

*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 15

- Superbugs and You – podcasts on AMR issues through expert interviews
- Environmental surveillance of AMR – perspective from UK's Environment Agency
- Potential role of vaccines in preventing antimicrobial resistance
- Antibiotic prescriptions for oral diseases in India
- Outcomes research & AMR – defining the value of healthcare interventions
- Global drivers of AMR across human and animal sectors

Strategic priority 1: Awareness and understanding

Superbugs & You

- Latest episode of the podcast is on “vaccines and the vulnerable: the race to end typhoid”
- Previous episodes focussed on neonatal sepsis, multi- and pan-resistant *C. auris*, and resistant *Acinetobacter*.

CIDRAP | Podcast | 21 March 2023 | [Online link](#)

Investigating the drivers for antibiotic use and misuse amongst medical undergraduates – perspectives from a Sri Lankan medical school

- Cross-sectional survey of medical students assessed patterns and drivers of antibiotic use and misuse, through ‘knowledge’ and ‘practice’ scores.
- Scores failed to show an improvement with the progress of study years, highlighting the need for adjustments in medical curricula to provide suitable knowledge and drive correct practices.

PLOS Global Public Health | Research article | 20 March 2023 | [Online link](#)

Are threat perceptions associated with patient adherence to antibiotics? Insights from a survey regarding antibiotics and antimicrobial resistance among the Singapore public

- Cross-sectional online survey to assess drivers of antibiotic adherence including knowledge and threats perceptions.
- Adherence was found to be strongly conditioned by perceived antibiotic-related costs and weakly influenced by perceptions of AMR as a threat and knowledge about antibiotics.

BMC Public Health | Research article | 20 March 2023 | [Online link](#)

Strategic priority 2: Laboratories and surveillance

Environmental surveillance of antimicrobial resistance (AMR), perspectives from a national environmental regulator in 2023

- Environmental AMR surveillance has been identified to be important in addition to surveillance in clinical, veterinary and food sectors.
- Offers guidance from UK's Environment Agency on technical decisions related to sources, pathways and receptors in designing systems for environmental AMR surveillance.

Eurosurveillance | Perspective | 16 March 2023 | [Online link](#)

The evolution and international spread of extensively drug resistant *Shigella sonnei*

- Multi-country genomic epidemiological exploration of extended-spectrum β -lactamase producing, extensively drug resistant strain of *S. sonnei* from a recent sexually transmitted outbreak among men who have sex with men (MSM).
- Revealed an internationally connected outbreak, highlighting the threat of horizontal transmission of AMR and importance of sharing genomic surveillance data.

Nature Communications | Research article | 8 April 2023 | [Online link](#)

Microbial contamination and antibiotic resistance in marketed food in Bangladesh: current situation and possible improvements

- Assessed bacterial contamination and AMR profiles in marketed food through a multi-antibiotic resistance (MAR) index, supplemented by key informant interviews.
- Study revealed that majority of isolated pathogens were multi-drug resistant (72.4%), and inadequate surveillance systems especially in the agriculture sector.

Antibiotics | Research article | 10 March 2023 | [Online link](#)

Strategic priority 3: Infection prevention and control

The potential role of vaccines in preventing antimicrobial resistance (AMR): an update and future perspectives

- Describes the role of vaccines as an approach to prevent pathogen transmission, lower rates of new infections and minimizing antibiotics use.
- Details the causes of AMR, current vaccine candidates in preclinical and clinical trials, and new strategies to improve vaccine efficiency to tackle AMR.

Vaccines | Review article | 1 February 2023 | [Online link](#)

Knowledge, attitude, practice, and perceived barriers for the compliance of standard precautions among medical and nursing students in Central India

- Assesses KAP around standard precautions and post-exposure management along with perceived challenges causing noncompliance among future healthcare providers.
- Highlights a suboptimal translation of knowledge into practice which may be resolved with hands-on practice based training.

IJERPH | Review article | 4 April 2023 | [Online link](#)

Strategic priority 4: Optimise use of antimicrobials

Antibiotic prescriptions for oral diseases in India: evidence from national prescription data

- A large nationally representative dataset found 403 prescriptions per 1,000 persons per year for all dental ailments, of which 89.2 prescriptions per 1000 persons per year were for antibiotics.
- Describes irrational use of antibiotics for oral diseases and calls for evidence based standard treatment guidelines and further research for drivers of prescription practices among dentists.

BMC Oral Health | Research article | 25 March 2023 | [Online link](#)

Drug resistance patterns of commonly used antibiotics for the treatment of *Helicobacter pylori* infection among South Asian countries: a systematic review and meta-analysis

- Provides pooled prevalence of antibiotic resistance in samples of *H. pylori* for commonly used antibiotics including clarithromycin, ciprofloxacin, levofloxacin and furazolidone.
- Shows a high level of resistance against commonly used antibiotics which has been increasing over 20 years necessitating a strong surveillance system and antibiotic stewardship.

Tropical Medicine and Infectious Disease | Systemic Review | 14 March 2023 | [Online link](#)

Strategic priority 5: Research, innovations, and finance

Outcomes research & AMR – defining value of healthcare interventions in antimicrobial resistance

- Three paper series detailing the role of outcomes research in public health, specifically AMR.
- Outlines the concept of outcomes research, case studies of impact of cost-effectiveness of use of diagnostics to inform antibiotic prescriptions and impact of interventions on patients.

CIDRAP | Review article | 7 April 2023 | [Online link](#)

Addressing antibiotic resistance: computational answers to a biological problem?

- Reviews how artificial intelligence, notably machine learning, can complement metagenomics to address AMR.
- Key avenues include improving clinical decision-making and promoting better treatment options for multi-resistant bacteria such as using artificial intelligence to develop new antibiotic combinations.

Current Opinion in Microbiology | Review article | 7 April 2023 | [Online link](#)

International manufacturing and trade in colistin, its implications in colistin resistance and One Health global policies: a microbiological, economic, and anthropological study

- Studied the prevalence of mcr-1-positive and mcr-3-positive *E. coli* in human, animal and environment microbiological samples from 131 sites across Pakistan along with data for colistin trade between 2017 and 2020 from Pakistan, Bangladesh and Nigeria.
- Prevalence of mcr-1 mediated colistin resistance in *Escherichia coli* was found to be 7% and despite international agreements, trade of colistin persists – with exports predominantly from China.

The Lancet Microbe | Research article | 14 March 2023 | [Online link](#)

Interspecies interaction reduces selection for antibiotic resistance in *Escherichia coli*

- Studies the role of interspecies interactions on the dynamics of nitrofurantoin resistance in *E. coli*.
- Presence of *Bacillus subtilis* significantly slowed down the selection for nitrofurantoin-resistant *E. coli*, highlighting the importance of interspecies interactions and synthetic microbial systems to understand evolution of AMR.

Communications Biology | Research article | 27 March 2023 | [Online link](#)

Strategic priority 6: Collaborations

Global antimicrobial-resistance drivers: an ecological country-level study at the human–animal interface

- Assessed associations between socioeconomic, anthropogenic and environment indicators with AMR rates in humans and food-producing animals.
- Significant association was found between animal antimicrobial consumption and AMR in food-producing animals and between animal antibiotic consumption and resistance in critical priority human pathogens.

The Lancet Planetary Health | Research article | 4 April 2023 | [Online link](#)

Global collaborations in antimicrobial stewardship: all hands on deck

- Highlights the importance of multiple-country collaborations and bidirectional learning to strengthen AMS.
- Provides illustrative examples of international collaborations for AMS, including Joint Programming Initiative on Antimicrobial Resistance, Commonwealth Partnerships for Antimicrobial Stewardship and UK-India-South Africa ASPIRES study among others.

Antimicrobial Stewardship & Healthcare Epidemiology | Review article | 5 April 2023 | [Online link](#)

Extended-spectrum beta-lactamase in *Escherichia coli* isolated from humans, animals, and environments in Bangladesh: One Health perspective systematic review and meta-analysis

- Based on 36 studies, the pooled prevalence of extended-spectrum beta-lactamase producing *E. coli* was 21%.
- Highlights importance of analysing samples from multiple interfaces, human-animal, animal-environment, environment-human and human-animal-environment for surveillance and mitigation of AMR.

One Health | Systematic Review | 13 March 2023 | [Online link](#)

Zoonotic and antibiotic-resistant *Campylobacter*: a view through the One Health lens

- Illustrates *Campylobacter* as an important One Health pathogen given its broad distribution and exposure to antibiotics used in both animal and human medicine leading to rising resistance.
- Increase in prevalence of resistant *Campylobacter* is attributed to antibiotic usage, interspecies transmission and subsequent clonal expansion thus signifying a multidirectional and complex transmission requiring a One Health approach.

BMC One Health Advances | Review | 30 March 2023 | [Online link](#)