

*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 7

- GLG-AMR call for reducing environmental pollution due to antimicrobial discharges
- Evaluation of integrated surveillance of AMR and antimicrobial use in Canada
- UNEP report summarizes environmental dimensions of AMR for policymakers
- First WHO global survey on infection prevention and control in health-care facilities
- Impact of antimicrobial stewardship program on antimicrobial resistant and prescribing in nursing homes
- Progress in alternatives to antibiotics to combat AMR
- WHO guidance on implementing NAP-AMR in the human health sector

Strategic priority 1: Awareness and understanding

Reducing antimicrobial discharges from food systems, manufacturing facilities and human health systems into the environment

- Call to action by the Global Leaders Group on Antimicrobial Resistance on reducing antimicrobial discharges from food systems, manufacturing facilities and human health systems into the environment.
- Warn that climate change could exacerbate the spread of drug-resistant infections that caused nearly 1.27 million deaths globally in 2019.

Global Leaders Group on AMR | Call to action | 2 March 2022 | [Online link](#)

Knowledge, perceptions, and practices on antibiotic use among Sri Lankan doctors

- Cross-sectional study highlights high scores for knowledge with relatively lower scores for practices.
- Implies the need to encourage correct practices through means other than solely promoting knowledge.

PLOS ONE | Research Article | 8 February 2022 | [Online link](#)

The impact of antimicrobial resistance awareness interventions involving schoolchildren, development of an animation and parents' engagements: a pilot study

- Awareness interventions involving schoolchildren with parents' engagements and AMR animation could influence parents' AMR knowledge and attitudes.

Antimicrobial Resistance & Infection Control | Research | 4 February 2022 | [Online link](#)

Pharmacists' knowledge, attitudes, behaviors and information sources on antibiotic use and resistance in Jordan

- Respondents scored high on knowledge about effective use, unnecessary use, and associated side effects of antibiotics, but lower scores were recorded for knowledge on spread of antibiotic resistance.
- Highlights the need for public health interventions (e.g., educational or communication campaigns) and efforts to improve the awareness of pharmacists about appropriate antibiotic use and spread of resistance.

Antibiotics | Article | 28 January 2022 | [Online link](#)

The overlooked pandemic of antimicrobial resistance

- The author comments that the invisible AMR pandemic continues in the shadows of the COVID-19 pandemic.
- A clearer picture of the AMR burden is finally emerging, which needs increasing global spending to address it.

The Lancet | Comment | 19 January 2022 | [Online link](#)

Strategic priority 2: Laboratories and surveillance

Integrated surveillance of antimicrobial resistance and antimicrobial use: evaluation of the status in Canada (2014–2019)

- Evaluation of surveillance of antimicrobial resistance (AMR) and antimicrobial use (AMU) across One Health sectors in Canada recommends action to develop an integrated AMR/AMU surveillance program; changes in policies to standardize AMR/AMU reporting; and allocation of more resources for AMR/AMU surveillance.

Canadian Journal of Public Health | Quantitative Research | 31 January 2022 | [Online link](#)

Exploiting genomics to mitigate the public health impact of antimicrobial resistance

- Explores how whole-genome sequencing techniques have advanced global, national, and local AMR surveillance, and how this understanding is applied to inform solutions, such as novel diagnostic methods that allow antimicrobial use to be optimised and vaccination strategies for better controlling AMR.

Genome Medicine | Review | 16 February 2022 | [Online link](#)

Elucidating the resistance repertoire, biofilm production, and phylogenetic characteristics of multidrug-resistant *Escherichia coli* isolated from community ponds: a study from West Bengal, India

- Details the phenotypic and molecular characteristics of multidrug-resistant *Escherichia coli* found in fresh community pond water collected from three districts of West Bengal.
- Re-emphasizes the need for stringent regulations and implementation of appropriate control measures to protect and preserve the water bodies.

Water Environment Research | Research Article | December 2021 | [Online link](#)

Strategic priority 3: Infection prevention and control

Environmental dimensions of antimicrobial resistance – summary for policymakers

- Calls to strengthen environmental action within the 'One Health' response to AMR
- Looks at the pollutants that exacerbate AMR in the environment, where they come from, and provides an overview of the environmental action required

UNEP | Report | 28 February 2022 | [Online link](#)

First WHO global survey on infection prevention and control in health-care facilities

- Cross-sectional survey, using WHO IPC assessment framework (IPCAF) of IPC programme implementation in 4,440 health-care facilities in 81 countries, found an advanced level of IPC implementation globally, but significantly lower scores were found in low-income and lower-middle-income countries, and public facilities.

The Lancet Infectious Diseases | Article | 21 February 2022 | [Online link](#)

Implementation of hand hygiene in health-care facilities: results from the WHO hand hygiene self-assessment framework global survey 2019

- Most healthcare facilities had an intermediate level of hand hygiene implementation or higher, for which health-care facility funding and country income level were important drivers.
- Availability of resources, leadership, and organisational support are key elements to further improve quality of care and provide access to safe care for all.

The Lancet Infectious Diseases | Article | 21 February 2022 | [Online link](#)

Three-year evaluation of the nosocomial infections in pediatrics: bacterial and fungal profile and antimicrobial resistance pattern

- Isolates of *Klebsiella pneumoniae* and *Candida* spp. were most common, followed by *Pseudomonas aeruginosa* and *coagulase-negative Staphylococci*, causing healthcare associated infections in an Iranian medical centre.
- High level of antimicrobial resistance in healthcare associated infections needs effective infection control programs and rational antibiotic use.

Annals of Clinical Microbiology and Antimicrobials | Research | 16 February 2022 | [Online link](#)

Antimicrobial stewardship and infection prevention and control in low- and middle-income countries: current status and best practices

- To combat AMR, World Society of Pediatric Infectious Diseases proposes a modified AMR declaration that is more child focused, with emphasis on what must be done for pediatric populations in hospitals and clinics.

The Pediatric Infectious Disease Journal | Supplement | March 2022 | [Online link](#)

Impact of environmental hygiene interventions on healthcare-associated infections and patient colonization: a systematic review

- Systematically reviewed effect of healthcare environmental hygiene intervention on HAI or patient colonization.
- Demonstrated a strong relation between interventions to improve healthcare environmental hygiene and reduction in environmental bioburden as well as patient colonization or HAI.

Antimicrobial Resistance & Infection Control | Review | 19 February 2022 | [Online link](#)

Effectiveness and sustainability of the WHO multimodal hand hygiene improvement strategy in the University Hospital Bouaké, Republic of Côte d'Ivoire in the context of the COVID-19 pandemic

- Assessment of hand hygiene knowledge, perception and compliance was performed 12 months before, right after the intervention and after a ten-months interval.
- Emphasizes the importance of a robust system to implement WHO's hand hygiene improvement strategy as an effective and pandemic-adaptable method to increase long-term hand hygiene compliance.

Antimicrobial Resistance & Infection Control | Research | 16 February 2022 | [Online link](#)

Strategic priority 4: Optimise use of antimicrobials

Impact of antimicrobial stewardship program on antimicrobial resistant and prescribing in nursing homes: a systematic review and meta-analysis

- Urinary tract infection is the most common infection for which antimicrobials are used in nursing homes.
- The review supports ASP implementation for improving health outcomes of patients.

Journal of Global Antimicrobial Resistance | Review | 11 February 2022 | [Online link](#)

Development of a mobile application for vancomycin dosing calculation: A useful tool for the rational use of antimicrobials

- Describes the development of a free mobile app to calculate vancomycin dosage regimens for inpatients in adult and pediatric patients.
- The app helped in antimicrobial stewardship by optimizing vancomycin dosing.

Exploratory Research in Clinical and Social Pharmacy | Article | February 2022 | [Online link](#)

Prophylactic antimicrobials may not be needed to prevent surgical site infection after skin biopsy: a retrospective study

- Out of 75 cases of punch skin biopsy reviewed, no cases of wound infection were observed in any group.
- Strengthens the evidence to withhold antimicrobials after skin biopsies.

Antimicrobial Resistance & Infection Control | Short report | 16 February 2022 | [Online link](#)

Multicentre point-prevalence survey of antibiotic use and healthcare-associated infections in Ethiopian hospitals

- Using the WHO's standardised PPS methodology, the study assessed the burden of healthcare associated infections and antibiotic use in selected public hospitals of Ethiopia.
- Antibiotic use across the surveyed hospitals was common and most were empiric which has both practical and policy implications for strengthening ASP and promoting rational antibiotics use.

BMJ Open | Original Research | 11 February 2022 | [Online link](#)

Are infants exposed to antimicrobials during the first 3 months of life at increased risk of recurrent use? An explorative data-linkage study

- Of 95 infants exposed to antimicrobials during the first 3 months of life, 23% had recurrent use compared with 14% use in 950 unexposed infants.
- Infants exposed to antimicrobials during the first 3 months of life had an increased risk of recurrent use during early childhood.

Journal of Antimicrobial Chemotherapy | Article | 8 February 2022 | [Online link](#)

A systematic literature review and meta-analysis of community pharmacist-led interventions to optimise the use of antibiotics

- The review found some positive results from pharmacist-led interventions to improve antibiotic use, but they do not seem sufficiently effective in the way they are currently implemented.
- Highlights the need for further research on the subject.

British Journal of Clinical Pharmacology | Meta-Analysis | 2 February 2022 | [Online link](#)

Strategic priority 5: Research, innovations and finance

Progress in alternative strategies to combat antimicrobial resistance: focus on antibiotics

- Reviews the strategies that are being applied or proposed as potential alternatives to traditional antibiotics, including combination therapy, techniques that target the enzymes or proteins responsible for antimicrobial resistance, drug delivery systems, physicochemical methods, and unconventional techniques.
- Several new approaches have been tested to enhance antibiotic efficacy through novel targets and mechanisms that include resistant gene inactivation, silencing, and editing.

Antibiotics | Review | 4 February 2022 | [Online link](#)

Exploiting genomics to mitigate the public health impact of antimicrobial resistance

- Explores how whole-genome sequencing techniques have advanced global, national and local AMR surveillance, and how this understanding is applied to inform solutions, such as novel diagnostic methods to combat AMR.
- Genomic insights have also been applied to facilitate outbreak detection and control, improve diagnostic tests, optimise antimicrobial use, and inform vaccination strategies.

Genome Medicine | Review | 16 February 2022 | [Online link](#)

Interventional research to tackle antimicrobial resistance in low-middle income countries in the era of the COVID-19 pandemic: lessons in resilience from an international consortium

- Summarizes the consequences of the COVID-19 pandemic, on an international AMR project — ASPIRES (Antibiotic use across Surgical Pathways — Investigating, Redesigning and Evaluating Systems).
- Current models for research collaboration and funding need to be critically evaluated and redesigned to retain the innovation that was shown to be successful through this pandemic.

Interventional Journal of Infectious Diseases | Journal Pre-proof | 9 February 2022 | [Online link](#)

Different nanotechnology approaches for ciprofloxacin delivery against multidrug-resistant microbes

- Antibiotic delivery with nanoparticles results in improved bioavailability by enhancing aqueous solubility, increasing residence time in the body, and targeting specific site of action.
- Ciprofloxacin–nanoparticle conjugation, ciprofloxacin nanoencapsulation, loading ciprofloxacin in liposomes, and polymeric nanoformations are among the different promising nanotechnology-based approaches to overcome ciprofloxacin resistance.

Infection and Drug Resistance | Review | 5 February 2022 | [Online link](#)

Multiple roles of ribosomal antimicrobial peptides in tackling global antimicrobial resistance

- Provides an overview of the potential and recent advances in the research and development of antimicrobial peptides to resolve the current global crisis of AMR.
- Diverse origins and mechanisms of action of natural antimicrobial peptides can be favourable for developing alternative antimicrobial agents.

Royal Society Open Science | Research Article | 26 January 2022 | [Online link](#)

Strategic priority 6: Collaborations

WHO implementation handbook for NAP-AMR: guidance for the human health sector

- Provides practical steps to implement national action plans on AMR within human health sector.
- Includes existing WHO tools to prioritize, cost, implement, monitor and evaluate national action plan activities, including annexes on SWOT, stakeholder analysis, and templates for operational plan.

WHO | Guidance | 28 Feb 2022 | [Online link](#)

AMR Industry Alliance Progress Report

- Reflects on collective achievements from the life sciences industry to minimize the spread of AMR
- Findings from the leading coalition of biotechnology, diagnostics, generic and large research-based pharmaceutical companies indicate continued focus and leadership from the life sciences sector.

AIA | Report | February 2022 | [Online link](#)

One Health, One Hive: a scoping review of honey bees, climate change, pollutants, and antimicrobial resistance

- Honeybees are a model One Health organism to investigate interactions between climate change and AMR.
- Review identified key themes and gaps in the literature, including the need for future interdisciplinary research to explore the link between AMR and environmental change evidence streams in honey bees.

Plos One | Research Article | 16 February 2022 | [Online link](#)

Antimicrobial resistance in Brazil: an integrated research agenda

- The Brazilian national action plan on AMR recognizes the need for a multidisciplinary and multisectoral approach to AMR.
- Reviews the potential ramifications of the One Health approach to AMR research in Brazil – including practices of prescribing and dispensing antibiotics by professionals, analysis of antibiotic use from the point of view of health services users, and reflection on the political agenda to fight AMR.

Journal of School of Nursing | View Point | 16 February 2022 | [Online link](#)

Assessing transparency and accountability of national action plans on antimicrobial resistance in 15 African countries

- Results show that most countries have published their AMR national action plans and number of countries sharing their AMR surveillance data is slowly increasing.
- Provides concrete policy recommendations on how transparency and accountability may be improved.

Antimicrobial Resistance & Infection Control | Research | 24 January 2022 | [Online link](#)

Antimicrobial resistance: the 'other' pandemic!

- Areas of greatest concern for India is the epidemic of MDR and XDR tuberculosis and resistance in gram-negative pathogens.
- Carbapenem use is driven by the alarming rates of ESBL producing Enterobacterales in both community and healthcare settings, and high carbapenem resistance in healthcare associated gram negative infections is associated with high mortality.

Indian Journal of Pediatrics | Review Article | 22 January 2022 | [Online link](#)