

## | EDITORIAL |

## Antimicrobial Resistance: An Emerging Challenge in Public Health and Beyond

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Antimicrobial resistance (AMR) has been recognised by the World Health Organization (WHO) as a global health and development threat.<sup>1</sup> An accurate, actionable estimate of the AMR burden is needed to prioritise resource allocation for strategies to prevent and control AMR including infection control, antimicrobial stewardship and updating strategies. Moreover, a mechanistic understanding of how AMR leads to worse outcomes will inform infection management.

Antimicrobials include antibiotics, antivirals, antifungals and antiparasitics- the medicines used to prevent and treat infections in humans, animals and plants caused by microorganisms including bacteria, viruses, fungi and parasites.<sup>1</sup> Antimicrobial Resistance (AMR) occurs when pathogens undergo adaptive evolutionary changes that enable them to withstand antimicrobials and no longer respond to medicines.<sup>1,2</sup> Easy mutation of the microbials also occurs among the immunodeficient hosts like HIV affected patients. In the immunodeficient hosts they can survive easily and can go for further mutations, and antimicrobials becoming less effective. AMR threatens the effective treatment and prevention, causing risk of spread of disease, severe illness and death.<sup>1</sup> With the clinical use of penicillin, the antibiotic era began in the early 1940s. Subsequent discovery, development, and clinical use of other antibiotics resulted in effective therapy against major bacterial pathogens.<sup>3</sup>

Irrational uses including (excessive use, misuse, abuse) of antimicrobials in human and agriculture sectors specially in livestock and fisheries, have played a critical causative role in the development of drug-resistant pathogens.<sup>1,4</sup> In most cases, it is perpetuated by diverse risk factors and maintained within environments because of poor infection control

practices.<sup>5</sup> Antibiotic resistant bacteria can be found in the environment including freshwater, soil, wastewater and among livestock and where humans are at high risk of environmental exposure. A number of factors favour the transmission of antibiotic resistance such as the widespread bacterial contamination of soil and drinking water; inadequate sanitation and poor treatment of wastewater as well as natural disasters. Inexpensive antibiotics are readily available from over-the-counter suppliers leading to widespread use in humans and animals.<sup>4</sup>

AMR accounts for hundreds of thousands of deaths annually.<sup>6</sup> It is estimated that by 2050, AMR will lead to approximately 10 million annual deaths worldwide.<sup>7</sup> WHO has declared that AMR is one of the top 10 global public health threats facing humanity.<sup>1,4</sup> As simulated by the World Bank, considering low AMR impacts, by 2050, annual global gross domestic product (GDP) would likely fall by 1.1 percent, and high AMR-impact scenario, the world will lose 3.8 percent of its annual GDP by 2050, with an annual shortfall of \$3.4 trillion by 2030. Moreover, with AMR, low-income countries would experience larger drops in economic growth than wealthy countries, so economic inequality between countries would increase. Livestock production in low-income countries would decline the most, with a possible 11 percent loss by 2050 in the high AMR-impact scenario. Meanwhile, as AMR spreads, health care expenditures, both public and private, will increase in step with the rising disease burden; by 2050 the annual costs may exceed the base-case level by some 25 percent in low-income countries, 15 percent in middle-income countries, and 6 percent in high-income countries.<sup>2</sup>

Without AMR containment, the Sustainable Development Goals for 2030—such as ending poverty, ending hunger, ensuring healthy lives, reducing inequality, and revitalising global development partnerships are less likely to be achieved. In the high

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AMR-impact scenario, an additional 24 million people would be forced into extreme poverty by 2030. Most of the increase would occur in low-income countries. As a result, the goal of eliminating poverty by 2030 would be harder to reach.<sup>2</sup> So, it requires urgent multisectoral action in order to achieve the Sustainable Development Goals (SDGs).<sup>1</sup>

The Government of Bangladesh is well committed to contain the antimicrobial resistance. At a 'High-level Interactive Dialogue on AMR' held in New York, the USA, on 29 April 2021, the Hon'ble Prime Minister Sheikh Hasina unveiled a five-point "action plan" to effectively fight antimicrobial resistance (AMR). The dialogue, convened by the President of the 75th session of the United Nations General Assembly - a follow-up to a call of the assembly in its resolution titled "Political declaration of the high-level meeting on universal health coverage." Five points action plan included: adoption of integrated multi-sectoral and collective action plan on AMR by the international community at both regional and global levels with special focus on low and middle-income countries; good manufacturing, laboratory practices and surveillance framework; putting emphasis on equitable access to affordable and effective antibiotics, as required, through transfer of technology and sharing of ownership; sustainable financing for AMR containment activities; and global public awareness to battle AMR through political commitment and partnership among the member states.<sup>8</sup> In 2017, the country's leading physicians, veterinarians, and scientists came together to form the Bangladesh AMR Response Alliance (BARA). BARA practitioners prescribe antimicrobials based on standard guidelines developed together with FAO and WHO, and actively advocate for responsible usage within their workplaces and communities.<sup>9</sup> Bangladesh is the member of One Health Global Leaders Group on Antimicrobial Resistance. The Food and Agriculture Organization of UN, together with the World Health Organization (WHO), and the World Organisation for Animal Health (OIE), established the group to harness the leadership and influence of world leaders to catalyse global attention and action to avert the disastrous consequences of AMR.<sup>9</sup>

Bangladesh has developed National Action Plan on Antimicrobial Resistance Containment in Bangladesh 2017-2022, which aims to establish a robust, cross-sectoral AMR surveillance system to generate data that can inform policy decisions and the prudent production, distribution, and use of antimicrobials in Bangladesh.<sup>10</sup> Furthermore, emphasis has been given on the one health approach to make the AMR

surveillance mainstreaming and sustainable one incorporating it into Bangladesh's human health system, as well as in the animal health sector, the food chain (including aquaculture) and the environment. Recently, Bangladesh has drafted the National Strategic Plan for Antimicrobial Resistance Containment in Bangladesh (2021-2026).<sup>11</sup>

To tackle the antimicrobial resistance across the globe- an emerging problem public health and beyond, a comprehensive, multisectoral and multi stakeholder efforts to strengthen public awareness, effective, integrated and uninterrupted surveillance system, further improved and consistent and standardised diagnostic methods and services and exchange of information, update of standard treatment guidelines with more rationale use of antimicrobials, access to safe food and water and sanitation and one health approach, and further investment in new antimicrobials, vaccines and to generate scientific evidence thus urgently needed.

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