

### *Sameeksha*\* – Antimicrobial Resistance (AMR)

\**Sameeksha* is a Hindi word, meaning review. This compilation of publications and resources (along with a brief summary) aims to review and share information to facilitate containment of antimicrobial resistance in India, grouped according to the strategic priorities of India's National Action Plan on Antimicrobial Resistance. Kindly note, inclusion of publications and resources in this review/compilation does not imply an endorsement by WHO.

#### Key highlights of volume 9

- Water, sanitation and hygiene facility improvement tool for trainers
- Strengthening the AMR surveillance in India using integrative technologies
- Global report on infection prevention and control
- India's ban on antimicrobial fixed-dose combinations: winning the battle, losing the war?
- WHO strategic priorities on antimicrobial resistance
- Quadripartite (FAO-WHO-OIE/WHO-UNEP) strategic framework for collaboration on antimicrobial resistance

### Strategic priority 1: Awareness and understanding

#### WASH FIT manual for trainers

- Training resources aligned with WASH FIT (Water, Sanitation and Hygiene Facility Improvement Tool) guide, including background documents, content of the recommended training and training evaluation approaches.
- Also provides sample training schedules, evaluation forms with links to a set of interactive training slides.

WHO-UNICEF | Training material | 5 May 2022 | [Online link](#)

#### Vaccines can help make a better life possible for everyone

- Part of the global digital campaign highlighting role of current/future vaccines, launched during the World Immunization Week.

IFPMA | Video | 20 April 2022 | [Online link](#)

#### Raising awareness of antimicrobial stewardship for nurses and midwives

- Resources to support registered nursing and midwifery staff in keeping antibiotics working by following antimicrobial stewardship best practice.
- Includes [pre-reflection activity](#), [post-reflection activity](#) and [keep antibiotics working: 5 key messages](#)

NHS Education for Scotland | Learning pack | 13 May 2022 | [Online link](#)

#### Monitoring national action plans on AMR at country level – best practices

- Quadripartite webinar resources on monitoring NAP-AMR, showcasing the best practices.

FAO-OIE-WHO-UNEP | Webinar recordings and presentations | 19 May 2022 | [Online link](#)

## CIDRAP communication toolkit for AMR

- The toolkit includes posters, infographics and a video to equip doctors and patients with key facts to give them the resources to raise AMR awareness in their communities.

*CIDRAP* | IEC resources | 13 April 2022 | [Online link](#)

## Knowledge, attitude, and practice survey on antimicrobial use and resistance among Indian clinicians: A multicentric, cross-sectional study

- Despite satisfactory knowledge about rational use of antimicrobials and AMR patterns, there are variations in the clinicians' prescribing attitudes and practices which highlights the need for specific interventions to improve antimicrobial prescribing.

*Perspectives in Clinical Research* | Original article | 31 May 2022 | [Online link](#)

## Strategic priority 2: Laboratories and surveillance

### Strengthening the surveillance of antimicrobial resistance in India using integrative technologies

- ICMR's AMR network has collected more than 0.4 million patient records using IT tools.
- Currently the AMR surveillance systems captures AMR data from humans and can be extended to capture AMR data from other sectors using a One Health approach.

*Frontiers in Public Health* | Brief research report | 4 April 2022 | [Online link](#)

### Hybrid plasmids encoding antimicrobial resistance and virulence traits among hypervirulent *Klebsiella pneumoniae* ST2096 in India

- Highlights the role of hybrid plasmids carrying both AMR and virulence genes in *K. pneumoniae* ST2096, suggesting that MDR-HvKp is not confined to selected clones.
- Convergence of virulence and AMR in *K. pneumoniae* is of great concern to public health.

*Frontiers in Cellular and Infection Microbiology* | Original research | 27 April 2022 | [Online link](#)

### Genomic screening of antimicrobial resistance markers in UK and US *Campylobacter* isolates highlights stability of resistance over an 18-year period

- AMR genes were identified in 32,256 *C. jejuni* and 8,776 *C. coli* publicly available genome sequences to compare the prevalence and trends of AMR in *Campylobacter* isolated in the UK and US between 2001 and 2018.
- Suggests that antimicrobial stewardship and restricted antibiotic usage may help contain further expansion of AMR prevalence in *Campylobacter* but are unlikely to reduce it in the short term.

*Antimicrobial Agents and Chemotherapy* | Research article | 11 April 2022 | [Online link](#)

### Genome-wide identification of carbapenem-resistant Gram-negative bacterial isolates retrieved from hospitalized patients in Bihar, India

- Genomic analysis showed a significantly high prevalence of beta-lactam and carbapenemase resistance genes – blaCTX-M followed by blaSHV, blaTEM, blaOXA, and blaNDM – in clinical isolates of Gram negative bacteria.
- The study highlights the need to address the threat posed by AMR in India.

*Scientific reports* | Article | 19 May 2022 | [Online link](#)

## Antibiotic resistance and molecular profiling of the clinical isolates of *Staphylococcus aureus* causing bovine mastitis from India

- Majority of isolates were multidrug-resistant, and 25% isolates were MRSA.
- Shows the prevalence of multidrug-resistant *S. aureus* isolates in India that have genetic factors for disease pathogenesis causing bovine mastitis.

*Microorganisms* | Article | 18 April 2022 | [Online link](#)

## Strategic priority 3: Infection prevention and control

### Global report on infection prevention and control

- Provides a global situation analysis of how IPC programmes are being implemented in countries around the world, according to evidence from the scientific literature and various reports, and new data from WHO studies.
- Highlights the harm to patients and health workers caused by health care-associated infections and AMR, addresses the impact and cost-effectiveness of IPC programmes and the strategies and resources available to countries to improve them.

*WHO* | Global report | 23 May 2022 | [Online link](#)

### WHA resolution on Global Strategy on Infection Prevention and Control

- Resolution endorsed at the Seventy-fifth World Health Assembly that outlines the importance and need for a global strategy on IPC.
- Key tasks/roles of Member States and WHO are outlined.

*WHO* | WHA resolution | 25 May 2022 | [Online link](#)

### The limit of limits: India's hurdles in regulating antimicrobial pollution

- Examines India's role as a crucial hub of antimicrobial manufacturing, the country's efforts to limit antimicrobials in pharmaceutical manufacturing wastewater, and the role of global accountability in mitigating AMR in the environment.

*CIDRAP-ASP* | Report | May 2022 | [Online link](#)

### Strategies to prevent central line-associated bloodstream infections in acute-care hospitals: 2022 update

- Highlights practical recommendations to assist acute care hospitals in implementing and prioritizing their central line-associated bloodstream infection (CLABSI) prevention efforts.

*ICHE compendium* | SHEA/IDSA/APIC Practice recommendation | 19 April 2022 | [Online link](#)

### Estimating the cost of achieving basic water, sanitation, hygiene, and waste management services in public health-care facilities in the 46 UN designated least-developed countries: a modelling study

- Investment will need to increase to reach full coverage of basic WASH and waste services in public health facilities.
- Countries will need to routinely budget for operations and maintenance of WASH and waste management assets.

*The Lancet Global Health* | Article | 6 April 2022 | [Online link](#)

## Water, sanitation and hygiene – a foundation of strong, resilient health systems

- Highlights the importance of water, sanitation and hygiene (WASH) in healthcare facilities for providing quality care, preventing avoidable deaths and achievement of Universal Health Coverage.
- Includes a case study on India – a health systems approach to integrating WASH in HCF; and calls for action by national/local governments, donor/international agencies, health/WASH practitioners and NGOs/civil society.

*WaterAid* | Global learning report | May 2022 | [Online link](#)

## Strategic priority 4: Optimise use of antimicrobials

### India's ban on antimicrobial fixed-dose combinations: winning the battle, losing the war?

- Although the sales of the banned antimicrobial fixed dose combinations reduced in 2019, mechanisms that offset the effects of the ban included implementation failure, rising sales of congeners, and products with additional non-antimicrobial components.

*Journal of Pharmaceutical Policy and Practice* | Short report | 28 April 2022 | [Online link](#)

### Factors influencing antibiotic prescribing behavior and understanding of antimicrobial resistance among veterinarians in Assam, India

- Less than two thirds of respondents were aware of the government ban for Colistin and only 2% were aware of a national plan for AMR.
- Highlights that antibiotic prescriptions are mostly based on presumptive diagnosis due to lack of diagnostic facilities in most veterinary clinics.

*Frontiers in Veterinary Science* | Original research | 26 April 2022 | [Online link](#)

### Availability, prices and affordability of antibiotics stocked by informal providers in rural India: a cross-sectional survey

- Cross-sectional survey of informal providers (IPs) in two districts of West Bengal to assess the availability of the antibiotics, as well as their sales volumes, retail prices, percentage markups for IPs and affordability.
- Of the 196 IPs that stocked antibiotics, 85% stocked tablets, 74% stocked syrups/suspensions/drops and 18% stocked injections. 71% of the IPs stocked an ACCESS antibiotic and 84% stocked a WATCH antibiotic.

*Antibiotics* | Article | 14 April 2022 | [Online link](#)

### Impact of antimicrobial stewardship programs on antibiotic consumption and antimicrobial resistance in four Colombian healthcare institutions

- The study showed that antimicrobial stewardship programs are a key strategy to tackle the emerging threat of AMR and have a positive impact on antibiotic consumption and AMR.

*BMC Infectious Diseases* | Research article | 2 May 2022 | [Online link](#)

### Tackling antimicrobial resistance in practice: dental students' evaluation of university teaching supplemented by an online course

- Knowledge and experience of using an online educational, interactive resource was evaluated in final year dental students, and showed that education was effective in ensuring that dental students understood their role in tackling AMR.

*JAC-AMR* | Article | 9 April 2022 | [Online link](#)

## Antimicrobial resistance in commensal *Escherichia coli* from humans and chickens in the Mekong Delta of Vietnam is driven by antimicrobial usage and potential cross-species transmission

- Demonstrates co-influence of antimicrobial use and potential transmission of drug resistant *E. coli* isolates from food-producing animals and in-contact humans; and reiterates that restricting unnecessary antimicrobial use along with limiting interspecies contact are essential for reducing the burden of AMR.

*JAC-AMR* | Article | 27 May 2022 | [Online link](#)

## Strategic priority 5: Research, innovations, and finance

### WHO strategic priorities on antimicrobial resistance

- Outlines the rationale, objective, approach, key achievements and WHO/Tripartite deliverables/next steps for 4 strategic priorities – 1) stepping up leadership for the AMR response; 2) driving public health impact in every country to address AMR; 3) research and development for better access to quality AMR prevention and care; and 4) monitoring the AMR burden and global AMR response.

*WHO* | Publication | 18 May 2022 | [Online link](#)

### Estimating the impact of health systems factors on antimicrobial resistance in priority pathogens

- Integrated longitudinal AMR data of 633,820 isolates from 70 middle and high-income countries with the global burden of disease, governance (WGI) and finance data sets to find AMR determinants.
- Analysis showed that governance, finance, and disease burden variables strongly correlate with AMR.

*Journal of Global Antimicrobial Resistance* | Article | 6 May 2022 | [Online link](#)

### Transmission routes of antibiotic resistant bacteria: a systematic review

- Reviews estimates of acquisition routes' contributions of antibiotic resistant bacteria in humans, animals, water and the environment and assessed the methods used to quantify the importance of transmission routes.

*BMC Infectious Diseases* | Review | 20 May 2022 | [Online link](#)

### Association of inappropriate outpatient pediatric antibiotic prescriptions with adverse drug events and health care expenditures

- Studied children with common infections treated in an outpatient setting – and found that inappropriate antibiotic prescriptions were common and associated with increased risks of adverse drug events and higher attributable health care expenditures.
- Highlight the individual- and national-level consequences of inappropriate antibiotic prescribing and further support implementation of outpatient antibiotic stewardship programs.

*JAMA Network Open* | Original investigation | 26 May 2022 | [Online link](#)

### Light-activated molecular machines are fast-acting broad-spectrum antibacterials that target the membrane

- Reports the discovery of an unconventional antibacterial mode of action by mechanical disruption at the molecular scale, which uses visible light-activated synthetic molecular machines to kill Gram-negative and Gram-positive bacteria in minutes.

*Science Advances* | Research article | 1 June 2022 | [Online link](#)

## Strategic priority 6: Collaborations

### Strategic framework for collaboration on antimicrobial resistance

- Reflects the joint work of WHO, FAO, OIE (WAHO) and UNEP to advance a One Health response to AMR at the global, regional and country level, broadly supporting the implementation of five pillars of the Global Action Plan on AMR, as well as strengthening global AMR governance.

*WHO* | Publication | 6 April 2022 | [Online link](#)

### G7 Health Ministers' Communiqué

- The G7 Health Ministers' Communiqué outlines the G7 commitment for tackling the "silent pandemic" of antimicrobial resistance.

*G7* | Communiqué | 20 May 2022 | [Online link](#)

### Antimicrobial Resistance Multi-Partner Trust Fund annual report 2021

- Annual report for 2021 highlights the progress made in advancing a multisectoral One Health response to AMR at country and global levels, in eight lower-income countries to support the implementation of AMR national actions plans across the human and animal health, agriculture and environment sectors.
- Includes reports of global projects focussed on (1) integrated surveillance, (2) One Health assessment tool for AMR-relevant legislation, (3) AMR monitoring and evaluation, and (4) capacity development and raising awareness on AMR in the environment.

*WHO* | Publication | 31 May 2022 | [Online link](#)

### Why AMR must be a substantive element of the international instrument on pandemic prevention, preparedness and response

- Outlines the co-benefits for AMR and pandemic prevention, preparedness and response, under the following substantive elements – governance, financing, surveillance, capacity building and risk assessment, research and development, and responsible and sustainable use of medicines.

*GLG-AMR* | Position statement | 7 April 2022 | [Online link](#)

### Practical actions to operationalize the One Health approach in the Asian Development Bank

- Explains how One Health can be instrumental in ADB's efforts to support recovery from COVID-19 pandemic in the Asia and Pacific region, along with other development issues including antimicrobial resistance, food security, ecological security, biodiversity, human health, and climate change.

*ADB* | Publication | May 2022 | [Online link](#)

### Key changes to the treatment of drug-resistant tuberculosis

- Rapid communication released in advance of updated WHO consolidated guidelines expected later in 2022.
- Key updates include shorter novel 6-month all-oral regimens for the treatment of multidrug- and rifampicin-resistant TB (MDR/RR-TB), with or without additional resistance to fluoroquinolones (pre-XDR-TB) as well as an alternative 9-month all-oral regimen for the treatment of MDR/RR-TB.

*WHO* | Rapid communication | 2 May 2022 | [Online link](#)