*Public Humanities* (2026), 2, e107, 1–16
doi:10.1017/pub.2025.10101

CAMBRIDGE UNIVERSITY PRESS PUBLIC HUMANITIES

ROUNDTABLE

# Understanding the Socio-economic and Environmental Determinants of Antimicrobial Resistance

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(Received 01 May 2025; revised 27 October 2025; accepted 15 November 2025)

## Abstract

Antimicrobial resistance (AMR) is a major global public health threat which disproportionately affects low- and middle-income countries. It intersects with other public health issues including climate change and its impact is compounded by existing socio-economic inequities. In the South Asian setting, persistent gender and caste-based discrimination create differences in infection susceptibility, health-seeking behaviours, accessibility and affordability to essential antibiotics, and quality health care and appropriate diagnosis by healthcare providers, resulting in disparities in healthcare access and outcomes. We report on the deliberations from a cross-disciplinary workshop held in Bengaluru, India, focusing on the Indian context of AMR and its intersections with gender, caste, and climate change—contexts that often apply to the rest of South Asia. The two-day workshop brought together healthcare professionals, public health experts, gender experts, climate experts, researchers, activists, and community members to explore institutional and community-level issues in AMR, gender, caste, and climate change. We also present a conceptual framework to understand how caste-based discrimination influences antibiotic use and AMR in India and other South Asian countries. Finally, we discuss the key recommendations highlighted by the experts to address the gender and caste blind spots in existing data collection methods, surveillance, and policy measures related to AMR.

**Keywords:** antimicrobial resistance; caste; climate change; gender; low- and middle-income countries

Antimicrobial resistance (AMR) occurs when viruses, bacteria, fungi, and parasites naturally evolve to resist antimicrobial treatment. As drugs become less effective, disease duration, severity, and mortality increase.[1] However, human activities, including the inappropriate or unregulated use of antimicrobials, inadequate water, sanitation, and hygiene infrastructure, restricted access to vaccines and diagnostics, and the absence of effective public health campaigns to raise awareness about AMR risks, all contribute to the potential rapid spread of AMR. Low- and middle-income countries (LMICs), in particular, face the greatest burden of drug-resistant infections globally.[2] These challenges may be further exacerbated by power imbalances and social disparities that influence health-seeking and health-providing behaviours in such country settings. Taking cognizance of the issue of AMR in the community, WHO has recently developed a people-centred approach to address AMR, and another technical report on addressing gender inequalities in AMR.[3] To align with WHO's efforts and mainstream gender and other socio-economic determinants in the Global Action Plan 2.0 and National Action Plans for AMR, it is crucial to study social and environmental determinants of AMR, including the impacts of gender, caste inequality, and climate change. Current literature offers limited insights into the intersectoral and intersectional aspects of AMR, exposing a gap in research and conversations among key stakeholders. One Health Trust organized a pioneering workshop on 18 and 19 March 2024 in Bengaluru, India, sponsored by British Academy, WHO Special Programme for Research and Training in Tropical Diseases (TDR) and Wellcome Trust. Here, we summarize these expert discussions on AMR intersections with gender, caste, and climate change, framed within the Indian context that extends to the rest of South Asia.

## 1. Methods

This article draws on the deliberations of a cross-disciplinary workshop on AMR and its intersections with gender, caste, and climate change. The workshop combined presentations by experts grounded in literature reviews and their own field experience with participatory discussions among practitioners, researchers, and policymakers from various parts of India and outside. Participants represented research and practice across all areas of discussion, including specifically gender, caste, and climate work. The discussions that followed the presentations were facilitated by the One Health Trust team and held in breakout groups designed to maximize diversity in participants' backgrounds and expertise. Each group shared its consolidated perspectives and, where relevant, divergent views through a nominated representative at the end of each session. Several such breakout sessions were held over the two workshop days.

The references cited in this manuscript draw from the literature presented and discussed during the workshop, and were subsequently enriched with additional materials shared by participants after the event during the manuscript drafting and review process. Key insights were distilled from these exchanges to identify recurring themes, conceptual linkages, and actionable recommendations. The article has been written as a synthesis of these

[1] Prestinaci et al. 2015.
[2] Lewnard et al. 2024.
[3] WHO 2023b, 2024.

deliberations, capturing the central learnings and policy directions relevant to strengthening AMR responses in the South Asian context.

## 2. Caste and AMR

The caste system in India is a descent-based socio-political stratification, often linked with occupation, that originally classified Hindus into hierarchical and endogamous groups, but has extended into neighbouring South Asian countries and other religions, perpetuating social marginalization for those at the bottom of the hierarchy.[4] Occupations in India are often informed by caste of the family one is born into—an average Indian is more than thrice as likely to continue a traditional occupation than any other occupation.[5] Caste-based occupational roles push those from marginalized castes into performing tasks that expose them to severe occupational hazards and health risks, such as manual scavenging, increasing risks of open wounds and infections.[6] Since caste inequalities often intersect with income and educational inequalities, seeking timely and effective medical interventions is harder for those from marginalized caste backgrounds due to limited resources to pay for doctors and medicines, lack of knowledge, and fear of losing employment.

Access to healthcare services is also reduced for people from Scheduled Castes, as they face discrimination at various stages, from admission to hospitals to the conduct of healthcare staff at medical institutions.[7] Deterred by such experience, many turn to unlicensed medical practitioners and pharmacists, diagnoses and antibiotic prescriptions from who can be both unreliable and difficult to track or govern. Internalization of caste inferiority can further suppress individuals' healthcare-seeking behaviour. Access to improved water, sanitation, and hygiene (WASH) services—which is critical in containing AMR and has been projected to prevent close to 250,000 deaths annually—has been historically denied to people from lower castes in India.[8] Finally, being from marginalized caste families can also result in losing out on benefits of health promotion schemes of the government such as the Integrated Child Development Service (ICDS) scheme, and the Mid-Day Meal Scheme.[9] With reduced access to both health promotion schemes and timely medical interventions, caste-based exclusion may not only result in nutritionally deficient children in marginalized caste households, but also push such families to inappropriate antibiotics use at the direction of non-licenced healthcare professionals.

Caste-based marginalization also influences AMR through several less-visible, but potent channels. The absence of caste-disaggregated data in AMR surveillance creates a critical blind spot, making it hard to track how delayed treatment or antibiotic misuse disproportionately affects marginalized communities and to design targeted interventions. Caste also shapes animal husbandry practices in rural and peri-urban India.[10] Marginalized castes are more likely to rear pigs or poultry or work in slaughterhouses—jobs often considered "polluting"—increasing zoonotic disease risk.[11] These communities frequently depend on unregulated antibiotics for animal health, feeding AMR through environmental and food

[4] Goghari and Kusi 2023.
[5] Deshpande 2011.
[6] Aamir Ali 2019.
[7] Acharya 2018.
[8] Kumar and Kharb 2024; Lewnard et al. 2024.
[9] Borooah 2018; Sabharwal et al. 2014.
[10] Narayanan 2023.
[11] Narayanan 2023.

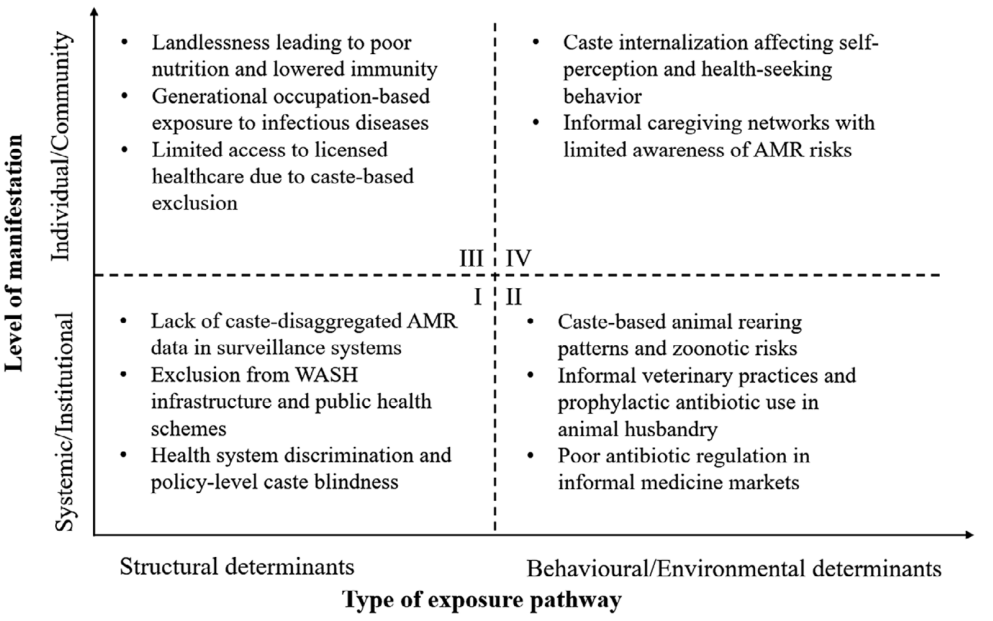


**Figure 1.** Caste-driven pathways to AMR vulnerability.

chain routes. Additionally, lower caste families are often landless and nutritionally insecure, leading to weaker immunity and more frequent infections, which drive repeated and unsupervised antibiotic use.[12]

## 3. Conceptual framework

To better conceptualize this complex relationship between caste-based marginalization and AMR, this article summarizes the workshop deliberations using a four-quadrant framework that maps key pathways of AMR vulnerability. The framework is organized along two axes: the horizontal axis categorizes the type of exposure pathway—ranging from structural determinants to behavioural/environmental determinants—while the vertical axis distinguishes between systemic/institutional level and individual/community levels of manifestation. This structure summarizes how caste dynamics influence AMR outcomes at different levels and through various channels. It is also crucial to note that these quadrants also influence each other and interact with each other to further perpetuate inequities (Figure 1).

Quadrant I captures the institutional-level exclusion that arises from structural caste hierarchies. These factors include exclusion from critical WASH infrastructure, health system discrimination, and absence of caste-disaggregated health data. Quadrant II illustrates how systemic caste norms, particularly in rural economies, contribute to environmental and behavioural drivers of AMR through practices related to animal husbandry and reliance on informal health care. Quadrant III addresses structural disadvantages experienced at the community and household levels, such as landlessness and nutritional security, generational exposure to infectious diseases, and caste-based differences in health-seeking behaviours. The last quadrant highlights behavioural and psychosocial dimensions of AMR

[12] Rajuladevi 2001.

vulnerability within caste-marginalized communities. These factors are internalization of caste inferiority and dependence on informal caregiving networks.

Together, these overlapping layers of exclusion create a cycle of heightened infection risk, delayed or inappropriate treatment, and unchecked antibiotic use, collectively amplifying vulnerability to AMR. The current framing of the public health threat of AMR lacks this focus on caste as a social determinant, as evidenced by a "caste blind spot" in Indian AMR policies both at central and state levels. This, combined with a lack of caste-disaggregated data currently available for AMR for various diseases and pathogens, points towards potential gaps that can be bridged from a policy perspective.

## 4. Gender and AMR

Gender is a key social determinant in health and AMR, especially in regions with high gender inequality such as South Asia, West Asia, and other LMICs. A study involving antibiotic consumption data from more than 70 countries finds that higher school attainment by girls and lower gender gap in labour force participation leads to significantly lower rates of antibiotic consumption at the population level, both within and across countries, after controlling for income levels and other confounding factors.[13] Promoting gender equality—1 of the 17 United Nations Sustainable Development Goals (SDGs)—is essential, as gender disparities influence the achievement of all SDGs across both communicable and non-communicable health conditions. According to the World Health Organization (WHO), women experience disproportionately poor outcomes in non-maternal health, as reflected in high disability-adjusted life year (DALY) counts. Notably, the global burden of non-communicable diseases among women increased by nearly 26 percent between 2000 and 2019.[14] While gender disparities in AMR are globally recognized, the discussions in this workshop focused on their manifestations in India and South Asia, where social norms and occupational hierarchies strongly influence access to care and antibiotic use.

Also, while this section primarily focuses on the disproportionate disadvantages faced by women, it is acknowledged that gender norms can also adversely affect men, particularly through risk-taking behaviours, occupational exposure, and restricted care-seeking patterns, which merit further intersectional examination alongside caste and class.

## 5. Structural and cultural gender barriers

Gender discrimination begins early in the lives of women, even before birth, as a result of a prevailing preference for male children. This male preference fosters practices such as sex-selective abortion, neglect of female infants, and unequal access to health care and nutrition, which cumulatively contribute to long-term health disparities.[15] These inequities are exacerbated throughout the life course, particularly in LMICs, where structural barriers such as low educational attainment, limited workforce participation, and insufficient access to health information disproportionately affect women. Furthermore, gender norms often dictate that women prioritize the health of other family members over their own, resulting in diminished access to care and inadequate nutrition, both of which increase susceptibility to infections and the overuse of antibiotics.[16]

[13] Batheja et al. 2025b.
[14] WHO 2023a.
[15] Ruckert et al. 2025; WHO 2024.
[16] Batheja et al. 2025a.

Biological and behavioural differences between men and women make women more susceptible to infections and lead them to consume more antibiotics. Women are disproportionately affected by the challenges of antimicrobial use and AMR, particularly during key stages of their reproductive life course, including menstruation, pregnancy, childbirth, abortion, and the treatment of infections such as urinary tract infections (UTIs) and sexually transmitted infections (STIs). These risks are further exacerbated in LMICs, where inadequate access to water, sanitation, and hygiene (WASH) services increases the likelihood of exposure to antibiotic-resistant pathogens.[17]

Masculine behaviours, including risk-taking and substance use, further compound health risks for women. Men are more likely to engage in behaviours such as alcohol, tobacco, and drug use, and are less inclined to seek timely medical attention. These behaviours increase the incidence of sexually transmitted infections, including HIV, which are transmitted to women, particularly those in relationships with substance-using or condom-averse male partners.[18] The convergence of substance abuse, risky sexual behaviours, and intimate partner violence increases women's vulnerability to physical harm, psychological trauma, and unintended pregnancies, all of which exacerbate gendered health and social disparities.[19]

## 6. Informal care and self-medication

Despite these risks, women frequently delay or avoid seeking medical care due to deeply ingrained adverse gender norms that position men as the primary earners and healthcare priorities. These norms limit women's autonomy, income, and well-being, complicating their access to healthcare services. They also suppress women's agency in healthcare decisions while expecting them to prioritize and dedicate healthcare resources towards the well-being of family members, often at the expense of their own health and nutrition needs, perpetuating a cycle of neglect that makes them more susceptible to infections.[20] Further, women in LMICs are subject to higher rates of child marriage and intimate partner violence, which limits their agency to access essential healthcare services like vaccinations and prenatal care, while collectively increasing the vulnerability of both mothers and children to infections. Widely prevalent social stigma and taboos around menstruation, underage pregnancies, and abortions further hinder access to quality reproductive health care, thus, increasing women's reliance on home-based remedies and informal sources of health care such as local pharmacists for unprescribed antibiotics. These infections, if diagnosed by non-licensed practitioners and pharmacists, might lead to inappropriate antibiotics use, and subsequently heightened risk of AMR.

In addition to self-medication driven by financial constraints, cultural and societal factors also influence women's healthcare-seeking behaviours. For instance, women in many LMICs resort to home-based remedies or traditional medicine, such as Ayurveda, instead of seeking formal medical treatment. A study conducted in Nigeria showed that 25 percent of the women surveyed self-medicate using antibiotics to reduce menstrual cramps.[21] This practice of self-medication not only plays a role in the development of AMR but also highlights

[17] Jasovský et al. 2016.
[18] Fleming et al. 2016.
[19] Fleming et al. 2016; Hatcher et al. 2022.
[20] Barasa 2019.
[21] Sapkota et al. 2010.

the urgent need for better access to affordable, high-quality healthcare services, particularly in the area of menstrual health management.

## 7. Intersectional vulnerabilities

Gendered division of work forces women into unpaid caregiving roles or low-paying occupational roles, including frontline health work and solid waste management, which puts their health at risk. Women from poorer households and lower castes may be particularly vulnerable to the effects of AMR as they are more likely to perform manual labour at agriculture and animal husbandry sites, which results in higher exposure to injuries and open wounds as well as animals carrying drug-resistant infections. However, economic limitations and gender barriers may prevent women from completing the full course of prescribed antibiotic treatment to cope with these occupational hazards.

The lack of representation of women in the medical field and the historical exclusion of women from clinical trials also leads to skewed prescription practices and results in inappropriate or ineffective treatment options. This inadequate representation might be worse for women of marginalized religion and caste backgrounds. Gender norms coupled with social discrimination, thus, further exacerbate health risks and complicate access to essential healthcare services, especially among women facing other social inequalities, exposing them to unsupervised antibiotics use, and potentially AMR.

## 8. Climate change and AMR

Climate change may impact the AMR burden through the increasing frequency and distribution of infectious diseases and the emergence and spread of zoonotic diseases.[22] The link between rising ambient temperatures and accelerated bacterial growth rates has been documented globally, with warmer climates facilitating faster replication and increased horizontal gene transfer of resistance elements among bacterial populations.[23] Moreover, seasonal temperature spikes have been correlated with higher rates of Gram-negative bloodstream infections in hospital settings, suggesting that heat stress on healthcare infrastructure can indirectly drive increased antibiotic use. Further, flooding events mobilize pathogens from soil and sewage into drinking water sources, potentially leading to outbreaks of waterborne diseases such as cholera, typhoid, and diarrhoea, which often increase the consumption of antibiotics in the population affected.

## 9. Socio-economic and gendered impacts

Extreme weather events can expose already vulnerable sections of society—such as the homeless, elderly, pregnant women, poor, and marginalized castes—to more diseases and antimicrobial consumption. Caste-based land dispossession makes people from marginalized castes more vulnerable to food insecurity, diseases, malnutrition, and AMR. Extended droughts and reduced water availability force households to rely on unsafe water sources, amplifying the risk of repeated gastrointestinal infections and unsupervised antibiotic self-medication, especially where access to formal health care is limited. Furthermore, women are responsible for fetching water and firewood for their families. Climate change, with its potential for droughts, reduced water availability, and deforestation, forces them to travel

[22] Eber et al. 2011.
[23] Fernández Salgueiro et al. 2024.

longer distances, increasing their workload and reducing time available for education, income-generating activities or rest, thereby increasing their health and AMR risks.

## 10. Agricultural and livestock impacts

In agricultural settings, rising temperatures and altered precipitation patterns disrupt livestock and aquaculture systems, leading farmers to increase prophylactic antibiotic use to prevent heat- and stress-related infections in animals. For instance, aquaculture sectors in Western geographic settings have reported higher antibiotic inputs in warmer seasons to control Vibrio outbreaks linked to warming waters.[24] Runoff from animal husbandry sites further transports antibiotic residues and resistant bacteria into surrounding soils and waterways, creating environmental reservoirs of resistance genes that can enter human and animal microbiomes.

## 11. Climate migration and institutional breakdown

The rising frequency of both rapid- and slow-onset climate-related disasters is likely to cause dramatic increases in human migration.[25] Families displaced by climate shocks are at heightened risk of diseases (and hence also antibiotic consumption and AMR) during and after migration in the following ways: (a) exposure to harsher and unsafe environments, (b) lack of sanitation and hygiene in overcrowded spaces, (c) exposure to pathogens, (d) lack of access to quality healthcare services, increasing chances of self-medication or reliance on last-resort antibiotics, and hospital acquired infections, and (e) lack of food security, leading to chances of food-borne zoonotic diseases. Furthermore, displacement camps which often house displaced families, can lack robust WASH infrastructure and antimicrobial stewardship programmes, resulting in unregulated antibiotic distribution and administration.

Climate-driven shifts in the geographic range of vector-borne diseases have also introduced new bacterial co-infections that require antibiotic treatment. For instance, areas newly endemic for dengue and malaria face secondary bacterial infections that are often empirically treated with broad-spectrum antibiotics, intensifying AMR pressure.[26]

Heavy rainfall and storm surges increase wastewater overflows, dispersing antibiotic residues, heavy metals and microplastics into rivers and coastal zones. These pollutants co-select for multidrug-resistant bacteria in aquatic ecosystems, creating hotspots of resistance gene exchange between environmental and human pathogens. Thawing of permafrost and glacial melt can release ancient and novel resistance genes into modern ecosystems. The available literature notes preservation of resistance elements in Arctic and alpine ice, which may be liberated into soils and waterways as temperatures rise.[27]

Finally, climate change-induced natural disasters can lead to a breakdown of public institutions—both health care and administrative. Without efficient functioning of institutions at various levels, outbreak of diseases and inappropriate consumption of antibiotics are likely to be difficult to control. Climate change induced disruptions to cold storage and the supply chain can lead to the degradation of antibiotics, resulting in their reduced efficacy and promoting the survival of bacteria exposed to sub-lethal doses, thereby increasing the

[24] Fernández Salgueiro et al. 2024.
[25] Kaczan and Orgill-Meyer 2020.
[26] Salgado et al. 2024; Siribhadra et al. 2022.
[27] Bavel et al. 2024.

selection pressure for antimicrobial resistance.[28] Disruptions to cold-chain logistics in remote regions due to extreme weather can also compromise vaccine efficacy, increasing reliance on antibiotic treatment for preventable diseases. Similarly, damage to laboratory and surveillance capacities during floods or storms hinders timely detection of resistant outbreaks, delaying critical public health responses and potentially allowing unchecked spread of AMR.

## 12. Policy implications

The simple tools and conceptual frameworks presented in this article are outputs of the workshop deliberations, aimed to guide policymakers, researchers, and other stakeholders to better understand the intersections of caste, climate change, and AMR in the South Asian setting. The policy reflections that follow are situated within India's governance and health system context and aim to inform the ongoing implementation of the National Action Plan on AMR and related state-level initiatives; similar initiatives exist in the rest of South Asia.

AMR is a complex issue that spans the health, agriculture, and environment sectors, highlighting the need for an intersectoral approach to tackling AMR. The current framing of the public health threat of AMR lacks inclusion of the environmental and social sectors, such as labour, sanitation, social protection, and urban infrastructure, in policy discussions and legislations or guidelines. There is also an urgent need to build novel research evidence on the socio-economic and climate drivers of AMR to inform policy. Equally critical is the establishment of robust surveillance systems that systematically collect and publicly report gender-, caste-, and region-disaggregated AMR data across human, animal, and environmental health domains—a foundational step towards building this evidence base, which will enable policymakers to formulate targeted interventions that address the specific needs of marginalized populations, including women and lower caste communities, who often face disproportionate health burdens.

Our discussions underscored the importance of establishing a country-specific governmental taskforce dedicated to AMR. This taskforce should include a surveillance and equity subcommittee to ensure social determinants are embedded within data collection frameworks and reporting tools. The taskforce should also facilitate the intersectoral implementation of national and state action plans, integrating inputs from multiple sectors, including health, agriculture, environment, education, and labour. By creating such a unit, governments can ensure coordinated action across all relevant sectors, fostering a unified approach to combat AMR.

In parallel, policymakers should prioritize improving awareness and understanding of AMR through effective, inclusive communication, education, and training. Developing context-specific and locally tested awareness materials with tailored messages, inclusive language and imagery, and delivery methods that address gender discrimination and socio-cultural barriers is critical. These efforts should actively engage community members, particularly those with lived experiences of inequities, to inform the co-design and implementation of awareness materials and campaigns.[29]

[28] Fagunwa et al. 2024.
[29] Batheja et al. 2025c.

In order to address persistent gender- and caste-blind spots in policymaking, it is imperative that state action plans embed gender- and caste-responsive indicators, ensuring that interventions are tailored to the unique vulnerabilities of women and marginalized caste groups in each state and region. These indicators should be integrated into national surveillance platforms such as the Integrated Health Information Platform, with mandatory periodic audits of diagnostic access, antibiotic consumption, and WASH coverage by social group.

Equally important is the inclusion of community voices, especially those most affected by AMR, such as patients and caregivers from lower caste groups and women who are primary caregivers, to ensure that policy design and implementation are grounded in lived realities.

Given India's federal structure and wide geographic and demographic diversity, each state should conduct context-specific assessments of the drivers of AMR—ranging from water scarcity and sanitation deficits to livestock practices and health-seeking behaviours—and translate these into state-level action plans with dedicated budgets, timelines, and measurable targets, but most importantly, incorporating state-specific contexts.

To operationalize these requirements, we discussed the need for the recruitment of state-level nodal officers for AMR equity, capacity-building workshops for frontline health workers on collecting and analysing disaggregated data, and establishment of community advisory boards—including representatives from women's collectives and scheduled caste associations—are crucial steps. Regular public reporting and open access data would enhance accountability and enable researchers to track inequities over time.

Finally, increasing funding for intersectional and interdisciplinary research on AMR risks, vulnerabilities, drivers, and outcomes is essential. Such research should include the development of baseline indicators and evaluation metrics that capture the challenges faced by diverse socio-economic groups. Gender and equity considerations should also be integrated into all AMR research and innovation efforts, including diagnostics, to ensure inclusive and context-sensitive solutions.

Further, integrating AMR indicators into existing national programmes such as the National Health Mission and Swachh Bharat Mission can leverage established platforms for robust monitoring and evaluation. Periodic reviews and adaptive management, conducted jointly by health, social justice, environment, and labour ministries at the state level, can help refine interventions, closing gaps in caste and gender equity.

At the community level, raising knowledge and awareness about AMR among the general public can facilitate the co-creation of inclusive solutions, supporting a Just Transition towards equitable and sustainable AMR mitigation strategies.[30] Simply disseminating information, however, is inadequate; instead, it is essential to implement communication strategies that are culturally appropriate and accessible to all members of the community, particularly women and marginalized groups, who may face additional barriers to understanding and addressing AMR. Such strategies should involve the use of cultural mediators, community health workers, and the creation of locally tailored educational materials, including infographics in vernacular languages, to ensure effective communication and comprehension of AMR and its implications for public health.

[30] Varadan et al. 2024.

Addressing AMR in agriculture and veterinary practices is also crucial. Policies should regulate the use of antibiotics in animal husbandry, aquaculture, and crop production to prevent the development of resistant strains. However, efforts should be made to ensure that small-scale farmers are not disproportionately affected by these regulations, and that they have access to resources that allow them to transition away from antibiotic-dependent practices. Additionally, promoting alternative methods for disease prevention in agriculture and improving hygiene standards can reduce the need for antibiotics in these sectors.

In conclusion, tackling AMR requires a comprehensive, intersectoral approach that integrates health, agriculture, environment, and social sectors. Policy interventions should focus on improving healthcare access, regulating antibiotic use, strengthening community engagement, and addressing the environmental and socio-economic factors that drive AMR. By adopting these policy recommendations, governments can build an effective response to AMR that is equitable, sustainable, and capable of protecting public health for future generations.

## 13. Limitations

This article synthesizes discussions from a cross-disciplinary workshop on AMR and its social and environmental determinants, and is therefore interpretive based on the academic and field experiences of the participants rather than based on primary data. The deliberations, while rich in perspective, were constrained by the absence of gender- and caste-disaggregated data to guide analysis and by limited representation across India's diverse regional contexts. As such, the insights presented here are not nationally generalizable but aim to highlight key structural gaps and blind spots in existing AMR discourse. Nonetheless, since the participants included experts on gender, caste, climate change, and AMR with extensive research experience in each field, the deliberations in the workshop did take into account the contributions of those research fields to a large extent. Further empirical research, particularly using disaggregated, region-specific AMR data, is needed to deepen and validate the associations discussed and presented here.

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**Author contribution.** DB and SG conceptualized the idea, with DB leading the organization of the workshop. RB, AB, DS and SG wrote the first draft, with RB leading the writing, under the supervision of DB. The rest of the authors contributed to the discussions and reviewed the paper.

**Acknowledgements.** D.B. acknowledges financial and technical support from the British Academy's Global Convening Programmes—Knowledge Translation (Grant no.: GCPKT\100023) and UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR), World Health Organization, Geneva, Switzerland (Grant No.: AP23-0156). E.C. acknowledges funding by Wellcome Trust Career Development Fellowship grant [225960/Z/22Z] and CAMO-Net Programme [226690/Z/22Z]. The authors alone are responsible for the views expressed in this article and they do not necessarily represent the views, decisions, or policies of the institutions with which they are affiliated. The authors also thank Astha Singh and Abhishek Shah of the One Health Trust for helping organize this workshop.

## References

Aamir Ali, M. S. 2019. "Manual Scavenging: Intersection of Caste and Labor." *International Journal of Law*. https://papers.ssrn.com/abstract=3667457.

Acharya, S. S. 2018. "Health Equity in India: An Examination through the Lens of Social Exclusion." *Journal of Social Inclusion Studies* 4 (1): 104–30. https://doi.org/10.1177/2394481118774489.

Barasa, V. 2019. "WaArusha Agro-Pastoralist Experiences with Risk of Febrile Illness: An Ethnographic Study of Social Drivers of Zoonoses and Rural Health-Seeking Behaviours in Monduli District, Northern Tanzania." Thesis, University of Sussex, 226.

Batheja, D., S. Goel, and E. Charani. 2025a. "Understanding Gender Inequities in Antimicrobial Resistance: Role of Biology, Behaviour and Gender Norms." *BMJ Global Health* 10 (1). https://doi.org/10.1136/bmjgh-2024-016711.

Batheja, D., V. Saint, Z. Dobreva, S. Goel, S. Lewycka, E. Mutua, S. Nayiga, et al. 2025c. "Integrating Gender and Equity Commitments in the Revised Global Action Plan on Antimicrobial Resistance." *The Lancet* 406: 1200–3.

Batheja, D., D. Samria, S. Lewycka, and A. Nandi. 2025b. "Gender Inequality and Antibiotic Consumption: Analysis of Pharmaceutical Sales Data from 70 Countries, 2000-2022 (SSRN Scholarly Paper 5220520)." Social Science Research Network. https://doi.org/10.2139/ssrn.5220520.

Bavel, B. van, L. Berrang-Ford, K. Moon, F. Gudda, A. J. Thornton, R. F. S. Robinson, and R. King. 2024. "Intersections between Climate Change and Antimicrobial Resistance: A Systematic Scoping Review." *The Lancet Planetary Health* 8 (12): e1118–28. https://doi.org/10.1016/S2542-5196(24)00273-0.

Borooah, V. 2018, May. The Social Orientation of India's Integrated Child Development Services (ICDS) Program [MPRA Paper]. https://mpra.ub.uni-muenchen.de/90421/.

Deshpande, Ashwini. 2011. "The Grammar of Caste: Economic Discrimination in Contemporary India." 10.1093/acprof:oso/9780198072034.001.0001.

Eber, M. R., M. Shardell, M. L. Schweizer, R. Laxminarayan, and E. N. Perencevich. 2011. "Seasonal and Temperature-Associated Increases in Gram-Negative Bacterial Bloodstream Infections among Hospitalized Patients." *PLoS One* 6 (9): e25298. https://doi.org/10.1371/journal.pone.0025298.

Fagunwa, O. E., D. Ashiru-Oredope, B. F. Gilmore, S. Doherty, L. B. Oyama, and S. A. Huws. 2024. "Climate Change as a Challenge for Pharmaceutical Storage and Tackling Antimicrobial Resistance." *Science of the Total Environment* 956: 177367. https://doi.org/10.1016/j.scitotenv.2024.177367.

Fernández Salgueiro, M., J. A. Cernuda Martínez, R. K. Gan, and P. Arcos González. 2024. "Climate Change and Antibiotic Resistance: A Scoping Review." *Environmental Microbiology Reports* 16 (5): e70008. https://doi.org/10.1111/1758-2229.70008.

Fleming, P. J., R. J. DiClemente, and C. Barrington. 2016. "Masculinity and HIV: Dimensions of Masculine Norms that Contribute to Men's HIV-Related Sexual Behaviors." *AIDS and Behavior* 20 (4): 788–98. https://doi.org/10.1007/s10461-015-1264-y.

Goghari, V. M., and M. Kusi. 2023. "An Introduction to the Basic Elements of the Caste System of India." *Frontiers in Psychology* 14: 1210577. https://doi.org/10.3389/fpsyg.2023.1210577.

Hatcher, A. M., A. Gibbs, R.-S. McBride, D. Rebombo, M. Khumalo, and N. J. Christofides. 2022. "Gendered Syndemic of Intimate Partner Violence, Alcohol Misuse, and HIV Risk among Peri-Urban, Heterosexual Men in South Africa." *Social Science & Medicine* 295: 112637. https://doi.org/10.1016/j.socscimed.2019.112637.

Jasovský, D., J. Littmann, A. Zorzet, and O. Cars. 2016. "Antimicrobial Resistance—A Threat to the World's Sustainable Development." *Upsala Journal of Medical Sciences* 121 (3): 159–64. https://doi.org/10.1080/03009734.2016.1195900.

Kaczan, D. J., and J. Orgill-Meyer. 2020. "The Impact of Climate Change on Migration: A Synthesis of Recent Empirical Insights." *Climatic Change* 158 (3): 281–300. https://doi.org/10.1007/s10584-019-02560-0.

Kumar, M., and S. Kharb. 2024. "Caste and Class Interactions in Inequality in Access to Sanitation and Hygiene Services in India." *Journal of Water, Sanitation and Hygiene for Development* 14 (5): 400–11. https://doi.org/10.2166/washdev.2024.020.

Lewnard, J. A., E. Charani, A. Gleason, L. Y. Hsu, W. A. Khan, A. Karkey, C. I. R. Chandler, et al. 2024. "Burden of Bacterial Antimicrobial Resistance in Low-Income and Middle-Income Countries Avertible by Existing Interventions: An Evidence Review and Modelling Analysis." *The Lancet* 403 (10442): 2439–54. https://doi.org/10.1016/S0140-6736(24)00862-6.

Narayanan, Y. 2023. "Animating Caste: Visceral Geographies of Pigs, Caste, and Violent Nationalisms in Chennai City." *Urban Geography* 44 (10): 2185–205. https://doi.org/10.1080/02723638.2021.1890954.

Prestinaci, F., P. Pezzotti, and A. Pantosti. 2015. "Antimicrobial Resistance: A Global Multifaceted Phenomenon." *Pathogens and Global Health* 109 (7): 309–18. https://doi.org/10.1179/2047773215Y.0000000030.

Rajuladevi, A. K. 2001. "Food Poverty and Consumption among Landless Labour Households." *Economic and Political Weekly* 36 (28): 2656–64.

Ruckert, A., Z. Dobreva, S. Garkay Naro, S. Paulin, L. A. Wilson, C. McGall, R. Morgan, et al. 2025. "The Role of Gender in Antimicrobial Resistance: Findings from a Scoping Review." *Global Public Health* 20 (1). https://doi.org/10.1080/17441692.2025.2542400.

Sabharwal, N. S., K. A. Naik, G. D. Diwakar, and S. Sharma. 2014. "Swallowing the Humiliation: The Mid-Day Meal and Excluded Groups." *Journal of Social Inclusion Studies* 1 (1): 169–82. https://doi.org/10.1177/2394481120140111.

Salgado, D., J. M. Silva, A. Salcedo, P. X. Losada, A. P. Niño, M. Molano, J. M. Bermeo, et al. 2024. "Frequency, Markers and Costs of Secondary Bacterial Infection in Pediatric Dengue." *The Pediatric Infectious Disease Journal* 43 (2): 123–9. https://doi.org/10.1097/INF.0000000000004156.

Sapkota, A. R., M. E. Coker, R. E. Rosenberg Goldstein, N. L. Atkinson, S. J. Sweet, P. O. Sopeju, M. T. Ojo, et al. 2010. "Self-Medication with Antibiotics for the Treatment of Menstrual Symptoms in Southwest Nigeria: A Cross-Sectional Study." *BMC Public Health* 10 (1): 610. https://doi.org/10.1186/1471-2458-10-610.

Siribhadra, A., T. Ngamprasertchai, P. Rattanaumpawan, S. Lawpoolsri, V. Luvira, and P. Pitisuttithum. 2022. "Antimicrobial Stewardship in Tropical Infectious Diseases: Focusing on Dengue and Malaria." *Tropical Medicine and Infectious Disease* 7 (8): 159. https://doi.org/10.3390/tropicalmed7080159.

Varadan, S. R., C. I. R. Chandler, K. Weed, S. M. Ahmed, C. Atuire, D. Batheja, S. J. Bull, et al. 2024. "A Just Transition for Antimicrobial Resistance: Planning for an Equitable and Sustainable Future with Antimicrobial Resistance." *The Lancet* 403 (10446): 2766–7. https://doi.org/10.1016/S0140-6736(23)01687-2.

WHO. 2023a. "Global Health Estimates: Leading Causes of DALYs." https://www.who.int/data/gho/data/themes/mortality-and-global-health-estimates/global-health-estimates-leading-causes-of-dalys.

WHO. 2023b. "People-Centred Approach to Addressing Antimicrobial Resistance in Human Health: WHO Core Package of Interventions to Support National Action Plans." https://www.who.int/publications-detail-redirect/9789240082496.

WHO 2024. "Addressing Gender Inequalities in National Action Plans on Antimicrobial Resistance." https://www.who.int/publications/i/item/9789240097278.

**Cite this article:** Bhagawati, Rishiraj, Abhik Banerji, Esmita Charani, Deepak Malghan, Sonia Lewycka, Srishti Goel, Ashish Giri, Shireen Jejeebhoy, Kashish Chhotaria, Hemangi Kadlak, Anastasia Koch, Ambika Lall, Ramanan Laxminarayan, Danny Muzata, Vrinda Nampoothiri, Rashmi Nayar, Neethi Rao, Srikanth Reddy Umenthala, Divija Samria, Samantha Serrano, Arpit Shah, A Shivram, Allen Ugargol, Swetha Valavarasu, Manjulika Vaz, Nancy G. Angeline, Yamini Atmavilas, Tikesh Bisen, B. Ramakrishna Goud, Ankur Jamwal, Merlyn Joseph, Arunima Sehgal Mukherjee, Akshatha Prasad, T. S. Syamala, Tamizhoviya Indhoomati Thangavel, Opinder Kaur, and Deepshikha Batheja. 2026. "Understanding the Socio-economic and Environmental Determinants of Antimicrobial Resistance." *Public Humanities,* 2, e107, 1–16. https://doi.org/10.1017/pub.2025.10101