

*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 12

- India's country profile from the 6th Tracking AMR Country Self-assessment Survey 2022
- Global antimicrobial resistance and use surveillance system report 2022
- Delhi network for surveillance of antimicrobial resistance
- WHO AWaRE antibiotic book and infographics
- First Fungal Priority Pathogens List
- Case series of country experiences in sustaining action against AMR

Strategic priority 1: Awareness and understanding

Antimicrobial resistance TrACSS India 2022 country profile

- India country profile from the sixth Tracking AMR Country Self-assessment Survey (TrACSS).
- Also includes trends of TrACSS responses over the last 5 years, across sectors.

WHO | Technical document | 31 October 2022 | [Online link](#)

The global mortality associated with 33 bacterial pathogens in 2019: a systematic analysis for the Global Burden of Disease Study 2019

- This global study derived mortality associated with 33 common bacterial pathogens across 11 infectious syndromes, for 204 countries and territories.
- The study found 13.6% of all global deaths to be associated with the 33 pathogens, over 50% deaths were caused by 5 pathogens - *Staphylococcus aureus*, *Escherichia coli*, *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*.

Lancet | Research article | 17 December 2022 | [Online link](#)

A pocket guide for ministers across sectors

- This handy AMR guide for policy makers provides clear information on AMR, including potential health and economic impacts, as well as suggested actions by ministers of different sectors and additional resources.
- Also useful for other relevant ministries and relevant authorities and policy makers based on country-specific arrangements.

Global Leadership Group on Antimicrobial Resistance | Technical document | 1 November 2022 | [Online link](#)

Animal health and welfare and antimicrobial resistance and use

- Provides guidance on strengthening animal health systems, animal welfare and rational use of antimicrobials.
- The target audience is people working in a range of animal and food-related industries, including veterinarians and allied veterinarian professionals, food producers, farmers, agronomists, public health inspectors and government officials.

Global Leadership Group on Antimicrobial Resistance | Information note | 28 November 2022 | [Online link](#)

The WHO AWaRe (Access, Watch, Reserve) antibiotic book – infographics

- Actionable guidance document to guide antibiotic prescription practices for various health conditions.
- An infographic is provided for each condition with clinical definition, diagnostic procedures, likely pathogens and treatment recommendations, for both children and adults.

WHO | Technical document | 9 December 2022 | [Online link](#)

Africa regional strategy on antimicrobial resistance communications and advocacy

- SWOT analysis of both AMR risk mitigation and AMR communications across Africa was undertaken to guide the development of a regional strategy on communication for AMR.
- Details key stakeholders and guidelines for effective communication about AMR to different stakeholders.

FAO, UNEP, WHO and WOA | Communication strategy | 6 December 2022 | [Online link](#)

Strategic priority 2: Laboratories and surveillance

Global antimicrobial resistance and use surveillance system (GLASS) report: 2022

- Summarizes 2020 data on AMR, antibiotic consumption (AMC), fungal infections, and One Health from 127 WHO Member States.
- GLASS has successfully enrolled more than half of the world's countries, territories and states, and will support national AMR prevalence surveys in addition to routine surveillance in the next phase.

WHO | Global report | 9 December 2022 | [Online link](#)

Delhi's network for surveillance of antimicrobial resistance: the journey, challenges and output from first year

- Documents the establishment of the AMR surveillance network in Delhi National Capital Region with 24 surveillance sites, from both public and private sectors.
- Despite the COVID pandemic, the report provides antimicrobial susceptibility profiles of 31,463 priority pathogens from urine, blood, pus aspirates and other sterile body fluids in the year 2020.

Indian Journal of Medical Microbiology | Research article | January-February 2023 | [Online link](#)

Systematic review of surveillance systems for AMR in Africa

- Reviews 23 national surveillance systems in Africa to assess countries compliance with recommendations from GLASS and WHO's Global Action Plan on AMR.
- Findings showed improvements in surveillance systems with evidence of true implementation of national action plans on AMR and widely used antimicrobial sensitivity testing (AST); however, inadequate external quality assessment and data reporting protocols is hindering AMR surveillance systems in the African region.

Journal of Antimicrobial Chemotherapy | Research article | 13 October 2022 | [Online link](#)

Trends in carbapenem resistance in pre-COVID and COVID times in a tertiary hospital in North India

- Data from a tertiary care hospital in North India was analysed to compare carbapenem resistance rates during August-October 2019 with those in early 2021.
- Overall carbapenem resistance increased from 23% (pre-COVID) to 41% (COVID period) in *Escherichia coli*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa*.

Annals of Clinical Microbiology and Antimicrobials | Research article | 3 January 2023 | [Online link](#)

An ISO-certified genomics workflow for identification and surveillance of antimicrobial resistance

- Details the development and validation of a new bioinformatics tool – *abritAMR* to detect AMR from bacteria whole genome sequencing (WGS) data, drawing on the NCBI's *AMRFinderPlus*.

Nature Communications | Research article | 4 January 2023 | [Online link](#)

Industrial effluents boosted antibiotic resistance risk in coastal environments

- This article highlights the importance of adopting a One Health lens to AMR by identifying the impact of waste released by wastewater treatment plants as a source of antibiotic resistance genes.

Environment International | Research article | 22 December 2022 | [Online link](#)

Strategic priority 3: Infection prevention and control

Sanitation safety planning – Second edition

- Provides operational guidance for implementation of previous WHO Guidelines on Sanitation and Health and Guidelines for the safe use of wastewater, excreta and greywater in agriculture and aquaculture.
- The target audience includes health authorities and regulators, local authorities, sanitation utility managers, sanitation enterprises and farmers, community-based organizations, farmers associations and nongovernmental organizations.

WHO | Technical document | 18 November 2022 | [Online link](#)

Transforming the care of babies with sepsis

- This multi-country observational study presents a severity score that can be used in neonatal ICUs and informs the design of trials evaluating treatments for neonatal sepsis.
- A quarter of newborns received WHO standard of care (ampicillin and gentamicin), while 15% were prescribed last line antibiotics. Almost 60% of infection-related deaths were due to hospital associated infection, with *Klebsiella pneumoniae* as the most commonly isolated pathogen.
- Highlights the need for countries to develop AMR national action plans and surveillance strategies that explicitly consider infants and children.

Global Antibiotic Research & Development Partnership | Study report | 2022 | [Online link](#)

Innovation for infection prevention and control – revisiting Pasteur's vision

- Includes 878 studies published between 2012-2022 on infection prevention control to review challenges and progress in modern IPC innovations and challenges in the light of 6 key Pasteurian principles.

Lancet | Review article | 17 December 2022 | [Online link](#)

Strategic priority 4: Optimise use of antimicrobials

The WHO AWaRE (Access, Watch, Reserve) antibiotic book

- Provides guidance on antibiotic treatment for 30 common clinical infections in children and adults, in primary health care and hospital setting, and is updated with recent evidence from Essential Medicines List and Essential Medicines Children List and the WHO AWaRE classification of antibiotics.
- The target audience includes health care providers who prescribe and dispense antibiotics.

WHO | Technical document | 9 December 2022 | [Online link](#)

Hospital-based antimicrobial stewardship, India

- In 2017, the Indian Council of Medical Research (ICMR) established a network of 20 hospitals to study the feasibility of implementing an antimicrobial stewardship programme.
- The authors found that institutional support, trained manpower and education were essential for the successful implementation of antimicrobial stewardship programmes.

Bulletin of the World Health Organization | Research article | 9 November 2022 | [Online link](#)

Strengthening antimicrobial stewardship activities in secondary and primary public healthcare facilities in India: Insights from a qualitative study with stakeholders

- The study assessed the national and state level policies in India that could be leveraged to strengthen antimicrobial stewardship activities, through in-depth interviews with policy makers and key stakeholders.
- They found the National Quality Assurance Program and Kayakalp program to be particularly important for strengthening antimicrobial stewardship, especially elements such as infection control, standard treatment guidelines, prescription auditing, and essential medicine lists.
- Incorporation of recommendations from WHO's practical tool kit, ICMR guidelines for antimicrobial stewardship activities, AWaRE classification of antimicrobials, AWaRE antibiotic book and ICMR resources for standard treatment guidelines were suggested to further strengthening the programs for antimicrobial stewardship in Indian healthcare facilities.

Indian Journal of Medical Microbiology | Research article | 13 January 2023 | [Online link](#)

The roles of bedside nurses in Japan in antimicrobial stewardship

- A survey of 400 infection control nurses (ICNs) in Japan suggested that ICN play important roles in antimicrobial stewardship.
- The study recommends expanding the role of ICNs further to include early mobilization care, oral care, UTI prevention care, pressure ulcer prevention care and nutritional status improvement care.

American Journal of Infection Control | Research article | 26 February 2022 | [Online link](#)

Antimicrobial resistance awareness, antibiotics prescription errors and dispensing patterns by community pharmacists in Saudi Arabia

- An online survey of 671 community pharmacists in Saudi Arabia showed good antibiotic dispensing practices among pharmacists.
- Community pharmacists could play a key role in antimicrobial stewardship programs to improve antibiotic dispensing practices among other health care and allied care professionals and help educate the public on proper antibiotic consumption.

Journal of Infection and Public Health | Research article | January 2023 | [Online link](#)

Strategic priority 5: Research, innovations, and finance

WHO fungal priority pathogens list to guide research, development and public health action

- As the first Fungal Priority Pathogens List (FPPL), this is a critical tool to drive research and policy interventions to fight fungal diseases and emerging antifungal resistance.
- A list of 19 pathogens categorized into 3 priority groups (critical, high and medium) has been developed.

WHO | Report | 25 October 2022 | [Online link](#)

The role of bacterial vaccines in the fight against antimicrobial resistance: an analysis of the preclinical and clinical development pipeline

- 94 active preclinical and 61 active development vaccine candidates have been identified against pathogens in the WHO's priority pathogen list along with *Clostridioides difficile* and *Mycobacterium tuberculosis*.

Lancet Microbe | Review article | 14 December 2022 | [Online link](#)

Fighting antibiotic resistance – strategies and (pre)clinical developments to find new antibacterials

- Novel antibacterials are challenging to discover, develop and market, particularly for nosocomial infections.
- The article details the challenges and advancements made and proposes novel strategies, notably for natural product-based discoveries.

Embo Reports | Review article | 9 January 2023 | [Online link](#)

Phage therapy: from biological mechanisms to future directions

- Before penicillin, bacterial infections among humans were treated by phage therapy using bacteriophages – that are natural enemies of bacteria.
- Reviews biological mechanisms, clinical applications and challenges in the current age phage therapy.

Cell | Review article | 5 January 2023 | [Online link](#)

Mucormycosis: a hidden mystery of fungal infection, possible diagnosis, treatment and development of new therapeutic agents

- Mucormycosis or 'black fungus', is common among immune compromised populations and has been recognized as a COVID-19 linked infection.
- Reviews the clinical and epidemiological profiles of mucormycosis, including patient case studies, diagnosis approaches and available antifungals.

European Journal of Medicinal Chemistry | Review article | 15 January 2023 | [Online link](#)

Estimating the economic cost of carbapenem resistant Enterobacterales healthcare associated infections in Singapore acute-care hospitals

- This study quantified the cost of hospital associated infections (HAIs) caused by Carbapenem Resistant Enterobacterales (CRE) and compared it with the cost of carbapenem susceptible HAIs.
- The found that the cost of HAIs due to CRE were considerably higher than carbapenem susceptible infections, with CRE pneumonia being the costliest.

PLOS Global Public Health | Research article | 7 December 2022 | [Online link](#)

Strategy to respond to antimalarial drug resistance in Africa

- This report outlines a strategy based on latest evidence to minimize the threat and impact of antimalarial drug resistance in *Plasmodium falciparum* parasites in Africa.
- Outlines the drivers of emergence of antimalarial resistance in *P. falciparum* and practical intervention to be implemented at global, regional and country level for mitigation (which include 4 pillars and 20 interventions).

WHO | Global strategy | 18 November 2022 | [Online link](#)

Strategic priority 6: Collaborations

Sustaining action against antimicrobial resistance: a case series of country experiences

- Documents country experiences in developing and advancing NAPs and applying WHO Costing and Budgeting Tool for NAPs to assist government ministries to cost the NAP, prioritise AMR activities and mobilise resources.

WHO, World Bank | Policy report | 2022 | [Online link](#)

FAO-OIE-WHO One Health approach to AMR mitigation and safer food in the Asia-Pacific Region

- Outlines best practices, challenges and next steps for advancing national action plans (NAPs) for AMR by strengthening multisectoral AMR strategies in the Asia Pacific Region.
- Highlights the importance of functional multisectoral groups, implementation of NAPs, enforcement of regulations on antimicrobial usage in all sectors, safe disposal of antimicrobials and strengthening surveillance.

FAO, OIE, WHO | Meeting report | 24 August 2022 | [Online link](#)

A 'whole of United Nations approach' to tackle antimicrobial resistance? A mapping of the mandate and activities of international organisations

- 78 international organizations, 21 AMR specific activities and 36 AMR sensitive activities were mapped.
- Highlights the need for expanded global governance for AMR, under the leadership of the Quadripartite.

BMJ Global Health | Research article | 8 May 2022 | [Online link](#)

Responding to outbreaks of antimicrobial-resistant pathogens in health-care facilities: Guidance for the Western Pacific region

- Step by step guidance for responding to AMR outbreaks in health care settings in the Western Pacific region.
- Target health care workers including, clinicians, IPC focal point, laboratory scientists, microbiologists, epidemiologists, and policy-makers.

WHO | Guidelines | 13 October 2022 | [Online link](#)

Driving multisectoral antimicrobial resistance action in South America: lessons learned from implementing an enhanced tripartite AMR country self-assessment tool

- A Tripartite-European Union collaboration project "Working Together to Fight AMR" was launched in 2020 in 7 Latin American countries to advance national action plans (NAPs) on AMR, which developed a landscape analysis tool complementing the Tripartite AMR Country Self-Assessment Survey (TraCSS) process
- The tool was used to collect information and develop seven priority-informed country workplans inline with the strategic priorities of each country's NAP-AMR.

One Health | Research article | 16 December 2022 | [Online link](#)