Ministry of Health and Family Welfare
Government of India

Compiled report of National Expert Consultations for developing National Action Plan on Antimicrobial Resistance 2.0

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1. Introduction

Past few years have seen many infectious agents becoming difficult to treat with the available-and affordable antimicrobial agents. This phenomenon of antimicrobial resistance (AMR) has been recognized as a major public health challenge to global efforts in controlling infectious diseases. AMR causes significant morbidity, mortality, and economic loss along with a negative impact on the efficacy of modern technological medical and surgical advances, which have focused global attention on combating this scourge.

Recognizing the impact of AMR on human development, the UN General Assembly, and several leading regional and global political platforms have given a call for urgent, concerted, effective, and multisectoral actions based on the One Health approach. FAO-OIE-WHO developed a Global Action Plan on AMR in 2015. In accordance with the call of the governing bodies of these intercountry technical agencies, India developed its National Action Plan (NAP) on AMR for 2017-2021 timeframe.

To continue the nation-wide activities to combat AMR, India has initiated the process of developing the NAP AMR 2.0. The National Centre for Disease Control (NCDC), in collaboration with the WHO Country Office for India and the United States Agency for International Development supported Infectious Disease Detection and Surveillance (IDDS) project, has commenced a series of national expert consultations to develop this NAP 2.0. Accordingly, three consultative expert consultations with focus on the role of human health sector, research sector as well as professional associations and civil society organizations were held in New Delhi in 2022. The programme of work for these three expert consultations can be seen in Annexures I (a), I (b) and I (c) respectively.

Each of the consultation was attended by more than 50 national experts (Annexures II (a), II (b) and II (c) who represented several sectors from National and State levels. Experts from both public and private sectors contributed. The participants included programme managers (national health programs and state AMR action plans), clinicians, microbiologists, public health professionals, health administrators, researchers, veterinarians, academicians, international development partners and several members of the Civil Society Organizations etc.

Following were the broad objectives of the consultations:

1. To undertake SWOT (Strength, Weaknesses, Opportunities and Threats) analyses across various sectors in context of the existing NAP-AMR and beyond as well as proposing the structure and contents of the proposed NAP 2.0.
2. To recommend essential elements of AMR research policy and research agenda of the country under NAP 2.0.
3. To identify research priorities in human health, animal health and environment sectors on diagnostics and technologies relevant to AMR, antimicrobial susceptibility testing (AST), estimation of antimicrobial usage/consumption (AMU), interface between human, animal and environment sectors, discovery and development of new antibiotics and their alternatives.
4. To fill up the identified gaps under the broad umbrella of One Health and suggest additional interventions & activities for NAP 2.0.
5. To suggest mechanisms for engaging private sector at national and state levels, coordination across and within sectors for efficient communication, behavioral changes in antimicrobial prescribers and users, effective Infection Prevention and Control (IPC), and appropriate research and surveillance.

6. To identify important communication and awareness activities for improving appropriate use of antimicrobials
7. To identify major activities from previous NAP that could not be implemented, reasons thereof and recommend solutions to undertake those activities in NAP 2.0.
8. To identify major stakeholders for implementing communication strategy for improving appropriate use of antimicrobials.
9. To document challenges, solutions, and plan for the next 5 years for various critical facets of AMR containment.
10. To draft an operational plan with a M&E component for efficient implementation of NAP 2.0.

2. National Expert Consultations

2.1. Human Health Component

Inaugural Session

The consultation was inaugurated by **Prof (Dr.) Atul Goel**, Director General of Health Services, Ministry of Health & Family Welfare, Government of India. Prof. Goel appreciated the initiative of formulation of NAP 2.0 and pressed upon the need for improving behavior of the antibiotics prescribers and consumers to assure rational use of this critical resource. He also showed concern regarding the abuse of antibiotics during the COVID-19 pandemic. Emphasizing the judicious use of antibiotics to contain AMR, he discussed on the approach of going back to the older antibiotics that haven't been used in decades to treat infectious diseases due to multidrug-resistant organisms. Advocacy with antibiotics prescribers was critical to bring about a change in their behavior.

Prof (Dr) Atul Goel, DGHS delivering the keynote address during the inauguration

In the inaugural session **Dr. Sujeet Kumar Singh,** the then Director, NCDC, elaborated on the importance of a planned approach to address the problem of AMR**. Ms. Payden**, Deputy WHO Representative, India informed about the collective support being provided by the WHO in strengthening the national response to AMR. **Dr. Reuben Swamickan**, Chief, Division of Tuberculosis and Infectious Diseases, USAID, India highlighted the need to strengthen the health systems to combat the spread of AMR, in an equitable and responsible manner.

Technical Session

The inaugural function was followed by a technical session wherein the nodal persons from NCDC, Indian Council of Medical Research (ICMR), representatives from three states each with respective state AMR control action plan (Kerela, Delhi and Madhya Pradesh) and, international funding partners presented their achievements and commitments in the field of AMR. The session was chaired by Dr. Rajesh Bhatia, Senior Advisor, AMR, IDDS and former Director Communicable Diseases, WHO Regional Office for South-East Asia and Dr. Sunil Gupta, Principal Consultant, NCDC.

Dr. Lata Kapoor, Joint Director, NCDC provided a brief outline of the work done under the auspices of NCDC and the lessons learnt during the implementation of NAP-AMR (2017-2021). The Ministry of Health and Family Welfare, Government of India (MoHFW) had designated NCDC as the National Coordinating Centre for AMR Surveillance in July 2017. She informed about the National Programme on AMR Containment being coordinated by NCDC and the establishment of the National AMR Surveillance Laboratory network (NARS NET) in a phased manner for monitoring AMR trends. She urged for the requirement of dedicated funding for NAP-AMR activities within each sector, support required by states to develop of state action plans and frequent consultations (six monthly) of intra-sectoral and intersectoral experts to review progress of NAP AMR implementation.

Activities undertaken/coordinated by the ICMR were presented by **Dr. Kamini Walia,** Scientist G, Division of Epidemiology and Communicable Diseases ICMR. She emphasized on the importance of Antimicrobial Stewardship (AMS) and listed the 30 hospitals and the stand-alone labs that are part of the ICMR AMR Surveillance network. Dr. Kamini highlighted the challenges in the implementation of AMS programme like the lack of reliable information systems in hospitals, over-representation of tertiary health care data and selection bias of available microbiology laboratories. She concluded by re-emphasizing the engagement of civil society, the need for investments, new indigenously developed diagnostics, and stringent regulations for antimicrobial use.

Technical session with program managers and international development partners

Dr. Aravind R, Assistant Professor and Head of the Department of Infectious diseases, Govt. Medical College, Thiruvananthapuram, Kerala briefed on the various Information, Education and Communication (IEC) activities done under the aegis of the state action plan to spread awareness about AMR among students, farmers, and civil society in addition to healthcare personnel.

Dr. Ravindra Aggarwal, Additional MS & Chief coordinator AMR, Lok Nayak Hospital, New Delhi shared the challenges faced during the drafting and implementation of the Delhi SAP-CAR like limited engagement of non-human sectors like veterinary, environment, and food, community mobilization, and rampant misuse/abuse of antibiotics during the COVID-19 pandemic. He further mentioned that the COVID-19 pandemic had severely impacted the implementation of the state action plan with the diversion of resources. He also elaborated upon the achievements of the Delhi SAPCAR.

Dr. Deepti Chaurasia, Professor and Head, Department of Microbiology, Gandhi Medical College, Bhopal presented the status of the state action plan of Madhya Pradesh. She highlighted the achievements made so far by the state of Madhya Pradesh and the key challenges being faced in the formulation and execution of the state action plan.

Dr. Daniel Vanderende, Medical Officer US CDC, summed up their recent contributions and future commitments to the fight against AMR in India. He discussed about the magnitude of the threat of AMR in the country and how the US CDC is strongly committed to providing support to various sectors for ongoing and future planned activities focused on the One Health approach.

Dr. Reuben Swamickan, Chief, Division of Tuberculosis & Infectious Diseases, USAID, India provided information on USAID supported activities to assist India in responding to the challenge of AMR. He stressed the necessity to take a "One Health" approach with integrated actions across human, animal, and environmental health sectors to adequately address AMR.

Dr. Suresh K Mohammed, Senior Health Specialist, World Bank, highlighted the work being done by the World bank in the field of AMR. He emphasized the World Bank's commitment to collaborate with organizations, donors, and country partners to support in improving awareness and surveillance of AMR in the country.

Dr. Vikas Aggarwal, Regional Coordinator, South Asia, Fleming Fund, shared the work done by Fleming fund towards strengthening laboratory capacity, collating data, and operationalizing the surveillance of AMR and Antimicrobial Usage (AMU) through a 'One Health' approach.

Dr. Sunil Gupta, Principal Consultant, NCDC stressed the importance of state action plans in the battle against AMR considering health is a state subject. He further emphasized that due consideration should be given to the respective strengths and weaknesses of each state while designing and customizing their State AMR action plan.

Dr. Rajesh Bhatia appreciated the work already done through NCDC and ICMR on various aspects of surveillance and control of AMR. He emphasized the need to accelerate and expand these tasks to achieve the desired objectives.

2.2. Research Component

Inaugural session

The meeting was inaugurated by **Dr. Rajesh Gokhale,** Secretary Department of Biotechnology. While underscoring the importance of AMR in his inaugural address, Dr. Gokhale emphasized the significance of research and innovation in addressing challenge of AMR. Quoting widely from the recent literature, he demonstrated the potential role of various new molecules that can culminate in the development of affordable new antibiotics or their alternatives. He cited the tremendous role played by the Indian SARS-CoV-2 Genomics Consortium (INSACOG), which was jointly initiated by the Union Health Ministry, and Department of Biotechnology with the Council for Scientific & Industrial Research (CSIR) and ICMR. Dr. Gokhale stressed the importance of similar harmonized nationally coordinated activities for successful development of tools and actions to combat AMR mainly in those pathogens which are of priority in India. He urged for a multifaceted action against AMR including development of alternatives and vaccines using the existing resources, infrastructure, and expertise available within the country.

Dr. Rajesh Gokhale, Secretary, Department of Biotechnology delivering the inaugural address

Speaking at the inaugural function, Dr. **Amit Shah** Deputy Director, Health Office, USAID India urged to replicate the coordinated efforts that were launched during the COVID-19 pandemic and optimally utilize the existing tools and resources. **Dr. Roderico H Ofrin**, WHO Representative in India elaborated about the collaborative efforts of FAO-WOAH-WHO and UNEP under their quadripartite initiative against AMR and **Dr. Sujeet Kumar Singh**, Former Director and Principal advisor, NCDC advocated an integrated and well-coordinated approach within the ambit of One Health. He stressed the need to engage private sector and professional associations who are primarily involved in prescription of antibiotics and that greater focus should be accorded to create awareness amongst communities (including farmers), professionals and the private sector.

The common thread that ran through the thoughts of all dignitaries was that though AMR has multitude of challenges, there is enough scope to find solutions to these through research that is appropriate and affordable in Indian context.

Technical Session

The technical session was chaired by **Dr. Rajesh Bhatia** and **Prof. Niyaz Ahmed**. Dr. Sunil Gupta, NCDC; Dr. Kamini Walia, ICMR; Dr. Shirshendu Mukherjee, BIRAC -DBT; Dr. Anuj Sharma, WHO and Dr. Naresh Goyal, NDRI

ICAR made very informative presentations highlighting work done in India during NAP (2017-2021) especially in surveillance, IPC, AMSP, research on diagnostics and support to build research capacity.

Technical session on setting the scene for the consultation on AMR

Dr. Sunil Gupta, Principal Consultant, NCDC traced the history of antibiotic discovery and development of resistance. Citing the higher mortality and economic impact, he explained in detail about why AMR is such an important public health and human development issue. He also briefed the gathering regarding the contributory factors and challenges being faced currently in India in containing AMR. Dr. Gupta described the key milestones that have been achieved during the tenure of NAP (2017-2021). He highlighted several initiatives in India to counter indiscriminate use of antimicrobial agents. These included the Red Line campaign for 24 H1 schedule drugs, ban on numerous fixed drug combinations (FDCs) and use of colistin in veterinary sector. Limited regulatory enforcement has restricted the response from these initiatives. He commended the work done through the national and state surveillance networks. The national network for Hospital Associated Infection Surveillance (HAIS) coordinated by AIIMS and ICMR under the Indo-US collaboration was also highly appreciated. He also apprised the experts about the FSSAI regulations like notification of maximum residual limits (MRLs) for 103 antimicrobials and banning use of 19 antibiotics in various animal source foods done by FSSAI in 2018. He further highlighted the achievements of ICMR, ICAR, DBT, AYUSH in terms of research and innovations for newer alternatives to antimicrobials. Development of an implementable NAP 2.0 with One Health perspective along with strengthening of IPC and AMS Programme in the country was suggested by him as the way forward.

Dr. Kamini Walia, Indian Council of Medical Research (ICMR) asserted that the evolution of antibiotic resistance is a consequence of selective pressure and that the exorbitant use of antibiotics across all sectors (human health, animal health, agriculture, pharmaceutical industry etc.) has contributed to the menace of AMR. She called upon appropriate investment in AMR containment and in establishing strong quantifiable economic linkages. Dr. Walia further elaborated upon achievements of ICMR on AMR surveillance in tertiary care hospitals, infection prevention and control (IPC) systems and antimicrobial stewardship programmes (AMSP). She discussed the results of the AMR surveillance carried out by ICMR and shared her concern regarding the rapidly growing multidrug resistance in several common pathogens that cause infections in hospitals and communities. She highlighted various limitations faced during the surveillance activities like sampling bias, selection bias of data from microbiology lab, lack of data regarding estimated papulation in the catchment area, limited correlation with antimicrobial usage, human resource requirements etc. Dr. Walia further elaborated on an ICMR study where the total cost of treating a resistant infection in a government hospital was compared and found to be much higher than a non-resistant infection. She stressed on the importance of diagnostic

stewardship. Prioritising research for innovative solutions and generating adequate evidence to influence policy makers was suggested as the way forward.

Dr. Shirshendu Mukherjee, Mission Director DBT-BIRAC, called upon a wholesome approach wherein all sectors perform a landscape analysis on the country's requirements and are engaged in developing all categories of products that can be utilized. These products include vaccines, therapeutics and newer diagnostics. He discussed about the various alternative treatment options currently under research. He further elaborated that BIRAC has been supporting various research studies and start-ups in area of AMR directly or through National Biopharma Mission. Grand Challenges India-BIRAC announced a joint call on AMR with funding support from DBT and the Bill and Melinda Gates Foundation (BMGF) to address challenges in tackling AMR in India and in comparable geographies like Brazil, South Africa, and few African countries. Moreover, the capacity of Indian researchers is being enhanced to enable them for competing in global set-up. For converting research outcomes into usable action, several sites are being developed for undertaking clinical trials as per the regulatory norms of the country. Dr. Mukherjee informed about the establishment of the Global Health Research India Unit at Kempegowda Institute of Medical Sciences, Bengaluru, which aims to provide intelligent global surveillance of bacterial pathogens using whole genome sequencing through appropriate sampling and analysis. The initiative is aimed at building genomic surveillance capacity in low and middle-income countries. He urged that India needs to establish an innovation ecosystem for curbing AMR.

Dr. Anuj Sharma, WHO Country Office, India highlighted that supporting and promoting research on health is a mandate of WHO and hence, it has also been included as an important component of the Global Action Plan on AMR. He added that WHO has been partnering with various organizations in promoting research on AMR. For instance, supporting the Global Antibiotic Research & Development Partnership (GARDP) which aims to develop five new treatments/antibiotic molecules by 2025 to fight drug-resistant infections. He referred to WHO's leadership in developing global norms and standards, including revisions to the WHO List of Critically Important Antimicrobials. Discussing about the lack of adequate evidence base especially in low- and middle-income countries (LMICs) being the problem, he proposed some key objectives. These include prioritizing research questions regarding AMR health policies and evidence-based NAP-AMR interventions as well as catalyzing investment and interest among scientific community and donors to translate research into action.

Dr. Anuj proposed that the AMR Research Agenda may have the following steps: scoping review of published research questions, deduplication and categorization of research questions into research avenues, expert group reviews the list and proposes additional questions, open consultation to generate additional questions, deduplication and consolidation, expert group scores the questions based on pre-defined scoring criteria, final list of priority research questions, dissemination through reports and scientific publications, M&E plan to monitor use and uptake of priority questions, and translating questions into action (Strategic group). He added that targeting India specific priority pathogens as identified in WHO-DBT meeting, overcoming existing resistance, addressing the public health need, making these drugs available to all, and preserving the effectiveness through stewardship are the key steps for development and optimal use of antimicrobials.

Dr. Naresh Goyal, Principal Scientist, National Dairy Research Institute (NDRI), Indian Council of Agricultural Research (ICAR) spoke about the need of point-of-care (POC) diagnostics for instituting appropriate antimicrobial

therapy in bacterial diseases. He enumerated the challenges related to livestock diseases, diagnostics and food safety, including emergence of new/unknown pathogens in livestock/food products, changing profile of livestock diseases, lack of advanced diagnostics etc. He further discussed about zoonotic pathogens and their outbreak links with livestock products leading to global issues of AMR. He shared information on rapid, sensitive and affordable POC systems developed at NDRI for the diagnosis and proper management of mastitis in cattle. Dr. Goyal said that despite several challenges in fighting AMR in India, huge resources and expertise are available within the country which needs to be harnessed to obtain reliable and affordable products. There is a need for National/International collaboration between animal, human & environment sectors to implement "Diagnostic One Health Solution" for early detection of livestock diseases, zoonotic pathogens to mitigate AMU and AMR and to ensure food safety. POC sensors developed in the country need to be approved by the Regulatory agency / Ministry for their field application for early diagnosis/ monitoring and should be one of the agenda in strategic action plan for One Health Approach on AMR. Development of novel biosensors using different biomarkers through effective collaboration between institutes under animal health, human health and environment ministry as a part of NAP AMR is the way forward.

Dr. Rajesh Bhatia concluded that all the sessions reflected the ground reality of research and innovation in AMR and that we are posed with a plethora of challenges. There is a need to translate these challenges into a research agenda. He stated that the country has sufficient resources and infrastructure to develop solutions to these challenges. He highlighted the need to adopt the one health approach and stressed upon the need to collaborate with social scientists as it would pave way for public engagement.

2.3. Professional Associations & Civil Society Organizations Component

Inaugural Session

The meeting was inaugurated, on behalf of Prof (Dr.) Atul Goel, Director General Health Services, Ministry of Health and Family Welfare, Government of India, by **Dr. Sujeet Kumar Singh,** Principal Advisor to DGHS and former Director NCDC. Dr. Singh compared the current status of AMR to that of a silent pandemic impacting entire world. He added that COVID-19 pandemic saw extensive misuse and overuse of antibiotics primarily because of lack of knowledge about what will work against the novel virus. Dr. Singh further advocated the need for cross-sectoral sharing of information and learning from each other. Apart from training the antibiotic prescribers, he requested the experts for committed evidence-based action to combat AMR. Dr. Singh opined that the professional associations have a unique public private partnership model that can bring the best from all parts of the country in mitigating AMR. Expertise available within the professional associations can be harnessed for strengthening IPC, Antimicrobial Stewardship Programme (AMSP) and rational use of antibiotics. He stressed on the importance of engaging communities through active partnership with the civil society organizations for promoting rational use of antibiotics which requires a behavioural change in communities.

Dr. Sujeet Kumar Singh delivering keynote address

The other dignitaries who graced the inaugural ceremony were **Ms. Sangita Patel** Director, Health Office, USAID India, who highlighted the importance of advocacy and community engagement for efficient execution of plans in achieving the objectives; **Ms. Payden**, Deputy WHO Representative to India, who highlighted WHO's support to the states in containing AMR and urged to link NAP 2.0 with various other national missions and initiatives that have a bearing upon sanitation, hygiene, IPC etc. to reduce the burden of AMR. ; President of the Indian Association of Medical Microbiologists (IAMM), **Prof (Dr.) Arti Kapil** who expressed the need to generate community-level data for accurate estimation of AMR in the country and articulated the requirement of state specific guidelines as well as harmonization of IPC, AMSP and diagnostic stewardship activities in health care facilities; **Dr. V. Ramasubramanian**, President, Clinical Infectious Diseases Society of India, who reiterated the importance of community engagement for behavioural change towards rational use of antibiotics.

Technical Session

The technical session was chaired by **Prof (Dr.) Arti Kapil** and **Dr. V. Ramasubramanian**. Dr. Lata Kapoor, NCDC; Dr. Kamini Walia, ICMR; Prof (Dr.) Purva Mathur, AIIMS; Dr. Anuj Sharma, WHO India; Mr. Sadique Ahmad, UNICEF and Dr. Aruna Sharma, Department of Animal Husbandry and Dairying, Government of India delivered informative presentations highlighting the work done in India during the term of NAP AMR (2017-2021).

Technical session on setting the scene for the consultation on AMR

Dr. Lata Kapoor, Additional Director, NCDC described the key milestones that have been achieved during the tenure of NAP AMR (2017-2021). While sharing the journey of the national response for containment of AMR, she discussed about the various developments like the setting up of an AMR task force in 2010, adoption of the National Policy for AMR Containment and Jaipur Declaration signed by the SEAR health ministers in 2011, release of treatment guidelines for infectious diseases in 2016 as well as the launch of NAP AMR in April 2017 and the Delhi Declaration signed by union ministers. She briefly summarized achievements made under each of the six pillars of NAP AMR. These included the various IEC media resources developed by NCDC, the World Antimicrobial Awareness Week (WAAW) activities, two national AMR surveillance networks coordinated by NCDC and ICMR, HAI surveillance network coordinated by AIIMS-ICMR, national training of trainers for IPC, CDSCO and FSSAI regulations regarding use of antimicrobials in humans, animals and food (ban on use of colistin in the veterinary sector). She informed about the national and international collaborations on AMR. She enumerated the challenges in implementation of NAP AMR like inadequate prioritization of AMR at state level, limited engagement of professional associations and community. Dr. Kapoor advocated stronger multisectoral collaboration for engaging community through various civil society organizations and professional associations in both human and animal sectors to rapidly move forward in combating AMR in India. She stressed that a dedicated funding for AMR activities within each sector, a national IPC programme/action plan and an integrated research agenda targeting AMR transmission dynamics, diagnostics, therapeutics, and vaccines is the way forward towards containment of AMR.

Dr. Kamini Walia, Indian Council of Medical Research (ICMR), enumerated several causes of the rising trends of AMR in India citing increased antibiotic consumption to be the single most important risk factor for emergence and spread of resistant bacterial strains. She highlighted the poor doctor to patient ratio, limited availability of diagnostics

and healthcare personnel, practitioners of alternate systems, self-medication, availability of Over-The-Counter drugs and inappropriate Fixed Drug Combinations (FDCs) as well as limited implementation of H1 schedule as some of the reasons which have been contributing towards the worsening trends especially in India. Studies targeting the antibiotic use in India were shared depicting significant rise in antibiotic sales especially during the COVID-19 pandemic. Dr. Walia further briefed the experts on initiatives undertaken by ICMR in building national capacity in various aspects of AMR containment. She elaborated upon achievements of ICMR in AMR research and surveillance in tertiary care hospitals, both in government and private sector, which includes genotypic surveillance in addition to phenotypic characterization, as well as capacity building for AMSP.

Dr. Walia called upon appropriate investment in AMR containment and in establishing strong quantifiable economic linkages with impact of AMR. Based on the ICMR surveillance data, she raised her concern regarding the rapidly growing multidrug resistance in several common pathogens that cause serious infections. She urged that AMSP should be made a mandatory part of all hospitals. Guidance documents should be made on AMSP and HIC and frequent audits should be performed to ascertain implementation of the guidelines. Further, she proposed the establishment of Infectious Diseases departments and availability of clinical pharmacists in healthcare institutions.

Prof (Dr.) Purva Mathur, All India Institute of Medical Sciences, New Delhi presented the work done by the network for surveillance of hospital associated infections (HAI) in terms of data collection and quality improvement. To achieve the objectives of the aforesaid network on HAI, extensive capacity building exercises have been undertaken in collaboration with NCDC, ICMR and US CDC. She emphasized that understaffing, staff attrition, lack of a dedicated infection control nurse and data entry operator were few of the challenges being faced routinely at the network sites. To strengthen IPC, stringent efforts have been made to improve the engineering component and skills of human resource. Prof. Mathur emphasized that COVID-19 gave us many valuable lessons in IPC which must be leveraged upon. Hand hygiene and screening of staff as well as prevention of cross-patient transmission of infections are critical components of any programme for containing drug resistant pathogens. She elaborated the bundle-based approach for prevention of device-related infections in hospitals. She also presented data of a healthcare facility showing rise in *Klebsiella* infections when hand hygiene was compromised in intensive care units (ICUs). Apart from education and skills components of IPC, Prof. Mathur opined that IPC was also a behavioural issue that needs to be addressed vigorously and that a National IPC Programme is the way forward.

Dr. Anuj Sharma, WHO Country Office, India, mentioned that providing leadership on matters critical to health and engaging in partnerships where joint action is needed is a core function of WHO. Supporting AMR containment to counter this public health challenge is a priority at the global, regional and country office level. WHO has been partnering with various organizations including NCDC in promoting activities on AMR. As a part of the quadripartite initiative between FAO-OIE-WHO-UNEP, AMR containment initiatives are being expedited.

WHO has supported four Indian states in the formulation of their respective state action plans and is also supporting three state AMR surveillance networks. In partnership with the Department of Biotechnology, a list of priority pathogens has been developed recently. WHO is partnering with India AMR Innovation Hub which has been established through the office of Principal Scientific Advisor to the Prime Minister. Dr. Anuj informed that WHO has been collaborating with several civil society organizations e.g., Centre for Science and Environment, ReAct and Indian Veterinary Association (Kerala) etc. and has been supporting the organization of various workshops pertaining to AMR and guidance to states on the development of State Action Plans. He further mentioned about the role of WHO in capacity building

activities pertaining to IPC throughout the country. He concluded his talk stressing on the fact that AMR is a concern for everyone and hence, all should work towards preventing it together.

Mr. Sadique Ahmad, UNICEF, India, deliberated upon the process of amending the behaviour of the communities to bring about a change towards rational use of antibiotics. He enunciated broad principles of the behaviour-change process which has interlinked components of awareness, desire, knowledge (and skill), efforts (trial and maintenance), motivation and provision of an enabling environment on a sustained basis at individual and community levels. He elaborated on the socio-ecological model which forms the basis of the social and behaviour change communication as individual behaviours are influenced by several ecologies surrounding them. While explaining the concepts of Social and Behavioural Change Communication (SBCC) in detail, he said that SBCC means communicating to change or positively influence social norms in support of long-term, sustainable behavior change at the population level. It works at the Individual, Interpersonal, Community, Organization and Policy level to create an enabling environment for change. Interpersonal communication, community meetings, mid-media including street plays and social media are few of the communication approaches that may be used.

Mr. Sadique informed that this model has been extensively used in India for campaigns on polio, measles and rubella vaccinations. He stressed that community behavioural changes require long term and dedicated efforts at the grass root level and that it is prudent to engage community leadership from the planning phase of initiative. Further, interventions designed should be socially and culturally acceptable.

Dr. Aruna Sharma, Department of Animal Husbandry and Dairying (DADH), Government of India spoke about the AMR mitigating activities undertaken by veterinary sector in India. As per current regulations, only qualified and registered veterinarians can prescribe antibiotics for treating animals. For minor illnesses, paravets may prescribe treatment but only under the supervision of registered veterinary practitioners. She added that a limited enforcement of regulatory mechanism pertaining to use of antibiotics in the country is a major challenge in containment of AMR.

She informed that in collaboration with the Indian Council of Agricultural Research (ICAR) and the Food and Agriculture Organization (FAO) of the United Nations, DADH has drafted the animal health component for NAP 2.0 and submitted it to the Ministry of Health and Family Welfare (MoHFW). DAHD has issued several guidelines and manuals for controlling diseases in animals. The Government of India is providing financial support and technical guidance to all Indian states/UTs under Livestock Disease and Health Programme.

Dr. Sharma briefed on the first ever AMR surveillance in the animal health sector in India (Indian Network for Fishery and Animal AMR-INFAAR) that has commenced generating quality surveillance data. Six regional diagnosis and reference laboratories, apart from eight other leading veterinary institutions shall soon be a part of INFAAR thereby, increasing reach of the network making it a pan India network. The network shall soon commence estimation of antimicrobial use at farm levels. She concluded by saying that though AMR is a complex issue, it can be solved through the One Health approach.

Group photograph of National Experts who deliberated on drafting of Human Health component of NAP-AMR 2.0

Group photograph of National Experts who deliberated on drafting of Research component of NAP-AMR 2.0

Consultation of National Experts from Professional Associations and Civil Society Organizations to provide inputs for developing NAP-AMR 2.0

3. Outcomes of Group Works

The guiding principles from the presentations by experts in the first technical session were converted into actionable points in three Group Works by three expert groups which discussed SWOT analyses and governance mechanism, operational plan and a M&E plan.

3.1. SWOT Analysis

The groups performed an extensive Strength, Weakness, Opportunities and Threat (SWOT) analyses on the relevant priorities of the NAP AMR (2017-2021). The recommendations from the deliberations have been compiled and will be taken into consideration during the development of the NAP 2.0.

Strategic Priority 1: Improve awareness and understanding of AMR through effective communication, education and training

Strategic priority 2: Strengthen knowledge and evidence through surveillance

Strategic priority 3: Reduce the incidence of infection through effective infection prevention and control

Strategic priority 4: Optimize the use of antimicrobial agents in health, animals and food

Strategic priority 5: Promote investments for AMR activities, research and innovations

STRENGTH

- AMR has been prioritized by Govt of India
- Individual agencies have allocated funds for AMR activities within their mandate
- Existing national and international funding for containment of AMR
- Expertise and infrastructure is available. Eg. ICMR, DBT, ICAR, DST, CSIR and other PSU's can undertake AMR related research
- Indigenous efforts in place to innovate new drugs and diagnostics
- Some progress towards development of alternative drugs by AYUSH
- Capacity to develop research agenda and priorities exists
- Efforts in place to encourage research for evidence informed policy making e.g.: Treatment guidelines
- Well- equipped government institutions with adequate resource for sequencing facilities.
- Inter-disciplinary expertise in material science, chemistry, physics, mathematics, biophysics.
- Capacity building for AMSP initiated
- DBT's Mission AMR prioritises the Indian priority pathogens.
- Repositories of various pathogens exist in IMTECH, NICED, NCMR, ICAR
- ICMR and ICAR have a MOU for AMR and zoonoses.
- Surveillance networks are functional at national health level (2), state level (3), veterinary (1) with databases on resistance patterns.
- DBT-BIRAC tech transfer offices for translational capacity building (7 regional centres)

WEAKNESS

- Limited funding for multisectoral projects requiring intersectoral collaboration
- Limited interagency collaborations
- No single task force/advisory group to guide research in AMR to avoid duplication
- Absence of supportive, specific regulatory framework to innovate new drugs and diagnostics
- Lack of guidelines on product development for alternative approaches in traditional systems of medicine
- Limited progress towards a national AMR research agenda
- Lack of evidence in area of transmission dynamics/transmission pathways of AMR among humans, animals, food, and environment
- Low awareness and sensitization on funding initiatives
- Limited awareness on procedures for optimal utilisation of existing AMR repositories
- Research and innovation on antimicrobial alternatives not adequately promoted
- Lack of clear-cut pathways for translation of indigenous drugs and diagnostics into healthcare system

OPPORTUNITIES

- Initiatives by CSIR, DBT, ICMR, DST and start-up ecosystems to innovate new medicines and diagnostics
- Sensitization towards integrative approach and traditional systems of medicine to tackle AMR
- Harness national research capacity in various public and private sectors
- Availability of adequate data to guide policy making
- Develop network with existing stakeholders with expertise and plan multi-centric studies
- Diagnostics based on genomic data
- Leveraging IT for information sharing on AMR research on a common platform; IT strength of India to be integrated for developing better surveillance and database/repositories
- Make in India initiative to be implemented and enforced for AMR
- AMR therapy with alternative medicines, integrating all streams of alternative medicine
- Research on significance of environmental surveillance of AMR
- Re-purposing of existing antibiotics
- Vibrant start-up sector willing to work in this space
- Research on probiotics/prebiotics and immune boosters

THREAT

- Non-implementation of cross- cutting multisectoral NAP AMR activities in the absence of dedicated budgetary allocation
- Inconsistent funding
- Lack of new drugs, diagnostics, vaccines leading to challenges in containment of AMR
- Delay in approval for new products/innovations
- Poor investment in drug development can lead to long wait for imported drugs
- Lack of good quality affordable diagnostics to support diagnostic stewardship
- Resources to keep the existing AMR research and repositories functional
- Lack of recognition of indigenous technologies for AMR

Strategic priority 6: Strengthen India's commitment and collaborations on AMR at international, national, and sub-national levels

3.2. Group Works

Experts were allotted the task of designing objectives and major activities, implementation mechanism and M&E component for NAP AMR 2.0 and multisectoral linkages. They were asked to suggest guiding principles to develop a practical, implementable NAP 2.0, suggest objectives, and major activities under NAP 2.0, propose mechanism for implementation of activities that are needed to strengthen the outcome of specific objectives (operational plan), specify linkages between sectors and stakeholders for every activity, suggest possible integration with existing health programmes at national, state/UT level and district level, suggested prioritization of proposed activities.

All the recommendations have been compiled and will be utilised for development of NAP-AMR 2.0, Operational as well as Monitoring and Evaluation Plan.

Group Work by Experts

Ministry of Health & Family Welfare
Government of India

Annexure 1(a): Program of Work
National Expert Consultation on the Human Health Component of National Action Plan on AMR 2.0

Venue: The LaLit Hotel, Barakhamba Avenue, Connaught Place, New Delhi-110001

Date: 22-23 June, 2022

Time: 8:30 AM – 5:30 PM

Day 1 (Wednesday, 22 June 2022)		
8:30 - 9:00 AM	**Registration and Tea**	
Time	**Major Activity**	**Principal Speaker**
9:00 – 9:10 AM	Welcome Address	Dr. Sujeet Kumar Singh, Director, National Centre for Disease Control, DGHS, MoHFW
9:10 – 9:20 AM	Remarks	Dr. Reuben Swamickan, Chief, Division of Tuberculosis & Infectious Diseases, USAID India
9:20 – 9:30 AM	Remarks	Ms. Payden, Deputy WHO Representative India
9:30 – 9:50 AM	Keynote Address	Prof (Dr) Atul Goel, Director General of Health Services, MoHFW
9:50 – 10:00 AM	Vote of Thanks	Dr. Lata Kapoor, Joint Director, NCDC
10:00 – 10:15 AM	Tea/Coffee Break and Group Photograph	
Assessment of achievements in recent past for AMR, suggestions for NAP AMR 2.0 and support from international development partner		
10:15-10:20 AM	Introduction: Chairs	**Chairs:** Dr. Rajesh Bhatia, Senior Advisor-AMR, IDDS Dr. Sunil Gupta, Principal Consultant, NCDC
10:20-10:35 AM	NCDC: Dr. Lata Kapoor	
10:35-10:50 AM	ICMR: Dr. Kamini Walia	
	State Action plans:	
10:50-11:00 AM	Dr. Aravind R (KARSAP)	
11:00-11:10 AM	Dr. Ravindra Aggarwal (SAPCARD)	
11:10-11:20 AM	Dr. Deepti Chaurasia (MP SAPCAR)	
	International partners:	
11:20-11:30 AM	USCDC: Dr. Daniel Venderende	
11:30-11:40 AM	USAID: Dr. Reuben Swamickan	
11:40-11:50 AM	World Bank: Dr. Suresh Mohammed	
11.50-12:00 Noon	Fleming Fund: Dr. Vikas Aggarwal	
12:00-12:05 PM	Concluding remarks by chairs	
12:05-12:15 PM	Mechanism of workshop and expected outcomes	Dr. Rajesh Bhatia, Senior Advisor-AMR, IDDS
Group Work 1		

12:15 – 1:30 PM	Undertaking India's SWOT (Strength, Weaknesses, Opportunities and Threats) analyses of its response to challenge of AMR addressing following in context of policy, program, infrastructure, capacity, and community mobilization and proposing structure and contents of the proposed NAP 2.0: • Governance at national and state levels, coordination across and within sectors • To propose coordination mechanism between Union and State Govts and other major stakeholders • To recommend structure of NAP-AMR 2.0 • To identify important activities from previous NAP that could not be implemented and reasons thereof and recommend solutions to undertake the activities • To identify major stakeholders, lead implementers and their salient functions • To delineate role of international development partners • Challenges, solutions, and plan for next 5 years	3 Groups (12-15 participants in each)
1:30 – 2:15 PM	Lunch	
2:15 – 3:00 PM	Group work continues	
3:00 – 3:15 PM	Tea/Coffee Break	
3:15 – 5:30 PM	PLENARY: Group Work 1 presentations, discussions, and analyses	**Chairpersons:** Dr. Sunil Gupta, Principal Consultant, NCDC Dr. Sangeeta Sharma, Professor & Head, Department of Neuropsychopharmacology, IHBAS
5:30 – 5:35 PM	Closure	

Day 2 (Thursday, 23 June 2022)		
Group Work 2		
9:00 – 10:30 AM	Designing objectives and major activities, implementation mechanism and M&E component for NAP AMR 2.0 and multisectoral linkages • To suggest guiding principles to improve implementation of NAP 2.0 • To suggest objectives, and major activities under NAP 2.0 • To propose implementation of activities that are needed to strengthen outcome of specific objectives (operational plan) • To specify linkages between sectors and stakeholders for every activity • To suggest possible linkages/ integration of activities with existing health activities/programmes at national, state/UT	3 Groups- Same groups as above

	level and district level • To articulate and suggest activity specific intersectoral linkages • To assess feasibility and prioritization of proposed activities • To identify budgetary estimates, if possible • To draft a M&E component that suggests indicators (process, output and outcome) for NAP AMR (2022-2026)	
10:30–10:45 AM	Tea/Coffee Break	
10:45–1:15 PM	Group work continues	
1:15 – 2:00 PM	Lunch	
2:00 – 3:30 PM	PLENARY Group Work: Presentations, Discussion, and Analysis	**Chairpersons:** Dr. (Prof) B. L. Sherwal, Director and MS, ABVIMS & RML Hospital, Dr. Sunil Gupta, NCDC
3:30 – 3:45 PM	Tea/Coffee Break	
3:45 – 5:15 PM	PLENARY Group Work: Presentations, Discussion, and Analysis	**Chairpersons:** Dr. (Prof) B. L. Sherwal, Dr. Sunil Gupta, NCDC
5:15 – 5:30 PM	Conclusions, Way Forward and Recommendations Closure	Dr. Sujeet Kumar Singh, Director, National Centre for Disease Control, DGHS, MoHFW

DEPARTMENT OF BIOTECHNOLOGY
Ministry of Science & Technology
Government of India

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Ministry of Health and Family Welfare
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Annexure I (b): Program of Work
National Expert Consultation on the Research Component of National Action Plan on AMR 2.0

Venue: The Claridges Hotel, 12 Dr. APJ Abdul Kalam Road, New Delhi-110011

Date: 26-27 September 2022

Time: 10:30 am- 5:30 pm

Day I

9.30–10.30 AM **RegistrationandTea**

Time	Major Activity	Principal Speaker
10:30– 10:32 AM	Welcome	Dr. Jyoti Logani, Scientist F, Department of Biotechnology, MoST
10:32– 10:37 AM	Address	Dr. Amit Shah, Deputy Director, Health Office, USAID India
10:37– 10:42 AM	Address	Dr. Roderico H Ofrin, WHORepresentative to India
10:42– 10:47 AM	Address	Dr. Atul Goel, Director General, DGHS, MoHFW
10:47– 11:05 AM	Keynote Address	Dr. Rajesh S Gokhale, Secretary, Department of Biotechnology, MoST
	Vote of Thanks	Dr. Lata Kapoor, Joint Director, NCDC, DGHS
11:05–11:15 AM	Tea/Coffee Break and Group Photograph	
Setting the scene for research in AMR in India: Current status, achievements, challenges and way forward		
11:15–11:20 AM	Introduction: Chairs	**Chairpersons:** Dr. Rajesh Bhatia, Senior Advisor-AMR, IDDS Prof Niyaz Ahmed, University of Hyderabad
11:20–11:35 AM	Overview of Implementation of National Action Plan on AMR (2017-2021)	Dr. Sunil Gupta, Principal Consultant, NCDC
11:35–11:50 AM	Filling knowledge gaps through research: Understanding transmission dynamics of AMR across sectors, newly emerged resistance in microorganisms and the cost of antimicrobial resistance: Challenges and research needs	Dr. Kamini Walia, Scientist F, ICMR
11:50–12.05 PM	Innovations and Research in the field of diagnostics, antimicrobials, vaccines in AMR	Dr. Shirshendu Mukherjee, Mission Director-Grand Challenges India, BIRAC
12.05–12.20 PM	WHO support to research policies and priorities in AMR	Dr. Anuj Sharma, Technical officer - AMR, Labs, IPC - WHO India
12.20–12.35 PM	Impact of agricultural practices and AMR/antibiotic residue in animals on human health: Need for research under One Health approach	Dr. Naresh Kumar Goyal, Principal Scientist, ICAR-NDRI
12:35–12.45 PM	Concluding remarks by chairs	
12.45–1.00 PM	Mechanism of the workshop, group composition, ToR and expected outcomes	Dr. Chelsia Chelladurai, NCDC/Dr. Jyoti Kayesth, IDDS

Time	Major Activity	Principal Speaker
1:00 – 1:45 PM	Lunch	
GROUP WORK1		

1.45 –3.00 PM	Undertaking India's SWOT (Strength, Weaknesses, Opportunities and Threats) analyses of its response to research in the field of AMR in context of the existing NAP-AMR and beyond and proposing structure and contents of the proposed NAP-AMR 2.0: AND
	• To suggest Governance at national and state levels, coordination across and within sectors for efficient result-oriented research on AMR in India
	• To recommend essential elements of AMR research policy and research agenda of the country for 2022-2026
	• To propose a coordination mechanism between various institutions Union and State Govts and other major stakeholders
	• To undertake SWOT of NAP-AMR
	  • To identify important research activities from previous NAP that could not be implemented and the reasons thereof and recommend solutions to undertake the activities
	  • To confirm major stakeholders and their salient functions for basic and operational research
		3 Groups (12-15 participants in each, moderator and presenter to be identified by the Group itself)

3:00– 3:15 PM	Tea/Coffee Break	
3.15–4.15 PM	Group work continues	
4:15– 5:30 PM	PLENARY: Group Work 1 presentations, discussions, and analyses	**Chairpersons:** Dr. Kamini Walia, Scientist F, ICMR Prof RK Singh, Project Director-OHSU, DAHD
5:30 onwards	Closure	

Day2		
9:30– 9:40 AM	Recap of Day 1	Dr. Rajesh Bhatia, IDDS
9:40– 9:55 AM	Innovations and Research in the field of developing alternatives to antimicrobials and adjuvant remedies for Infectious Disease	**Chairpersons:** Dr. Lata Kapoor, NCDC, DGHS Dr. Pallab Ray, Professor and Head-Microbiology, PGIMER Chandigarh **Presenter:** Dr. V. Aarthi, Research Officer Siddha, Central Council for Research in Siddha
GROUP WORK 2		
	COMMON TOR FOR ALL THREE GROUPS • To identify research priorities in human health, animal health and environment sectors on diagnostics and technologies relevant to AMR, antimicrobial susceptibility testing (AST), estimation of antimicrobial usage/consumption (AMU), interface between human, animal and environment sectors discovery and	

Time	Major Activity	Principal Speaker
9:55– 10:45 AM	development of new antibiotics and alternatives • To fill up the identified gaps under the broad umbrella of One Health and suggest additional research interventions & activities for NAP 2.0 • Develop integrated research agenda on AMR including one health perspective GROUP SPECIFIC TOR **Group 1:** Innovations in diagnostics, antimicrobials, vaccines for AMR Containment: Current status and research priorities • To identify research needs for the applicability and affordability of available diagnostics (including point-of-care) in India to inform health practitioners and veterinarians of the diagnosis and susceptibility of the pathogens to available antibiotics. • To recommend basic research and translational studies to support the development of new treatments, diagnostic tools, vaccines, and other interventions; either indigenously produced or through technology transfer **Group 2:** Filling up important knowledge gaps through research & surveillance of AMR • To understand how resistance develops and spreads, including how resistance circulates within and between humans and animals and through food, water, and the environment. • To rapidly characterize newly emerged resistance in microorganisms and elucidate the underlying mechanisms; this knowledge to be used to ensure that surveillance and diagnostic tools and methods remain current • To undertake economic impact research, including the development of models to assess the cost of antimicrobial resistance • To improve understanding of the impact of agricultural practices on the development and spread of antimicrobial resistance, • To generate evidence through studies on reduction of non-therapeutic use of antimicrobial agents in agriculture through sustainable husbandry practices **Group 3:** Developing alternatives to antimicrobials and adjuvant remedies for Infectious Diseases in humans and animals • Research to identify alternatives to nontherapeutic uses of antimicrobial agents in agriculture and aquaculture, including their use for growth promotion and crop protection	3 Groups (10-15 participants in each group)
10:45–11:00 AM	Tea/Coffee Break	
11:00–12:15 PM	Group work continues	
12:15– 1:15	PLENARY Group Work: Presentations, Discussion, and Analysis	**Chairpersons:** Prof Rama Chaudhry, Dean-Research, AIIMS Delhi

Time	Major Activity	Principal Speaker
		Dr. Shirshendu Mukherjee, BIRAC
1:15– 2:00 PM	Lunch	
GROUP WORK 3		
2:00–3:45 PM	Implementation mechanism/operational plan and M&E for research component of NAP AMR 2.0 and multisectoral linkages • To suggest research objectives for NAP 2.0 • To propose major activities to strengthen outcome of specific objectives (draft operational plan) • To suggest responsible agency and linkages/ integration of activities with existing research initiatives at national, state/UT level and district level • To assess prioritization of proposed activities • To identify source of funding & if possible budgetary estimates • Identify key research objectives for M & E of research component of NAP-AMR (2022-2026) • To draft a M&E plan that suggests indicators (output) for research objectives of NAP AMR (2022-2026)	3 Group – same as above
3:45– 4.00 PM	Tea/Coffee Break	
4.00– 5:15 PM	PLENARY Group Work: Presentations, Discussion, and Analysis	**Chairpersons:** Prof R. K. Singh, Project Director, OHSU, DAHD Dr. Shanta Datta, Director, ICMR-NICED, Kolkata Prof Vibha Tandon, JNU
5:15– 5:30 PM	Conclusions, Way Forward and Recommendations Closure	**Chairpersons:** Dr. Jyoti Logani, Dr. Kamini Walia and Dr. Lata Kapoor

Ministry of Health and Family Welfare
Government of India

Annexure I (c): Program of Work

National Expert Consultation of Professional Associations and Civil Society Organizations towards developing National Action Plan on AMR 2.0

Venue: The Claridges Hotel, 12 Dr. APJ Abdul Kalam Road, New Delhi-110011 **Date: 15-16 December 2022** **Time: 9:30 am- 5:30 pm**

Day I		
8.30–9: 30 AM	**Registration and Tea**	
Time	**Major Activity**	**Principal Speaker**
9:30-9:33 AM	Welcome Address	Dr. Lata Kapoor, Additional Director, NCDC, DGHS
9:33-9:43 AM	Address	Dr. Arti Kapil, President, President IAMM
9:43-9:53 AM	Address	Dr. V. Ramasubramanian, President, Clinical Infectious Disease Society
9:53-10:03 AM	Address	Ms. Sangita Patel, Director, Health Office, USAID India
10:03-10:13 AM	Address	Ms Payden, Deputy WHO Representative to India
10:13-10:28 AM	Keynote Address	Dr. Sujeet Kumar Singh, Principal Advisor, NCDC
10:28-10:30 AM	Vote of Thanks	Dr. Sanjeev Saini, Team Lead, IDDS India
10:30-11:00 AM	Tea/Coffee Break and Group Photograph	
Technical session- Setting the scene for enhancing awareness on AMR: Current status, achievements, challenges and way forward		
11:00-11:05 AM	Introduction: Chairs	Chairs: Prof. (Dr.) Arti Kapil, President IAMM Dr. V. Ramasubramanian, President CIDS
11:05-11:20 AM	Impact of National Action Plan on AMR (2017-2021) on containment of AMR	Dr. Lata Kapoor, Additional Director, NCDC
11:20-11:35 AM	Initiatives for improving AMSP in the country	Dr. Kamini Walia, Scientist F, ICMR
11:35-11:50 AM	Initiatives for improving IPC in the country	Prof. (Dr.) Purva Mathur, Professor of Lab Medicine, JPNATC AIIMS
11:50-12:05 PM	WHO partnerships and collaborations for containment of AMR – globally and in India	Dr. Anuj Sharma, Technical Officer AMR, Health Laboratories, IPC, WHO
12:05-12:20 PM	Behavioral change through communication: a complex but much needed priority to contain AMR	Mr. Sadique Ahmad, Social and Behavior Specialist, UNICEF
12:20-12:35 PM	Antimicrobial Resistance Containment in veterinary sector	Dr. Aruna Sharma, Deputy Commissioner, Dept of Animal Husbandry & Dairying, MoFAHD
12:35-12:50 PM	Concluding remarks by chairs	
12:50-1:00 PM	Mechanism of workshop, group composition and ToR and expected outcomes	Dr. Chelsia Chelladurai/ Dr. Ashima Jain Vidyarthi
Group Work I		
1:00 – 1:30 PM	Undertaking India's SWOT (Strength, Weaknesses, Opportunities and Threats) analyses of implementation of NAP-AMR and propose structure and contents of the proposed NAP-AMR 2.0: • To suggest mechanisms of involving private sector at national and state levels, coordination across and within sectors for efficient communication for	3 Groups (10-12 participants in each, moderator and presenter to be identified by the Group itself)

Time	Major Activity	Principal Speaker
	behavioral changes in antimicrobials prescribers and users in India, effective infection prevention and control (IPC) and Community Level AMR Surveillance. • To identify important communication and awareness activities and activities for improving appropriate use of antimicrobials from previous NAP that could not be implemented and reasons thereof and recommend solutions to undertake the activities • To identify new activities for inclusion under various Strategic priorities of NAP-AMR 2.0 - sectoral and under the broad umbrella of One Health • To identify major stakeholders for implementing communication strategy and for improving appropriate use of antimicrobials • **To document challenges, solutions, and plan for next 5 years for communication policy, and antimicrobial stewardship across sectors**	GROUP 1: CIVIL SOCIETY GROUP 2: HUMAN HEALTH GROUP 3: ANIMAL HEALTH
1:30 – 2:15 PM	Lunch	
2:15 – 4:00 PM	Group work continues	
3:00 – 3:15 PM	Tea/Coffee Break	
4:15 – 5:25 PM	Group Work 1 presentations, discussions, and analyses	Chairpersons: Dr. Sujeet Kumar Singh, Principal Advisor, NCDC Dr. Amit Khurana, Program Director-SFS, CSE -
5:25 – 5:30 PM	Closure	

Day 2		
GROUP WORK 2		
9:30-9:45 AM	Recap of Day 1	
9:45 – 10:30 AM	COMMON TOR FOR ALL THREE GROUPS • To identify priorities in human health, animal health and environment sectors for prescribers and users for implementation during 2023-2027. • To suggest interventions & activities for NAP 2.0 to fill up the identified gaps GROUP SPECIFIC TOR ***Group 1:*** *Improving public perception on AMR and promoting rational use of antibiotics* • *To identify communication needs for the communities to augment awareness on proper use of antibiotics.* • *To suggest interventions that can bring about behaviour change in communities* • *To recommend a mechanism for implementation* ***Group 2:*** *Augmenting rational use of antibiotics in clinical practice* • *To understand factors that encourage irrational use of antibiotics in the clinical practice and their genesis* • *To suggest interventions that can bring about behaviour change in prescribers*	3 Groups (10-15 participants in each group)

Time	Major Activity	Principal Speaker
	• *To identify gaps regarding knowledge and compliance w.r.t. Infection Prevention and Control (IPC) (both within and outside healthcare settings) that have a bearing on the use of antimicrobials* • *To recommend a mechanism for implementation* ***Group 3:*** *Augmenting rational use of antibiotics in veterinary set up* • *To understand factors that encourage irrational use of antibiotics in the veterinary set up, use of antibiotics for growth promotion and their genesis* • *To suggest interventions that can bring about behaviour change in prescribers and users especially small farmers* • *To identify supplemental knowledge viz biosafety, biosecurity and hygiene practices that have a bearing on the use of antimicrobials* • *To recommend a mechanism for implementation*	
10:30–10:45 AM	Tea/Coffee Break	
10:45-12:00 PM	Group work continues	
12.00-1:00 PM	Group Work: Presentations, Discussion, and Analysis	Chairpersons: Dr. Sangeeta Sharma, President, DSPRUD Dr. Ranga Reddy Burri, President, IFCAI
1:00- 1:45 PM	Lunch	
Group Work 3		
1:45-3:45 PM	Implementation mechanism/operational plan and M&E component for improving awareness, strengthening IPC and AMSP by professional associations and civil society organizations for NAP AMR 2.0 (2023-2027) • To propose implementation of activities that are needed to strengthen outcome of specific objectives (operational plan) • To identify stakeholders and specify linkages between sectors and stakeholders for every activity • To suggest possible linkages/ integration of activities with existing initiatives at national, state/UT level and district level • To assess feasibility and prioritization of proposed activities • To draft a M&E component that suggests indicators (output) for NAP AMR 2.0 (2023-2027)	3 Group – same as above
3:45- 4.00 PM	Tea/Coffee Break	
4.00- 5:15 PM	Group Work: Presentations, Discussion, and Analysis	Chairpersons: Dr. Sunil Gupta, Principal Consultant, NCDC Dr. Anuj Sharma, Technical Officer AMR, Health Laboratories and IPC, WHO
5:15- 5:30 PM	Conclusions, Way Forward and Recommendations Closure	Dr. Lata Kapoor, Additional Director, NCDC

Annexure II (a): List of experts at the National Expert Consultation on the Human Health Component of National Action Plan on AMR 2.0

Sr.No.	Name of Experts	Designation and Organization
1	Prof (Dr). Atul Goel	Director General Health Services (DGHS), MOHFW, Delhi
2	Dr. Sujeet Kumar Singh	Director, National Centre for Disease Control, Delhi
3	Dr. (Prof.) B. L. Sherwal	Director and Medical Superintendent, Atal Bihari Vajpayee Institute of Medical Sciences & RML Hospital
4	Dr. Sunil Gupta	Principal Consultant, National Centre for Disease Control, Delhi
5	Ms. Payden	Deputy WHO Representative to India, WHO
6	Dr. Reuben Swamickan,	Chief, Division of Tuberculosis & Infectious Diseases, USAID India
7	Dr. Rajesh Bhatia	Senior Advisor, AMR Infectious Disease Detection and Surveillance, India
8	Dr. G. Kausalya	Director, Central Health Education Bureau
9	Brig. MM Ramchandra (Retd)	Director, National Security Council Secretariat
10	Dr. Ajit Shewale	Deputy Director, Division of Zoonotic Disease Programmes, NCDC
11	Dr. Anuradha Chowdhary	Head, AMR NRL for Fungal pathogens & Department of Mycology, VP Chest Institute, New Delhi
12	Dr. Apurba Sastry	Additional Professor, Department of Medicine, JIPMER, Puducherry
13	Dr. Aravind R	HOD (Infectious Diseases), Govt Medical College, Thiruvananthapuram
14	Ms. Arnika Sharma	Consultant (PH), CHEB
15	Dr. Arti Bahl	Additional Director, Division of Epidemiology, NCDC
16	Dr. Azger Dusthackeer, V N	Scientist D, ICMR-NIRT Chennai
17	Dr. Chelsia Chelladurai	Project Officer, AMR Surveillance NCDC
18	Dr. Daniel Vanderende	Medical Officer, Centers for Disease Control and Prevention
19	Dr. Deepti Chaurasia	Professor & Head, Microbiology Dept. GMC, Bhopal MP SAPCAR
20	Dr. Falguni Debnath	Scientist D, Division of Epidemiology, ICMR-NICED, Kolkata
21	Dr. Geeta Mehta	Independent IPC Expert, Ex- HoD, Microbiology, LHMC
22	Dr. Hafsa Ahmed	Consultant (Health) NITI Aayog
23	Dr. Harioum Sharma	Consultant, NHSRC
24	Dr. Hema Paul	Associate Physician, Department of Microbiology & Hospital infection control, CMC Vellore
25	Dr. Jyoti Iravane	Professor and Head, Department of Microbiology, Govt Medical College, Aurangabad
26	Dr. Jyoti Kayesth	Senior Diagnostics Advisor, Infectious Disease Detection and Surveillance,India
27	Dr. Jyoti Misri	Principal Scientist, Animal Science Division, ICAR
28	Dr. K. Nagamani	Professor, Department of Microbiology, Gandhi Medical College, Secunderabad
29	Dr. Kamini Walia	Scientist F, Division of Epidemiology and Communicable Diseases, ICMR
30	Dr. Lata Kapoor	Joint Director & Head, AMR Programme Unit & CBDDR. National Centre for Disease Control
31	Dr. Madhumita Barua	Deputy Director, Centre for Bacterial Diseases and Drug Resistance, NCDC
32	Dr. Mala Chhabra	Consultant Microbiology, RML Hospital, Delhi

Sr.No.	Name of Experts	Designation and Organization
33	Dr. Manish Chaturvedi	Head of Department, MCHA, National Institute of Health and Family Welfare
34	Dr. Monica Puniya	Assistant Director, FSSAI, Delhi
35	Dr. Monica Sharma	Scientist C, ICMR
36	Dr. MVS Subbalaxmi	Additional Professor, Nizam's Institute of Medical Sciences, Hyderabad
37	Dr. Nivedita Thass	AMR Specialist Infectious Disease Detection and Surveillance, India
38	Dr. Nusrat Shafiq	Professor, Dept of Pharmacology, PGIMER Chandigarh
39	Dr. P. Anand Kumar	Professor & Head, Department of Veterinary Microbiology, NTR university of Veterinary sciences, Gannavaram, AP
40	Dr. Pallab Ray	Prof. & Head, Dept of Medical Microbiology, PGIMER Chandigarh
41	Dr. Poonam Yadav	Consultant (Public Health Admn.), NHSRC
42	Dr. Purva Mathur	Professor, AIIMS Trauma Centre Delhi
43	Dr. Raman Sardana	Lead IPC, Apollo Hospital New Delhi, and Hospital Infection Society of India
44	Dr. Rathi Balachandran	ADG (Nursing), Nursing Division, MoHFW
45	Dr. Ravindra Aggarwal	Additional MS, Lok Nayak Hospital & Chief coordinator AMR Delhi SAP CAR
46	Dr. Rikta Saha	Assistant Drug Controller, CDSCO
47	Dr. Rubina Bose	Deputy Drug Controller, CDSCO, MoHFW
48	Dr. Sangeeta Sharma	Professor & Head, Department of Neuropsychopharmacology, Institute of Human Behaviour and Allied Sciences
49	Dr. Sanjay Gupta	Professor and Acting HOD Epidemiology, NIHFW
50	Dr. Sanjeev Saini	Team Lead, Infectious Disease Detection and Surveillance, India
51	Dr. Shreeparna Ghosh	Programme Coordinator, Infectious Disease Detection and Surveillance, India
52	Dr. Simmi Tiwari	Joint Director & Head, Division of Zoonotic Disease Programme, NCDC
53	Dr. Siromany Valan	Public Health Specialist, Centers for Disease Control and Prevention
54	Dr. Snehal Bagtharia	Joint Director (R&D), Gujrat State Biotechnology Mission
55	Dr. Sonal Saxena	Director Professor & Head, Dept. of Microbiology, Maulana Azad Medical College, New Delhi
56	Dr. Sonam Vijay	Scientist D, ICMR
57	Dr. Sumeeta Soni	Associate professor, BJ Medical College, Ahmedabad
58	Dr. Suneet Kaur	Deputy Director, Epidemiology Division, NCDC
59	Dr. Suresh Mohammed	Senior Health Specialist, World Bank
60	Dr. Sushil Kumar Singh	Livestock Officer DAHD
61	Dr. Swati Khullar	Project Officer, IPC NCDC
62	Dr. Taru Singh	Scientist C, ICMR
63	Dr. Umesh Alavadi	Senior Health Advisor, Division of Tuberculosis & Infectious Diseases, USAID India
64	Dr. Varshneya Singh	Scientist C, Department of Biotechnology (DBT)
65	Dr. Vijay Kumar Teotia	Regional Officer, DAHD
66	Dr. Vikas Aggarwal	Regional Coordinator, South Asia Fleming Fund
67	Mr. Pankaj Johri	Director, NABL
68	Mr P. Karthikeyan	Joint Director, FSSAI

Annexure II (b): List of experts at the National Expert Consultation on the Research Component of National Action Plan on AMR 2.0

Sr.No.	Name of Experts	Designation and Organization
1	Dr. Rajesh S. Gokhale	Secretary, Department of Biotechnology (DBT)
2	Dr. Sujeet Kumar Singh	Principal Advisor, NCDC
3	Dr. Roderico H Ofrin	WHO Representative to India
4	Dr. Lata Kapoor	Joint Director, NCDC, DGHS
5	Dr. Rajesh Bhatia	Senior Advisor-AMR, Infectious Disease Detection and Surveillance, India
6	Prof Niyaz Ahmed	One Health Epidemiologist and Professor, Biotechnology and Bioinformatics, University of Hyderabad, India
7	Dr. Sunil Gupta	Principal Consultant, NCDC
8	Dr. Shirshendu Mukherjee	Mission Director- Grand Challenges India, BIRAC
9	Prof R K Singh	Project Director-OHSU, DAHD
10	Dr. Shanta Datta	Director, ICMR-NICED, Kolkata
11	Prof Rama Chaudhry	Dean-Research, AIIMS Delhi
12	Dr. Pallab Ray	Professor and Head-Microbiology, PGIMER Chandigarh
13	Prof. Anita Kotwani	Professor, Department of Pharmacology, VPCI
14	Dr. Kamini Walia	Scientist F, ICMR
15	Dr. Umesh Alavadi	Senior Health Advisor, Division of Tuberculosis & Infectious Diseases USAID India
16	Dr. Anuj Sharma	Technical officer - AMR, Labs, IPC - WHO India
17	Dr. Naresh Kumar Goyal	Principal Scientist, ICAR-NDRI
18	Dr. Daniel Vanderende	Medical Officer, US CDC
19	Dr. Indumathi M. Nambi	Professor, Environment and Water Resources Division, Department of Civil Engineering, IIT Chennai
20	Dr. Ranjana Pathania	Professor, Department of Biosciences and Bioengineering, IIT Roorkee
21	Prof Vibha Tandon	Professor, JNU, New Delhi
22	Dr. Debjit Chakraborty	Scientist D (Medical), ICMR-NICED, Kolkata
23	Dr. Bhabatosh Das	Associate Professor, Translational Health Science and Technology Institute
24	Dr. Anand Kumar P.	Professor & University Head, Department of Veterinary Microbiology NTR College, Andhra Pradesh
25	Dr. Anuradha Chowdhury	Professor, Department of Medical Mycology, VPCI
26	Dr. Nitin Jain	Scientist- F, DBT
27	Dr. Zahoor Ahmad Parry	Scientist, Indian Institute of Integrative Medicine, Jammu
28	Dr. Ravikrishnan Elangovan	Associate Professor, Department of Biochemical Engineering and Biotechnology, IIT Delhi
29	Dr. H. R. Khanna	Joint Commissioner (NLM), DAHD
30	Dr. V. Aarthi	Research Officer Siddha, Central Council for Research in Siddha
31	Dr. Siromany Valan	Public Health Specialist, USCDC
32	Dr. Varshneya Singh	Scientist- C, DBT
33	Dr. Subhra Chakrabarti	Director- Operations, BIRAC
34	Dr. Aravind Penmatsa	Associate Professor, IISc Bangalore
35	Dr. Asheesh Srivastava	Professor, IISER Bhopal
36	Dr. Sidharth Chopra	Scientist Central Drug Research Institute, Lucknow
37	Ms. Sehr Brar	Technical Officer - AMR & IPC WHO India
38	Dr. Hemraj Santuji Nandanwar	Senior Principal Scientist, Institute of Microbial Technology, Chandigarh
39	Dr. Ashish Arora	Scientist, Central Drug Research Institute, Lucknow
40	Dr. Jyoti Misri	Principal Scientist, ICAR
41	Dr. Susmita Chaudhuri	Associate Professor, THSTI, Faridabad
42	Dr. Swati Subodh	Programme Lead, AMR, CCAMP, Bangalore

Sr.No.	Name of Experts	Designation and Organization
43	Dr. Prabhu Patil	Principal Scientist, IMTECH Chandigarh
44	Dr. Snehal Bagtharia	Joint Director, Gujrat State Biotechnology Mission
45	Prof. Rama Vaidyanathan	Professor, Dr. MGR Educational and Research Institute
46	Dr. Divya Datt	Programme Manager, UNEP
47	Mr. Rajesh Dubey	Program and Operations Officer, FAO
48	Dr. Madhavi Rao	Senior Programme Manager, National Biopharma Mission, BIRAC
49	Dr. Rajeshwari Sinha	Programme Manager, Food Safety and Toxins, CSE
50	Dr. Deepak Bhati	Programme officer, Sustainable Food systems, CSE
51	Ms. Neha Dharmshaktu	Associate Programme Management Officer, UN Environment Programme India
52	Dr. Sonam Vijay	Scientist, ICMR
53	Dr. Monica Sharma	Scientist C, ICMR
54	Dr. Chelsia Chelladurai	Project Officer AMR Surveillance, NCDC
55	Dr. Swati Khullar	Project Officer IPC, NCDC
56	Dr. Sanjeev Saini	Team Lead, Infectious Disease Detection and Surveillance, India
57	Dr. Jyoti Kayesth	Senior Diagnostics Advisor, Infectious Disease Detection and Surveillance, India
58	Dr. Ashima Jain Vidyarthi	AMR Diagnostics Specialist, Infectious Disease Detection and Surveillance, India
59	Dr. Shreeparna Ghosh	Programme Coordinator, Infectious Disease Detection and Surveillance, India

Annexure II (c): List of experts at the National Expert Consultation of Professional Associations and Civil Society Organizations towards developing National Action Plan on AMR 2.0

Sr.No.	Name of Experts	Designation and Organization
1	Dr. Sujeet Kumar Singh	Former Director and Principal Advisor, NCDC
2	Dr. Lata Kapoor	Additional Director, NCDC, DGHS
3	Dr. Sunil Gupta	Principal Consultant, NCDC
4	Ms. Payden	Deputy WHO Representative to India, WHO
5	Dr. Anuj Sharma	Technical officer - AMR, Labs, IPC - WHO India
6	Ms. Sangita Patel	Director, Health Office, USAID India
7	Dr. Umesh Alavadi	Senior Health Advisor, Division of Tuberculosis & Infectious Diseases USAID India
8	Dr. Daniel Vanderende	Medical Officer, US CDC
9	Dr. Siromany Valan	Public Health Specialist, CDC
10	Dr. Sanjeev Saini	Team Lead, Infectious Disease Detection and Surveillance, India
11	Dr. Jyoti Kayesth	Manager, Infectious Disease Detection and Surveillance, India
12	Dr. Ashima Jain Vidyarthi	AMR Diagnostics Specialist, IDDS
13	Dr. Shreeparna Ghosh	Programme Coordinator, Infectious Disease Detection and Surveillance, India
14	Dr. Chelsia Chelladurai	Project Officer, AMR Surveillance NCDC
15	Dr. Swati Khullar	Project Officer, IPC NCDC
16	Dr. Aruna Sharma	Deputy Commissioner, Dept of Animal Husbandry & Dairying, Ministry of fisheries, animal husbandry and dairying
17	Dr. Vijaya Lakshmi Nag	AMR focal point, National Medical Commission
18	Prof. (Dr.) Arti Kapil	President, Indian Association of Medical Microbiologist
19	Dr. Swati Mahajan	Lead, Health Systems Strengthening, South Asia, PATH
20	Shri. Bhupendra Kumar	Secretary, Indian Pharmacist Association (IPA)
21	Dr. Prabhat Jha	President, Medical Students Association of India (MSAI)
22	Dr. Rajesh Pande	General Secretary, Indian Society for Critical care Medicine (ISCCM)
23	Dr. Kapil Goel	Indian Association of Preventive and Social medicine (IAPSM)Assistant Professor of Epidemiology, Department of Community Medicine and School of Public Health, PGIMER
24	Dr. Amit Khurana	Program Director, Sustainable Food Systems, Center for Science and Environment
25	Dr. Sujith J. Chandy	Project Director, ReAct Asia Pacific
26	Dr. Abdul Ghafur	APUA Board Member, Coordinator Chennai Declaration and Managing Trustee, AMR Declaration Trust
27	Dr. Sangeeta Sharma	President- Delhi Society for Promotion of Rational Use of Drugs DSPRUD
28	Dr. Rajat Jain	President, Doctors for you
29	Dr. V. Ramasubramanian	President, Clinical Infectious Diseases Society (CIDS)
30	Mr. Akash Maheshwari	Technical Services and Research Support- India, USAID TRANSFORM Project
31	Dr. Rakhi Singh	Chair of FOGSI Endocrinology Committee, Federation of Obstetric and Gynaecological Societies of India (FOGSI)
32	Dr. Tarun Mittal	Executive member, Association of Surgeons of India
33	Dr. Ranga Reddy Burri	President, Infection Control Academy of India (IFCAI)
34	Dr. Jerry Paul	President, Indian Association of Respiratory Care (IARC)

Sr.No.	Name of Experts	Designation and Organization
35	Ms. Harsha Doriya	Senior Campaign Officer-India, World Animal Protection
36	Ms. Neha Dharmshaktu	Associate Programme Management Officer, UN Environment Programme India
37	Dr. Purva Mathur	Professor, Dept. of Lab Medicine, JPNATC, AIIMS, New Delhi
38	Ms. Deepanwita Chattopadhyay	Chairman & Chief Executive Officer, IKP Knowledge Park
39	Dr. Vijay N Yewale	Former President, Indian Academy of Paediatrics (IAP)/ Director of Paediatrics, Apollo Hospital Mumbai
40	Dr. Raman Sardana	General Secretary, HISI
41	Prof. (Dr.) Lalit Maini	Director Professor, Department of Orthopaedics, Maulana Azad Medical College/ Indian Orthopaedic Association
42	Mr. Sadique Ahmad	Social and Behavior Change specialist for Health, UNICEF
43	Dr. Kumar Rajan	National Technical Advisor, Indian Dental Association
44	Dr. Abhijit Ganguli	Senior Counsellor, FACE/ Confederation of Indian Industry (CII)
45	Dr. Arti Bahl	Additional Director, Division of Epidemiology, NCDC
46	Mr. Pankaj Bector	General secretary, Indian Hospital Pharmacists' Association (IHP)
47	Mr. Pankaj Johri	Director (Medical) NABL & Head of Services
48	Dr. Kamini Walia	Scientist F, ICMR
49	Dr. D. J. Kalita	Head Technical & Regulatory, Zenex Animal Health India Private Ltd. Indian Federation of Animal Health Companies
50	Dr. Sumathy Muralidhar	Executive Member, IASSTD & AIDS
51	Dr. Jaya Tapadar Chakravarty	Member, The Association of Physicians of India
52	Mr. Vivek Sehgal	Director General, Organization of Pharmaceutical Producers of India (OPPI), New Delhi
53	Mr. Kalhan Bazaz	President, Indian Pharmocological Association (Delhi Branch)
54	Dr. C. S. Sahukar	President, Indian Veterinary Association (Delhi Chapter)