics are needed to prevent their misuse. The healthcare system itself must be reformed to ensure better infection prevention and control. along with improved surveillance and diagnostic capabilities. Finally, international collaboration is crucial in addressing AMR as a global issue, requiring the sharing of knowledge, research, and resources across borders.

> To address AMR effectively, the Philippine government developed the Philippine National Action Plan on Antimicrobial Resistance (PNAP-AMR), which brings together multiple government agencies, including the Department of Health (DOH), Department of Agriculture (DA), Department of Science and Technology (DOST). Department of Trade and Industry (DTI),

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Local Government (DILG). The PNAP-AMR aims to system is crucial for tracking the prevalence of AMR strengthen the country's response to AMR by focusing across the country. The ARSP operates through 26 on several key goals. These include enhancing sentinel sites nationwide, where priority specimens surveillance and laboratory capacity to monitor AMR are routinely sent for clinical testing. The data trends, ensuring access to safe and high-quality collected from these sites are essential for identifying antimicrobials, promoting the rational use of AMR patterns and potential outbreaks, enabling antibiotics, reducing infections in all settings, timely and targeted responses. The program's fostering innovation and research on AMR, and raising emphasis on surveillance is critical for detecting new public awareness on the importance of combating resistance trends and guiding clinical decision-AMR. These strategic actions are designed to curb the making, which helps to mitigate the spread of spread of resistance and protect the public from its resistant infections. dangerous consequences.



Figure 1: Map of sentinel sites of Antimicrobial Resistance Surveillance Reference Laboratory (ARSRL),

The Research Institute for Tropical Medicine (RITM) has been at the forefront of efforts to combat AMR in the Philippines. As a key player in antimicrobial resistance surveillance. RITM operates the Antimicrobial Resistance Surveillance Reference Laboratory (ARSRL), which serves as the central hub country's Antimicrobial the Resistance for Surveillance Program (ARSP). This laboratory-based

In addition to surveillance and regulation, raising public awareness about AMR is vital for fostering a more informed society. One significant initiative in this regard is the Philippine Antimicrobial Awareness Week (PAAW), an annual event aimed at educating both healthcare professionals and the general public about the risks of AMR.

The 2024 PAAW officially launched in Iloilo City on November 20, bringing together health professionals. advocates, and community members for a day focused on this critical issue. The theme of the event, "Samasamang Magtulungan upang Antimicrobial Resistance Mapigilan: Maki-alam. Manghikayat. Agarang av Kilos," emphasizes the need for collective action to combat AMR. During the event, expert-led discussions were held on the importance of antimicrobial stewardship and the impact of AMR on agriculture, a key area often overlooked in discussions about resistance. Such initiatives are instrumental in creating a sense of urgency about AMR and ensuring that everyone, from healthcare providers to the general public, understands their role in preventing its spread.

AMR is a growing global threat that requires immediate and sustained action. The situation in the Philippines highlights the urgent need for comprehensive strategies that involve government agencies, healthcare professionals, and the public. The country can take significant steps toward addressing this critical issue through national action plans, improved surveillance, and public awareness initiatives. Collaborative efforts at both the national and international levels will ensure that antimicrobial treatments remain effective for future generations, ultimately safeguarding global health from the devastating effects of AMR.

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# Antimicrobial Resistance in low- and middle-income countries: An Established Global Health Crisis

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Antimicrobial resistance (AMR) has emerged as a significant global health crisis, with farreaching consequences for human health. economies, and societies. Low- and middlecountries. in particular. income are disproportionately affected by AMR due to various factors, including inadequate access to healthcare, poor sanitation, lack of standard microbiology laboratories, and the misuse of antimicrobials. This paper examines the scope of the AMR crisis in low- and middle-income countries, its causes, consequences, and potential solutions.

The World Health Organization (WHO) has identified AMR as a major global health threat. with the potential to undermine decades of progress in public health and modern medicine such as cancer chemotherapy, caesarean section. hip replacements, organ transplantation, and other surgeries (1). In developing countries. the situation is particularly dire. According to the WHO, Bacterial AMR was directly responsible for an estimated 1.27 million deaths annually in 2019 and contributed to 4.95 million deaths, with this number projected to increase to 10 million by 2050 if left unchecked (2).

One of the primary drivers of AMR in resourcepoor settings is the misuse of antimicrobials. In many of these countries, antibiotics are readily available over the counter, leading to widespread self-medication and misuse (3). Additionally, weak healthcare systems and poor regulation of pharmaceuticals bv government authorities contribute to the proliferation of substandard and counterfeit antibiotics with the problem of access to the right antibiotics remaining a perennial problem in the AMR landscape. The unavailability of standard clinical microbiology laboratories coupled with inadequate antimicrobial research and development pipeline further exacerbates the problem.

Poor sanitation and inadequate access to healthcare due to poverty and inequality also play significant roles in the spread of AMR in

developing countries. In many of these countries, healthcare facilities lack basic infrastructure, including clean water, sanitation, and hygiene facilities (4). This creates an environment conducive to the spread of microorganisms, which in turn fuels the development of AMR. Additionally, the cost of quality healthcare is potentially out of reach for the common man who essentially relies on out-of-pocket payment for access.

The consequences of AMR in low- and middle-income countries are severe and catastrophic. AMR increases the risk of treatment failure, leading to prolonged illnesses, increased mortality, and higher healthcare costs (3). Moreover, AMR undermines the effectiveness of vaccines, making it more challenging to control infectious diseases (1).

To combat AMR in developing countries, a multifaceted approach is necessary. Firstly, improving access to healthcare and strengthening healthcare systems is critical. This includes investing in healthcare infrastructure including upscaling our clinical microbiology laboratories, training healthcare workers, and improving access to essential medicines (2).

Secondly, promoting the rational use of effective antimicrobials is essential. This can be achieved through public awareness campaigns, education and training of healthcare workers, and implementation of antimicrobial stewardship programs (3).

Thirdly, enhancing surveillance and monitoring of AMR is vital. This includes robust surveillance systems, monitoring antibiotic use and resistance patterns, and sharing data internationally (1).

Finally, addressing the root causes of AMR, including poverty, poor sanitation, and inadequate access to healthcare, is crucial.

This requires a comprehensive approach that involves governments, international organizations, civil society, and the private sector (2).

The United Nations General Assembly High-level Meeting on AMR that was held for the second time in New York on 26 September 2024 with the theme "Investing in the Present and Securing Our Future Accelerating Multisectoral Together: Global. Regional. and National Actions to Address Antimicrobial Resistance" is an example of the global solidarity needed to address the threat AMR poses to global health, food security, and achieving the 2030 Sustainable Development Goals. The meeting offered a critical opportunity for political leaders and stakeholders from across different sectors to collectively commit to clear, new targets and practical steps to addressing AMR (5).

In conclusion, AMR is an established global health crisis that disproportionately affects resource-poor countries. The causes of AMR in these countries are complex and multifaceted, and addressing them requires a comprehensive approach that involves access to healthcare, promoting rational use of effective antimicrobials and equitable access to vaccines, enhancing surveillance and monitoring through quality diagnostics and robust data, and addressing the root causes of AMR. Only through collective action can we hope to mitigate the impact of AMR on human health and ecosystems and ensure that infectious diseases remain treatable for future generations.

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## A Global Threat: Antimicrobial Resistance through the One Health Lens

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Daniel Andrés Sierra García, MD MSc. Innovative Medicine Uppsala Universitet Guatemala, Guatemala <u>daniel-</u> <u>andres.sierra-</u> <u>garcia.1114@stud</u> <u>ent.uu.se</u> The extensive use of antimicrobial drugs has substantially reduced endemic illness and infection-related mortality, yet it has triggered an alarming situation – antimicrobial resistance (AMR). Predicted to cause up to 10 million deaths by 2050, AMR stands as one of the major global health threats in this century(1,2).

## Antimicrobial resistance in a nutshell

At its core, AMR is the mechanism by which microbes resist the effects of antimicrobial drugs, a phenomenon existing in nature long before the widespread antimicrobial use. Nevertheless, the extended misuse and antimicrobials overuse of in human medicine. veterinary practices. and agriculture have massively accelerated AMR. As a result, the standard treatment of infectious diseases is now under threat, demanding urgent response to this problem(3,4).

#### **One Health framework**

One Health acknowledges the interconnectedness of human, animal, and environmental health. It recognizes that the emergence and spread of AMR is not confined solely to humans but is intricately linked across the three sectors and its interconnections. As a comprehensive strategy that connects human, animal, and environmental domains, a One Health approach is imperative to curb the path of AMR (1,5).

In human health, antimicrobials are primarily used for infection treatment and prophylaxis. However, widespread misuse, unrestrained over-the-counter sales, and self-medication, significantly contribute to AMR. With the global consumption of antimicrobials expected to double in the upcoming years, anthropogenic factors like world trade, conflict, migration, food production massification, and climate



Figure 1: The complexity of AMR across the One Health domains. This scheme shows the interconnectedness between humans, animals, and the surrounding environment, and how these relations facilitate the transmission of AMR. (Created with BioRender. Adapted from Walsh TR, Nat Microbiol, 2018.)

change further complicate the issue. Cultural habits, including food choices and hygiene practices, also play a role in AMR transmission (1,4).

In animal health, antimicrobials are extensively used in livestock and aquaculture, for therapy. prophylaxis, metaphylaxis, and growth promotion. Some of these practices are associated with of antibiotics in prolonged use sub-lethal concentrations, dumping not absorbed and partially metabolized antimicrobials into the environment. Approximately two-thirds of total antimicrobial consumption is used in animal production, significantly contributing to the transmission of AMR to humans through direct contact and consumption of animal products(2,4,5).

The environment, often overlooked, serves as a major reservoir for AMR, with soil and freshwater settings acting as major reservoirs and dissemination routes for AMR. Anthropogenic pollution, and human and animal waste, introduce AMR factors to the environment, creating AMR hotspots in wastewater and manure due to the presence of remains of antibiotics. metals. and disinfectants. hard Consequently, drinkable water and agricultural products, constantly exposed to environmental AMR factors, serve as reintroduction routes of AMR to humans and animals, completing the transmission cycle (1,4,5).

#### **Global Impact**

From a public health perspective, human health is considered a priority, but its interdependence with animal health and the associated environment cannot be ignored. Since AMR microbes are extended in multiple niches, AMR strains of fungi and bacteria represent a significant global problem, raising mortality rates due to the inefficiency of currently available antimicrobials. The escalating global consumption of antimicrobials, with chances of a catastrophic future where no antimicrobials are effective for human disease, is leading to prolonged illness and increased mortality rates (2–4).

#### Challenges and future directions

Governments. organizations, and scientists worldwide recognize the urgency of addressing AMR. Antimicrobial stewardship plans, ensuring responsible antimicrobial use for therapeutic purposes in human and animal health, are crucial. Public health interventions, such as sanitation and extended vaccination, complement these efforts. A paradigm shift in research and development is essential, focalizing research efforts on discovering new antibiotics or alternative therapies. The absence of new antibiotics in the last 30 years underscores the need for innovation. with alternative therapies like bacteriocins, bacterial genetic modification, bacteriophage therapy, toxins, and predatory bacteria, requiring further research for clinical application (2-4).

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# Antimicrobial Resistance in Ophthalmology: A Global Perspective

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<sup>1</sup> National Point of Contact, Space Generation Advisory Council (SGAC), in support of the United Nations Program on Space Applications, Vienna, Austria

<sup>2</sup> Medical Doctor, Firdous Hospital, Baghdad, Iraq Antimicrobial resistance (AMR) is quickly becoming a serious challenge in eye health. The rise in multi-drug-resistant infections, like methicillin-resistant Staphylococcus aureus (MRSA), highlights the urgent need for a united effort to protect the power of antibiotics in treating eye infections.

## Ocular Infections and the Pathogens Responsible

Ocular infections commonly arise due to microorganisms, particularly gram-positive bacteria such as Staphylococcus aureus. coagulase-negative Staphylococci. and Streptococcus pneumonia. In addition, Gram-negative organisms, such as Pseudomonas aeruginosa, contribute significantly, especially in keratitis and endophthalmitis(1).

with non-targeted They are treated antibiotics as broad-spectrum fluoroquinolones. The result is the gradual emergence of resistance to ocular pathogens, which impacts the future use of these agents. Gram-positive bacteria, for example, Staphylococcus aureus (SA), also demonstrated fluoroquinolone resistance in 9-13%, while gram-negative pathogens like Pseudomonas exhibit resistance rates as high as 39% in certain regions(2).

#### Mechanisms Driving Resistance

The mechanisms of AMR are multiple, including the enzymatic inactivation of antibiotics, alteration of drug targets, efflux of antimicrobial agents, and diminished permeability of bacterial cell membranes. These acquisitions make bacterial escape or overcoming therapeutic strategies much more difficult, leading to either more complex treatment regimens or a higher potential to cause blindness, such as corneal perforation or enucleation in severe cases of endophthalmitis.

#### AMR in Ophthalmology: Global Landscape

#### INDIA

This is particularly concerning in India, where we are facing the challenge of multidrug resistance among ocular organisms. Certain strains of Staphylococcus aureus show resistance to the widely used fluoroquinolones of ofloxacin, gatifloxacin, and moxifloxacin. Gram-negative bacilli display intermediate resistance to tobramycin and remain vulnerable to ceftazidime. The Asia Cornea Society's multicenter study's results the demonstrate high frequency of resistance isolates and the pressing need for regional stewardship programs(3).

#### THE UNITED STATES OF AMERICA

The Ocular Tracking Resistance in The U.S. Today (Ocular TRUST) program lasted between 2005 and 2008 and provided data isolated staphylococci on showing methicillin resistance up to 80%. Coresistance to other classes of antibiotics including fluoroquinolones remains a growing concern. Interestingly, resistance patterns have remained stable for a long time, which suggests predominant factors that need to be addressed systematically(4).

#### THE UNITED KINGDOM

In the United Kingdom, from studies carried out between 2009 and 2015, it was noted that there is considerable AMR across the care settings. In Pseudomonas spp., it was chloramphenicol while swiveling for fusidic acid, it was especially high in Haemophilus spp. The epidemiological picture is made even worse by seasonal fluctuations owing to an upsurge of infections in the spring season(5).

#### The Role of Antimicrobial Stewardship in Ophthalmology

Although Antimicrobial Stewardship (AMS) has shown great promise in reducing Antimicrobial Resistance (AMR) in systemic diseases, its application in ophthalmology is still relatively limited. The World Health Organization's 2015 global action plan developed a framework for AMS. It places a strong emphasis on cooperation, education, and the creation of guidelines. These guidelines can be modified for ophthalmology in the following ways:

- 1. Monitoring and Reporting: The regular monitoring of resistance patterns is essential to identify AMR. Collaborating with laboratories and microbiology experts is crucial for guiding the strategic selection of antibiotics, paving the way for more precise and effective treatments.
- 2. Awareness and Education: The dangers of AMR and the significance of using antibiotics sparingly can be emphasized in training programs for patients, prescribers, and pharmacists.
- 3. Protocol Development: The development of evidence-based recommendations for the use of antibiotics in ocular infections should be spearheaded by ophthalmology professional societies.
- 4. Implementation of the Policy: Regular evaluation of antimicrobial prescribing procedures and results is essential to evaluate the effectiveness of AMS programs.

Stakeholders must prioritize the implementation of AMS programs tailored to ophthalmology. The ophthalmology community can help prevent AMR by encouraging collaboration, improving research, and educating healthcare practitioners.

#### Conclusion

To address AMR in ophthalmology, a multifaceted approach is required, including worldwide surveillance, regional stewardship, and local adoption of best practices. Sustained efforts to integrate AMS into ophthalmic treatment are critical to maintaining antibiotic efficacy and ensuring that the vision preservation aim is possible for future generations.

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