223 Research Paper
22 July 2025

Community Based Surveillance for AMR Monitoring: Significance, Requirements and Feasibility in LMICS

Afreenish Amir

SOUTH CENTRE

RESEARCH PAPER

223

COMMUNITY BASED SURVEILLANCE FOR AMR MONITORING: SIGNIFICANCE, REQUIREMENTS AND FEASIBILITY IN LMICS

Afreenish Amir[1]

SOUTH CENTRE

22 JULY 2025

[1] Dr. Afreenish Amir is a Consultant on Antimicrobial Resistance at the South Centre.

SOUTH CENTRE

In August 1995, the South Centre was established as a permanent intergovernmental organization. It is composed of and accountable to developing country Member States. It conducts policy-oriented research on key policy development issues and supports developing countries to effectively participate in international negotiating processes that are relevant to the achievement of the Sustainable Development Goals (SDGs). The Centre also provides technical assistance and capacity building in areas covered by its work program. On the understanding that achieving the SDGs, particularly poverty eradication, requires national policies and an international regime that supports and does not undermine development efforts, the Centre promotes the unity of the South while recognizing the diversity of national interests and priorities.

NOTE

The views contained in this paper are attributable to the author/s and do not represent the institutional views of the South Centre or its Member States. Any mistake or omission in this study is the sole responsibility of the author/s.

Any comments on this paper or the content of this paper will be highly appreciated. Please contact:

South Centre
International Environment House 2
Chemin de Balexert 7–9
1219 Geneva
Switzerland
Tel. (41) 022 791 80 50
south@southcentre.int
www.southcentre.int

ABSTRACT

Community based surveillance, in addition to clinical antimicrobial resistance (AMR) surveillance, plays an essential role in AMR and antimicrobial use trend monitoring. Various community-based AMR surveillance studies to monitor trends in AMR and use of antimicrobials have been conducted and shown its potential to facilitate evidence-based interventions and policy making for control of AMR. Many low and middle income countries (LMICs) lack the necessary systems and resources to establish effective surveillance systems. Specifically, the surveillance capacity at hospitals and other health facilities is limited, and the overall human resource capacity for community-level data collection, analysis, and multi-sectoral coordination is severely constrained. Prior to planning for community based AMR surveillance, a country should have established mechanisms to run the system efficiently, including strong governance and regulations, surveillance infrastructure, laboratory capacities, skilled human resources, data collection and management, funding and sustainability.

The World Health Organization and quadripartite partners have recommended advancing community based AMR surveillance in LMICs, and integrated AMR surveillance combining information from humans, animals and ecosystems, which seems a challenge in the current situation. Considering the significant gaps in systems, resources, and capacities, it is important to prioritize strengthening the country's core capacities and addressing the underlying gaps in healthcare systems. Efforts should focus on enhancing the country's core capacities, systems, and technical requirements while exploring the potential of advancing selective community based AMR surveillance interventions and systems in the future.

La vigilancia comunitaria, además de la vigilancia clínica de la resistencia a los antimicrobianos (RAM), desempeña un papel esencial en el seguimiento de las tendencias de la RAM y el uso de antimicrobianos. Se han realizado diversos estudios de vigilancia comunitaria de la RAM para seguir las tendencias de la RAM y el uso de antimicrobianos, que han demostrado su potencial para facilitar intervenciones basadas en datos empíricos y la elaboración de políticas para el control de la RAM. Muchos países de ingresos bajos y medios (PIBM) carecen de los sistemas y recursos necesarios para establecer sistemas de vigilancia eficaces. En concreto, la capacidad de vigilancia de los hospitales y otros centros de salud es limitada, y la capacidad general de recursos humanos para la recopilación de datos a nivel comunitario, el análisis y la coordinación multisectorial es muy limitada. Antes de planificar la vigilancia de la RAM basada en la comunidad, los países deben haber establecido mecanismos para gestionar el sistema de manera eficiente, incluyendo una gobernanza y una normativa sólidas, infraestructura de vigilancia, capacidad de los laboratorios, recursos humanos cualificados, recopilación y gestión de datos, financiación y sostenibilidad.

La Organización Mundial de la Salud y los socios cuatripartitos han recomendado avanzar en la vigilancia de la RAM basada en la comunidad en los países de ingresos bajos y medios, así como en la vigilancia integrada de la RAM que combine información de seres humanos, animales y ecosistemas, lo que parece un reto en la situación actual. Teniendo en cuenta las importantes deficiencias en los sistemas, los recursos y las capacidades, es importante dar prioridad al fortalecimiento de las capacidades básicas del país y a la subsanación de las deficiencias subyacentes en los sistemas de salud. Los esfuerzos deben centrarse en mejorar las capacidades básicas, los sistemas y los requisitos técnicos del país, al tiempo que se explora el potencial de avanzar en el futuro hacia intervenciones y sistemas selectivos de vigilancia de la RAM basados en la comunidad.

La surveillance communautaire, en complément de la surveillance clinique de la résistance aux antimicrobiens (RAM), joue un rôle essentiel dans le suivi des tendances en matière de RAM et d'utilisation des antimicrobiens. Diverses études de surveillance communautaire de la RAM ont été menées afin de suivre les tendances en matière de RAM et d'utilisation des antimicrobiens. Elles ont démontré leur potentiel pour faciliter la mise en place d'interventions fondées sur des données probantes et l'élaboration de politiques visant à contrôler la RAM. De nombreux pays à revenu faible ou intermédiaire (PRFI) ne disposent pas des systèmes et des ressources nécessaires pour mettre en place des systèmes de surveillance efficaces. Plus précisément, les capacités de surveillance des hôpitaux et autres établissements de santé sont limitées, et les ressources humaines globales pour la collecte de données au niveau communautaire, l'analyse et la coordination multisectorielle sont très restreintes. Avant de planifier une surveillance communautaire de la RAM, un pays doit avoir mis en place des mécanismes permettant de faire fonctionner efficacement le système, notamment une gouvernance et une réglementation solides, une infrastructure de surveillance, des capacités de laboratoire, des ressources humaines qualifiées, des systèmes de collecte et de gestion des données, un financement et une viabilité.

L'Organisation mondiale de la santé et ses partenaires quadripartites ont recommandé de faire progresser la surveillance communautaire de la RAM dans les pays à revenu faible et intermédiaire, ainsi que la surveillance intégrée de la RAM combinant des informations provenant des humains, des animaux et des écosystèmes, ce qui semble difficile dans la situation actuelle. Compte tenu des lacunes importantes en matière de systèmes, de ressources et de capacités, il est important de donner la priorité au renforcement des capacités de base du pays et de combler les lacunes sous-jacentes des systèmes de santé. Les efforts devraient se concentrer sur le renforcement des capacités de base, des systèmes et des exigences techniques du pays, tout en explorant le potentiel de mise en place, à l'avenir, d'interventions et de systèmes sélectifs de surveillance communautaire de la RAM.

TABLE OF CONTENTS

1. SIGNIFICANCE OF COMMUNITY BASED SURVEILLANCE FOR AMR

Community based surveillance (CBS), in addition to clinical AMR surveillance, plays an essential role in AMR and antimicrobial use trend monitoring. Clinical AMR surveillance primarily focuses on AMR in patients, potentially overlooking environmental and community based AMR reservoirs. By integrating the community based AMR surveillance data in existing clinical AMR surveillance, researchers and policymakers can triangulate the findings from the different datasets. They can understand the complex dynamics of AMR, identify AMR hotspots and reservoirs, track the spread of AMR genes and resistant bacteria, develop targeted interventions and strategies and hence monitor the effectiveness of AMR control measures.

CBS is one of the tested strategies to guide control of antimicrobial overuse or misuse. The natural environment is an important reservoir of AMR. There is discharge of antimicrobials and their metabolites into the environment from a wide range of sectors, including waste, wastewater, sewage, pharmaceutical manufacturing, agriculture and aquatic environment. This makes CBS a vital approach to understand the AMR dynamics.

Community Based AMR Surveillance involves assessment of:
✓ Risks of transmission of resistant pathogens to humans through environmental routes. ✓ The risk of emerging infections with high antibiotic resistance potential. ✓ Geographical and temporal antibiotic resistance trends in human and animal populations at local, regional and global scales. ✓ The effect of antibiotics on various ecosystems including water and soil ✓ Exploring the AMR trends in human population by examining the wastewater or sewage environmental samples. ✓ Studying the antibiotic use in human populations by determining antibiotic concentrations in environmental samples

2. IMPACT OF COMMUNITY BASED AMR SURVEILLANCE APPROACHES

Various community-based AMR surveillance studies to monitor trends in AMR and the use of antimicrobials have been conducted and shown its potential to facilitate evidence-based interventions and policy making for control of AMR (Table 1).

The Swedish Strategic Program for the Rational Use of Antimicrobial Agents and Surveillance of Resistance (STRAMA), coordinated by a national steering committee, is targeting surveillance and tracking AMR trends over time, and also aims to reduce antimicrobial use in community by interventions including clinical guidelines, training of prescribers, and consumer education.[2] The European Surveillance of Antimicrobial Consumption (ESAC) project tracked antibiotic consumption, and developed quality tools to promote rational use of antimicrobials.[3] The European Antimicrobial Resistance Surveillance System (EARSS), another system for monitoring AMR trends in community. The SENTRY Antimicrobial Surveillance Program working in 22 countries, is tracking resistance patterns, using a network of sentinel laboratories.[4] Countries such as Denmark and Spain have databases containing information on antimicrobials prescribed for all patients in the country. Prescription information for various populations and between different provinces of the country are analyzed to determine trends in antimicrobial use at the population level. Majority of environmental surveillance initiatives are from highly income developed countries e.g., JPIAMR,[5] the Tricycle project,[6] NARMS (Surface Water AMR Monitoring SWAM),[7] EARS-net, EARS-vet. There are many challenges to implement such studies in resource constrained settings.

Community based AMR surveillance studies have been targeting human sewage as a source for monitoring AMR and suggest it as an affordable surveillance option in resource-poor settings for AMR surveillance.[8] The ongoing surveillance for polio eradication program is also following the sewage systems. Various CBS studies from USA, China and Brazil targeted water sources. A pilot study was conducted across six wastewater treatment plants in urban, rural, and remote communities in Canada. Results revealed that urban sites exhibited higher AMR levels and gene diversity compared to remote sites, highlighting the influence of population density on AMR dissemination.

---

[2] Mölstad S, Erntell M, Hanberger H, et al. “Sustained reduction of antibiotic use and low bacterial resistance: 10-year follow-up of the Swedish Strama programme”. 2008;8(2):125-132.
[3] Vander Stichele R H, Elseviers M M, Ferech M, Blot S, Goossens H, “European surveillance of antimicrobial consumption (ESAC): data collection performance and methodological approach”. 2004;58(4):419-428.
[4] De Kraker M, Jarlier V, Monen J, et al. “The changing epidemiology of bacteraemias in Europe: trends from the European Antimicrobial Resistance Surveillance System”. 2013;19(9):860-868.
[5] Do NT, Vu HT, Nguyen CT, et al. "Community-based antibiotic access and use in six low-income and middle-income countries: a mixed-method approach". 2021;9(5):e610-e619.
[6] Anjum MF, Schmitt H, Börjesson S, et al. “The potential of using E. coli as an indicator for the surveillance of antimicrobial resistance (AMR) in the environment”. 2021;64:152-158.
[7] Hashim R, Husin SA, Ahmad N, et al. "Tricycle Project–One Health approach: Whole genome sequencing (WGS) of Extended-spectrum beta-lactamase (ESBL) producing Eschericia (E.) coli derived from human, food chain and environment". 2022;116:S105-S106.
[8] Fresno M, Pavez L, Poblete Y, Cortez A, Del Pozo TJFiM. “Unveiling antimicrobial resistance in Chilean fertilized soils: a One Health perspective on environmental AMR surveillance”. 2023;14:1239761.

Table 1
Community based AMR surveillance studies to monitor trends in AMR and use of antimicrobials

Study reference	Study location	Study period	Study objective	Outcome
Javvadi, Y., & Mohan, S. V. Understanding the distribution of antibiotic resistance genes in an urban community using wastewater-based epidemiological approach. *Science of the Total Environment*, *868*, 161419.	India	2023	Monitored the domestic wastewater samples in urban settings	Community's sewage showed positive detection of targeted antibiotic resistance genes, notably aph, aadA1, and strB being particularly abundant. Resistance to aminoglycoside and trimethoprim classes was prevalent, followed by chloramphenicol, sulfonamide, and β-lactams.
Rodriguez-Mozaz S, Vaz-Moreira I, Della Giustina SV, et al. Antibiotic residues in final effluents of European wastewater treatment plants and their impact on the aquatic environment. 2020;140:105733.	Portugal, Spain, Ireland, Cyprus, Germany Finland, and Norway	2020	To monitor the antibiotics in effluent of waste water treatment plants from seven European countries	Within the 53 antibiotics monitored 17 were detected in the final effluent of the WWTPs. The countries exhibiting the highest effluent average concentrations of antibiotics were Ireland, Portugal and Spain, whereas the Norway, Finland, Germany and Cyprus exhibited lower total concentration.
Rahman Z, Liu W, Stapleton L, Kenters N, Dewi DA, Gudes O, Ziochos H, Khan SJ, Power K, McLaws ML, Thomas T. Wastewater-based monitoring reveals geospatial-temporal trends for antibiotic-resistant pathogens in a large urban community. Environmental Pollution. 2023 May 15;325:121403.	Australia	2022	Monitored 25 wastewater treatment plants for the presence of four clinically significant patho gens	ESBL producing *Enterobacteriaceae* were consistently detected, Isolates for carbapenem-resistant *Enterobacteriaceae*, vancomycin-resistant enterococci, and methicillin-resistant *Staphylococcus aureus* were only occasionally detected.

Charles FR, Lim JX, Chen H, Goh SG, He Y, Gin KY-HJSoTTE. Prevalence and characterization of antibiotic resistant bacteria in raw community sewage from diverse urban communities. 2022;825:153926.	Singapore	2022	Compared to the antibiotic resistance profiles of *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa and Enterococcus spp.* from 3 sewage sources: raw community sewage from 2 housing estates, a foreign workers dormitory and a pet center	Multidrug resistant *P. aeruginosa* and *Enterococcus* spp. showed the highest prevalence with percentages above 96%. MDR *E. coli* and MDR *K. pneumoniae* was lower, ranging between 9% to 54% and 8% to 23% respectively. Highest prevalence of MDR *E. coli* and *K. pneumoniae* were detected in the pet center, with a percentage of 54% and 23% respectively.
Asaduzzaman M, Rousham E, Unicomb L, et al. Spatiotemporal distribution of antimicrobial resistant organisms in different water environments in urban and rural settings of Bangladesh. 2022;831:154890	Bangladesh	2022	Integrated survey of AMR was conducted in drinking water, wastewater and surface water (rivers and ponds) in three settings: rural households, rural poultry farms, and urban food markets.	Wastewater had the highest concentrations of ESBL-*E. coli*, CR-*E. coli*, $bla_{\text{CTXM-1}}$ and $bla_{\text{NDM-1}}$ and these were significantly higher in urban compared to rural samples. ESBL-*E. coli* is ubiquitous in drinking water, wastewater and surface water bodies in both rural and urban areas of Bangladesh. CR-*E.coli* found at a high prevalence in wastewater discharged from urban food markets and in rural river samples.
Fresno M, Pavez L, Poblete Y, Cortez A, Del Pozo TJFiM. Unveiling antimicrobial resistance in Chilean fertilized soils: a One Health perspective on environmental AMR surveillance. 2023;14:1239761.	Chile	2023	Identified the AMR genes in fertilized soil and manure	Tetracycline and sulfonamide resistance genes had high prevalence in unamended soil, which highlights the potential risk of persistence of resistance genes in soil microbiome and likelihood of spread of AMR over time.
Abejew AA, Wubetu GY, Fenta TGJPo. A six years	Africa (Mozambiq ue, Ghana,	2024	Community based antibiotic access and use	Vietnam and Bangladesh had the largest proportions of

trend analysis of systemic antibiotic consumption in Northwest Ethiopia. 2024;19(1):e0290391.	and South Africa) and Asia (Bangladesh, Vietnam, and Thailand)		practices across communities were assessed in six LMICs	non-licensed antibiotic dispensing points. Self-medication with antibiotics was found to be widespread in Vietnam (55·2% of antibiotics dispensed without prescription, Bangladesh (45·7%), and Ghana (36·1%), but less so in Mozambique (8·0%), South Africa (1·2%), and Thailand (3·9%)
Gutema G, Ali S, Suleman SJPO. Trends of community based systemic antibiotic consumption: Comparative analyses of data from Ethiopia and Norway calls for public health policy actions. 2021;16(5):e0251400	Ethiopia	2020	Community based consumption of systemic antibiotics for Ethiopia has been studied	Community based consumption of systemic antibiotics increased from 11.02 DID in 2016 to 12.83 DID in 2020 in Ethiopia, an increase by 16.4%

The studies on surveillance interventions have proposed various methods for AMR surveillance, including quantitative polymerase chain reaction, next-generation sequencing, liquid chromatography-tandem mass spectrometry, and shotgun metagenomics. While these techniques provide valuable findings, they require specialized equipment and expertise, making them costly and potentially unsuitable for LMICs. However, these methodologies can be adapted to accommodate limited resources by simplifying sampling strategies, utilizing alternative laboratory methods, and leveraging existing healthcare infrastructure. This makes them a feasible, cost-effective and adaptable approach for understanding antibiotic resistance gene distribution in communities. Collaboration with local institutions, consideration of local contexts, and capacity-building programs can also ensure the sustainability and success of such studies.

3. REQUIREMENTS TO ESTABLISH EFFECTIVE COMMUNITY BASED AMR SURVEILLANCE PROGRAM

3.1 Systems Requirement

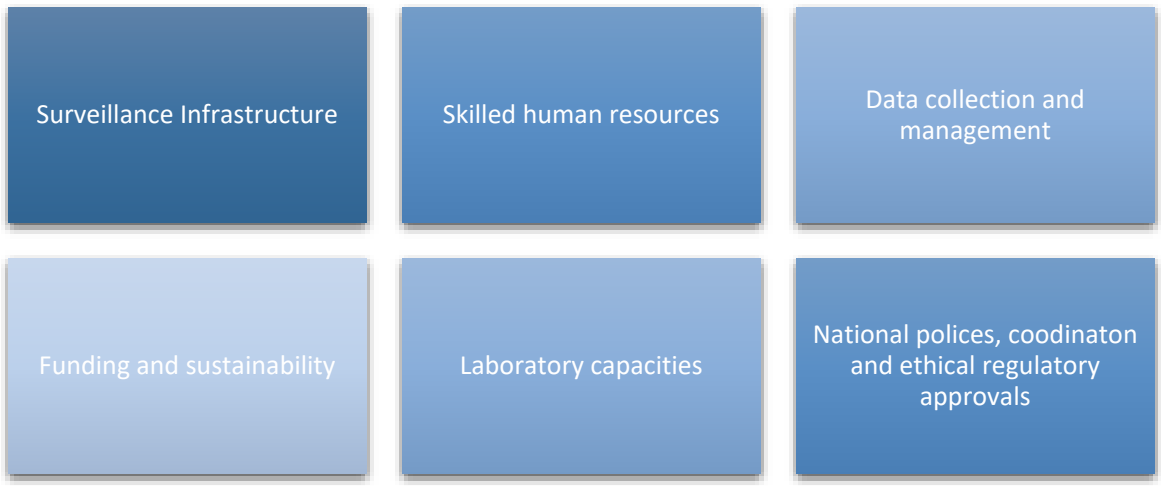
When planning for community based AMR surveillance, a country should have already established the necessary mechanisms to run the systems efficiently,[9,10] (Figure 1). There should be an effective **governance mechanism** at the national level that describes the community based AMR surveillance need and its execution. The policies and action plan should be well defined. The coordination mechanism between health authorities, pharmacies, laboratories, and community healthcare providers should be developed. The ethical and regulatory approvals and community engagement strategies should be defined. **Funding mechanisms** should be established for long-term sustainability. If required, partnerships with local organizations, universities, and global health organizations should be enhanced. The **surveillance infrastructure** is required.

For data collection, a network of community health centers, clinics, and pharmacies is needed. A designated sentinel surveillance sites network would be helpful for systematic sample collection. The country should have reference and sentinel **laboratory network** for pathogen identification and antimicrobial susceptibility testing. The laboratories should be following standardized AMR testing protocols (e.g., CLSI, EUCAST guidelines), and should be enrolled in external quality assurance programs. **Data collection, management and analysis** capacities should be established. Ideally, there should be availability of antimicrobial sales or prescriptions records, standardized data collection tools and electronic AMR surveillance databases for real-time data entry and analysis. It should be integrated with health information systems.

Trained healthcare workers, including nurses, pharmacists, and community health workers are required. Laboratory staff should be skilled in microbial culture, Antibiotic Susceptibility Testing (AST), and molecular diagnostics. There should be data analysts and epidemiologists for trend analysis and reporting. Regular data sharing and CBS AMR surveillance reports should be shared with policymakers and healthcare providers. The trend monitoring can help to identify emerging cases and outbreaks.

[9] McGowan CR, Takahashi E, Romig L, Bertram K, Kadir A, Cummings R, Cardinal LJ. “Community-based surveillance of infectious diseases: a systematic review of drivers of success”. BMJ Global Health. 2022 Aug 1;7(8):e009934.
[10] Holloway K, Mathai E, Gray A, “Surveillance of community antimicrobial use in resource-constrained settings. Experience from five pilot projects”. Community-Based Surveillance of Antimicrobial Use and Resistance in Resource-Constrained Settings Project Group. *Tropical Medicine & International Health*. 2011 Mar;16(3):368-74.

Figure 1
System requirements to establish community based amr surveillance program in LMICs



3.2 Technical Requirements

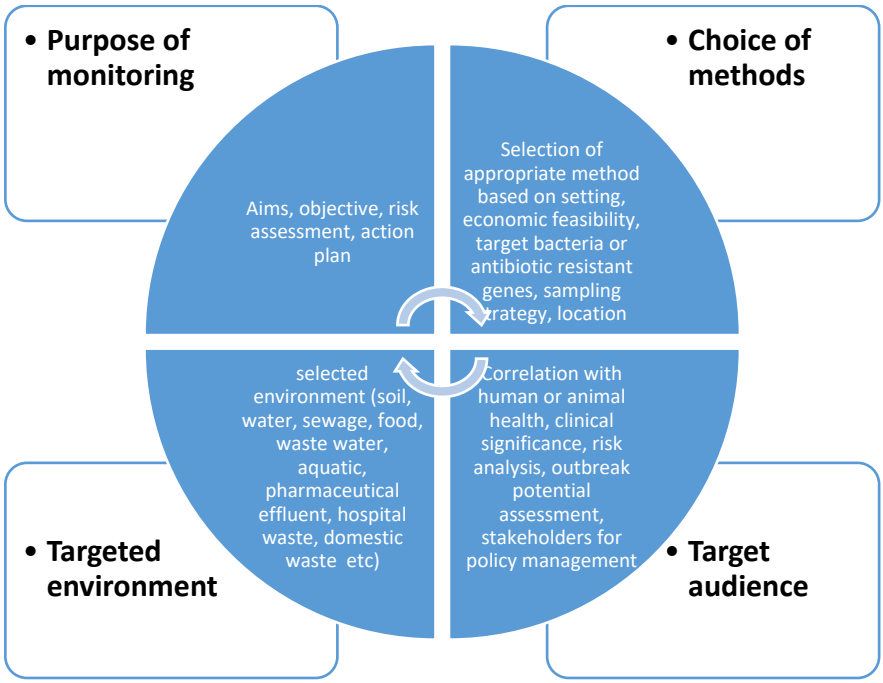
Compared to clinical based surveillance which relies on the large hospitals and laboratories, and common pathogen of concern and specimen type, community based AMR surveillance has different implementation requirements. A comprehensive approach to the community surveillance of AMR uses and combines culture techniques, metagenomics, antimicrobial residues and physicochemical samples.[11] There is need for development of a standard protocol for sequencing for resistant bacteria from the environment and correct interpretation of the generated data. The correlation of sewage metagenomics data with clinical surveillance can be challenges as the former provides resistome information covering the whole community. However, molecular methods are continuously advancing over time, and it can be possible in the future.

To implement AMR environmental surveillance, *E. coli* could be used as an indicator complementing surveillance in humans and livestock. [10] Using *E. coli* as an indicator for AMR in the environment has some key advantages including comparisons to data from human and animal sectors are possible, analysis are relatively cost-effective, easy to implement, protocols are available. *E. coli* is implemented in a multitude of national surveillance programs with several programs producing integrated national reports with human clinical data, livestock carriage and occurrence on meat-products, with some reports also including and clinical veterinary data. Examples of integrated European national reports are RESAPATH,[12] NethMap[13] and DANMAP,[14] NARMS,[15] Canada (CIPARS).[16] Currently, there are no standard methods of surveillance of antimicrobial resistance genes or antibiotics in aquatic and

[11] *https://iris.who.int/bitstream/handle/10665/375008/9789240074668-eng.pdf*
[12] Daigle J. "Addressing gaps in community-level antimicrobial resistance monitoring through wastewater surveillance". 2024.
[13] Jouy E, Chauvin C, Chazel M, Roux Al, Madec J, Kempf I. "Evolution of antimicrobial resistance for E. coli isolated from diseased poultry", (Résapath). 2011.
[14] De Greeff S, Schoffelen A, Verduin C. "NethMap 2020: Consumption of antimicrobial agents and antimicrobial resistance among medically important bacteria in the Netherlands in 2019/MARAN 2020: Monitoring of Antimicrobial Resistance and Antibiotic Usage in Animals in the Netherlands in 2019". 2020.
[15] Bager F. "DANMAP: monitoring antimicrobial resistance in Denmark". 2000;14(4):271-274.
[16] White D, Fedorka-Cray P, Chiller C. "The national antimicrobial resistance monitoring system (NARMS)". Paper presented at: NMC-Annual Meeting Proceedings 2006.

terrestrial and sources. Moreover, there are no implemented standards for the removal of antibiotics and antimicrobial resistance genes from these environmental sources.[17] Following can be key considerations for implementing a program for AMR surveillance (Figure 2).

Figure 2
Technical Requirements to Establish Community Based AMR Surveillance in LMICs



[17] Gow S. "Antimicrobial resistance, prudent use, and the Canadian integrated program for antimicrobial resistance surveillance", (CIPARS). 2005.

4. ASSESSING THE READINESS OF LMICS FOR COMMUNITY BASED AMR SURVEILLANCE ESTABLISHMENT

LMICs face a high burden of resistant infections, and there is continuous threat of emerging infections due to various factors that create an enabling environment. Besides clinical AMR surveillance, community AMR surveillance is crucial and needs comprehensive mechanisms (Figure 1). The review of LMICs capacities reveals a dire situation. LMICs lack the necessary systems and resources to establish effective surveillance systems. Specifically, surveillance capacity in hospitals and other health facilities is limited, and the overall human resource capacity for community-level data collection, analysis, and multi-sectoral coordination is severely constrained.

In this context, the recommendation by WHO and quadripartite partners to establish community based AMR surveillance in LMICs appears to be a highly ambitious, if not impractical goal.[18,19,20] Given the existing gaps in systems, resources, and capacities, it is essential to prioritize enhancing the country's capacities under the required systems and technical requirements, rather than rushing to establish community based AMR surveillance. This strengthening is crucial to ensure that any future efforts to establish community based AMR surveillance are built on a solid foundation, rather than setting up a system that may be collapse due to underlying weaknesses.

Many LMICs continue to face significant challenges in establishing comprehensive AMR surveillance mechanisms. The governance structure for community based AMR surveillance is particularly complex, requiring the coordination of policies, action plans, regulations, and stakeholders, including health authorities, pharmacies, laboratories, and community healthcare providers. A major obstacle is the lack of sustainable funding, as many LMICs have limited health budgets and rely heavily on donor support. Furthermore, the surveillance infrastructure in these countries is often inadequate, with shortages of trained personnel, quality diagnostics, and effective data management systems. The situation is exacerbated by weak and fragmented healthcare systems, the overuse and misuse of antibiotics, and inadequate regulations governing pharmacy practices, ultimately hindering efforts to combat AMR in LMICs.

[18] World Health Organization. “WHO global strategy for containment of antimicrobial resistance”. (2001).
[19] Holloway K, Mathai E, Gray A, “Surveillance of community antimicrobial use in resource-constrained settings. Experience from five pilot projects”. Community-Based Surveillance of Antimicrobial Use and Resistance in Resource-Constrained Settings Project Group. *Tropical Medicine & International Health*. 2011 Mar;16(3):368-74.
[20] World Health Organization. *WHO Outlines 40 Research Priorities on Antimicrobial Resistance*. 2023.

5. CHALLENGES FOR THE IMPLEMENTATION OF COMMUNITY BASED AMR SURVEILLANCE IN LMICS

The healthcare systems in LMICs are struggling to reach standard levels in various areas including strong governance and regulations, surveillance infrastructure, laboratory capacities, skilled human resources, data collection and management, funding and sustainability. The feasibility of community based AMR surveillance implementation is impacted due to these crucial challenges in LMICs. Though community based AMR surveillance being a non-invasive approach seems a rational solution to monitor community-level AMR and use of antimicrobials in LMICs, its implementation needs a comprehensive analysis of the current situation and capacities. Good governance and financial and human resources in LMICs are required. Key challenges in community-based AMR surveillance include establishing adequate sample sizes, maintaining standardized diagnostic protocols, and processing large-scale metagenomic data. AMR analysis from the environmental sources requires specialized techniques and equipment, such as metagenomics and microbiome analysis, which can be resource intensive. The findings generated can be difficult to interpret due to the complex interactions between environmental factors, microorganisms, and AMR genes. Many studies have been conducted and yielded useful findings, yet environmental AMR analysis lacks standardized protocols and quality control measures, which can lead to inconsistencies in data collection and analysis.

The importance of community based AMR surveillance in control of AMR has been recognized and emphasized by various bodies[21][22] including the United Nations General Assembly 2024. The WHO Global Action Plan (2015) on AMR highlighted the need for surveillance of the AMR genes and use of antibiotics, as it is crucial to addressing the global crisis of infections from antibiotic resistant bacteria. The global database for tracking AMR country self-assessment survey showed development towards the community based environmental AMR surveillance initiatives ([23], 2023). The survey shows that 29 member countries have a system for regular monitoring (passive surveillance) of antimicrobial compounds and their metabolites (or residues) and resistant bacteria or antimicrobial resistance genes in water, while 139 countries lack such a system. There is a significant disparity in the implementation of regular monitoring systems across different country income groups. Among the 26 low income countries (LICs), only 5 have established regular monitoring systems. In the 44 LMICs, merely 5 have such systems in place.

In the 46 Upper-Middle-Income Countries, 7 countries having regular monitoring systems. Among the 54 High income countries, only 12 have implemented regular monitoring systems, highlighting substantial room for improvement even among developed countries. This shows that awareness needs to be created along with enabling systems to support the surveillance of antimicrobial resistance genes in water systems. 27 out of 171 countries have conducted a national assessment of risks for residues of antimicrobial compounds and antimicrobial resistant pathogens in the environment. 72 out of 166 countries have legislation and/or regulations to prevent contamination of the environment with antimicrobial compounds and their metabolites discharged to the environment. There are 62 out of 70 countries that have legislation and/or regulation and policies to mitigate risks related to disposal of medicines, antimicrobial agents (unused, left-over products and also product containers) for human use.

[21] https://www.amrleaders.org/resources/antimicrobial-resistance-and-the-climate-crisis.
[22] https://www.un.org/pga/wp-content/uploads/sites/108/2024/09/FINAL-Text-AMR-to-PGA.pdf.
[23] https://amrcountryprogress.org/#/visualization-view.

These statistics highlight the urgent need for LICs and LMICs to adopt an active and financially viable strategy for developing CBS AMR systems. These countries need to consider the capacities of their healthcare infrastructure, governance, and human resources to develop community based AMR surveillance. Further qualitative approaches and research are required to develop cost-effective and feasible solutions for community based AMR surveillance in LMICs. International collaborations and knowledge sharing from already established systems can help bridge the gap in implementing CBS AMR surveillance systems in low-income countries.

6. CONCLUSION

The question of how to develop effective strategies for planning and implementing community based AMR surveillance in LMICs considering their complex systems requires greater attention. These should be context-specific solutions, which require consideration of how to ensure their long-term sustainability.

In LMICs, where multiple challenges and a high burden of AMR exist, community based AMR surveillance can help identify areas with high AMR burdens, identify temporal associations between antibiotic use and resistance in different areas, and inform targeted interventions such as antimicrobial stewardship programs and infection control measures. Moreover, promoting community based AMR surveillance can generate community engagement and a sense of responsibility, facilitating behavioral change interventions. By providing valuable data to inform evidence-based policy making, it can guide national and local strategies to combat AMR, contributing to improved health outcomes in LMICs.

Policy makers at national and global level should also recognize that there are significant challenges in establishing clinical AMR surveillance systems in LMICs, let alone advancing to more sophisticated ones like community based AMR surveillance system. The key concerns include limited resources, such as insufficient funding, inadequate infrastructure, and scarcity of skilled personnel, which challenge the development of AMR surveillance systems. Additionally, weak healthcare systems in LMICs, which are often fragmented and under-resourced, struggle to support AMR surveillance efforts. The lack of standardization in data collection, reporting, and analysis methods delays the comparability and reliability of AMR surveillance data. Generating funds for advanced community based AMR surveillance is also a significant challenge. LMICs often face competing demands for limited resources, making it challenging to allocate funds for advanced AMR surveillance systems. The long-term sustainability is also uncertain, as funding may be unpredictable through local health budgets or reliant on external donors. Technology and infrastructure gaps, such as the lack of electronic laboratory information systems, also hinder the development of advanced AMR surveillance systems.

To address these challenges, policy makers must prioritize funding and other resource allocation for defining context-specific priority AMR interventions, including building capacity on AMR surveillance. International collaboration should be promoted to support technical assistance, capacity building, and funding support. Collaboration among governments and local stakeholders is also vital, facilitating the sharing of data, best practices, identifying appropriate legislation, and regulations.

RECENT SOUTH CENTRE RESEARCH PAPERS

No.	Date	Title	Authors
142	4 January 2022	Competition Law and Access to Medicines: Lessons from Brazilian Regulation and Practice	Matheus Z. Falcão, Mariana Gondo and Ana Carolina Navarrete
143	11 January 2022	Direito Brasileiro da Concorrência e Acesso à Saúde no Brasil: Preços Exploratórios no Setor de Medicamentos	Bruno Braz de Castro
144	27 January 2022	A TRIPS-COVID Waiver and Overlapping Commitments to Protect Intellectual Property Rights Under International IP and Investment Agreements	Henning Grosse Ruse-Khan and Federica Paddeu
145	9 February 2022	The Right to Health in Pharmaceutical Patent Disputes	Emmanuel Kolawole Oke
146	16 February 2022	A Review of WTO Disputes on TRIPS: Implications for Use of Flexibilities for Public Health	Nirmalya Syam
147	28 February 2022	Can Negotiations at the World Health Organization Lead to a Just Framework for the Prevention, Preparedness and Response to Pandemics as Global Public Goods?	Viviana Muñoz Tellez
148	7 March 2022	Marine Genetic Resources Beyond National Jurisdictions: Negotiating Options on Intellectual Property	Siva Thambisetty
149	8 March 2022	The International Discourse on the Right to Development and the Need to Reinvigorate its Implementation	Yuefen Li, Daniel Uribe and Danish
150	21 March 2022	The Liability of Internet Service Providers for Copyright Infringement in Sri Lanka: A Comparative Analysis	By Ruwan Fernando
147	28 February 2022	Les négociations au sein de l'Organisation mondiale de la santé peuvent-elles aboutir à un cadre juste pour la prévention, la préparation et la riposte aux pandémies en tant que bien public mondial?	Viviana Muñoz Tellez
147	28 February 2022	¿Podrán las negociaciones en la organización mundial de la salud resultar en un marco justo para la prevención, la preparación y la respuesta ante pandemias como bienes públicos globales?	Viviana Muñoz Tellez

151	19 April 2022	Escaping the Fragility/Conflict Poverty Trap: How the interaction between service delivery, capacity development and institutional transformation drives the process of transition out of fragility	Mamadou Dia
152	21 April 2022	An Examination of Selected Public Health Exceptions in Asian Patent Laws	Kiyoshi Adachi
153	26 April 2022	Patent Analysis for Medicines and Biotherapeutics in Trials to Treat COVID-19	Srividya Ravi
154	9 May 2022	COVID-19 Vaccines as Global Public Goods: between life and profit	Katiuska King Mantilla and César Carranza Barona
155	27 May 2022	Manufacturing for Export: A TRIPS-Consistent Pro-Competitive Exception	by Carlos M. Correa and Juan I. Correa
156	1 June 2022	A Tough Call? Comparing Tax Revenues to Be Raised by Developing Countries from the Amount A and the UN Model Treaty Article 12B Regimes	Vladimir Starkov and Alexis Jin
157	3 June 2022	WTO Moratorium on Customs Duties on Electronic Transmissions: How much tariff revenue have developing countries lost?	Rashmi Banga
158	15 June 2022	Twenty Years After Doha: An Analysis of the Use of the TRIPS Agreement's Public Health Flexibilities in India	Muhammad Zaheer Abbas, PhD
156	1 June 2022	Un choix cornélien ? Comparaison des recettes fiscales à engranger par les pays en développement au titre des régimes du Montant A et de l'Article 12B du Modèle de convention des Nations Unies	Vladimir Starkov et Alexis Jin
159	15 July 2022	Reaping the Fruits of Research on Microorganisms: Prospects and Challenges for R&D and Industry in Sri Lanka	Ruwan Fernando
160	21 July 2022	Movement Forward on ABS for the Convention on Biological Diversity: Bounded Openness Over Natural Information	Joseph Henry Vogel, Manuel Ruiz Muller, Klaus Angerer, and Christopher May
161	26 July 2022	Two Pillar Solution for Taxing the Digitalized Economy: Policy Implications and Guidance for the Global South	Irene Ovonji-Odida, Veronica Grondona, Abdul Muheet Chowdhary

162	11 August 2022	The Proposed Standing Multilateral Mechanism and Its Potential Relationship with the Existing Universe of Investor – State Dispute Settlement	Danish and Daniel Uribe
163	19 August 2022	The Human Right to Science: From Fragmentation to Comprehensive Implementation?	Peter Bille Larsen and Marjorie Pamintuan
156	1 June 2022	¿Una elección difícil? Comparación de los ingresos fiscales que recaudarán los países en vías de desarrollo a partir de los regímenes del Monto A y del Artículo 12B de la Convención Modelo de las Naciones Unidas	Vladimir Starkov y Alexis Jin
143	11 January 2022	Brazilian Competition Law and Access to Health in Brazil: Exploitative Pricing in the Pharmaceutical Sector	Bruno Braz de Castro
164	23 September 2022	Impact of a Minimum Tax Rate under the Pillar Two Solution on Small Island Developing States	Kuldeep Sharma
165	4 October 2022	Evaluating the Impact of Pillars One and Two	Suranjali Tandon and Chetan Rao
166	6 October 2022	Lessons From India's Implementation of Doha Declaration on TRIPS and Public Health	Nanditta Batra
167	27 October 2022	Analysing Intersections between Climate Change and Human Rights	Daniel Uribe Teran and Luis Fernando Rosales
168	28 October 2022	TRIPS Flexibilities and Access to Medicines: An Evaluation of Barriers to Employing Compulsory Licenses for Patented Pharmaceuticals at the WTO	Anna S.Y. Wong, Clarke B. Cole, Jillian C. Kohler
169	8 November 2022	The WTO TRIPS Decision on COVID-19 Vaccines: What is Needed to Implement it?	Carlos M. Correa and Nirmalya Syam
170	17 November 2022	Left on Our Own: COVID-19, TRIPS-Plus Free Trade Agreements, and the Doha Declaration on TRIPS and Public Health	Melissa Omino and Joanna Kahumbu
171	29 November 2022	Pautas para el Examen de Solicitudes de Patentes Relacionadas con Productos Farmacéuticos	Carlos M Correa

162	11 August 2022	El mecanismo multilateral permanente propuesto y su posible relación con el universo existente de solución de controversias entre inversionistas y estados	Danish y Daniel Uribe
162	11 August 2022	Le mécanisme multilatéral permanent proposé et sa relation potentielle avec l'univers existant du règlement des différends entre investisseurs et États	Danish y Daniel Uribe
172	1 December 2022	Illicit Financial Flows and Stolen Asset Recovery: The Global North Must Act	Abdul Muheet Chowdhary and Sebastien Babou Diasso
171	31 January 2022	Directives pour l'examen des demandes de brevet relatives aux produits pharmaceutiques	Carlos M Correa
173	7 February 2023	Analysis of COVID-Related Patents for Antibodies and Vaccines	Kausalya Santhanam
174	13 February 2023	Leading and Coordinating Global Health: Strengthening the World Health Organization	Nirmalya Syam
138	October 2021	Más allá de la responsabilidad social de las empresas: reforzar la diligencia debida en materia de derechos humanos mediante el Instrumento jurídicamente vinculante sobre empresas y derechos humanos	Daniel Uribe Terán
138	October 2021	Au-delà de la responsabilité sociale de l'entreprise : Renforcer le devoir de diligence en matière de droits de l'homme au moyen de l'instrument juridiquement contraignant relatif aux entreprises et aux droits de l'homme	Daniel Uribe Terán
167	27 October 2022	Analyse des Intersections entre le Changement Climatique et les Droits de l'Homme	Daniel Uribe Teran y Luis Fernando Rosales
167	27 October 2022	Análisis de las intersecciones entre cambio climático y derechos humanos	Daniel Uribe Teran y Luis Fernando Rosales
175	22 March 2023	Experiencias internacionales sobre la concesión de licencias obligatorias por razones de salud pública	Catalina de la Puente, Gastón Palopoli, Constanza Silvestrini, Juan Correa
176	29 March 2023	De dónde viene y a dónde va el financiamiento para la salud mundial	Germán Velásquez

177	18 May 2023	Policy Dilemmas for ASEAN Developing Countries Arising from the Tariff Moratorium on Electronically Transmitted Goods	Manuel F. Montes and Peter Lunenborg
178	22 May 2023	A Response to COVID-19 and Beyond: Expanding African Capacity in Vaccine Production	Carlos M. Correa
179	14 July 2023	Reinvigorating the Non-Aligned Movement for the Post-COVID-19 Era	Yuefen Li, Daniel Uribe and Danish
180	9 August 2023	Neglected Dimension of the Inventive Step as Applied to Pharmaceutical and Biotechnological Products: The case of Sri Lanka's patent law	Ruwan Fernando
181	14 August 2023	Trends, Reasons and Prospects of De-dollarization	Yuefen Li
182	7 September 2023	Multistakeholderism: Is it good for developing countries?	Harris Gleckman
183	15 September 2023	Least Developed Countries and Their Progress on the Sustainable Development Goals	Peter Lunenborg
184	15 September 2023	Promoting Jordan's Use of Compulsory Licensing During the Pandemic	Laila Barqawi
185	13 October 2023	Foreign Investment Flows in a Shifting Geoeconomic Landscape	Danish
182	7 September 2023	Multistakeholderismo: ¿Es bueno para los países en desarrollo?	Harris Gleckman
182	7 September 2023	Multipartisme: est-ce bon pour les pays en développement?	Harris Gleckman
186	14 November 2023	Patentamiento de anticuerpos monoclonales. El caso de Argentina	Juan Correa, Catalina de la Puente, Ramiro Picasso y Constanza Silvestrini
187	4 December 2023	The Global Digital Compact: opportunities and challenges for developing countries in a fragmented digital space	Carlos Correa, Danish, Vitor Ido, Jacquelene Mwangi and Daniel Uribe
188	7 December 2023	The Intersection Between Intellectual Property, Public Health and Access to Climate-Related Technologies	Lívia Regina Batista
189	21 December 2023	Status of Permanent Establishments under GloBE Rules	Kuldeep Sharma

190	24 January 2024	Implementing the Doha Declaration in OAPI Legislation: Do Transition Periods Matter?	Patrick Juvet Lowé Gnintedem
191	25 January 2024	TRIPS Waiver Decision for Equitable Access to Medical Countermeasures in the Pandemic: COVID-19 Diagnostics and Therapeutics	Nirmalya Syam and Muhammad Zaheer Abbas, PhD
192	30 January 2024	Pautas para el examen de patentes sobre anticuerpos monoclonales	Juan Correa, Catalina de la Puente, Ramiro Picasso y Constanza Silvestrini
193	2 February 2024	Desafíos actuales y posibles escenarios futuros de la salud mundial	Germán Velásquez
194	15 February 2024	Implementation of TRIPS Flexibilities and Injunctions: A Case Study of India	Shirin Syed
195	6 March 2024	Régimen de licencias obligatorias y uso público no comercial en Argentina	Juan Ignacio Correa
196	19 April 2024	Licencias obligatorias para exportación: operacionalización en el orden jurídico argentino	Valentina Delich
197	28 May 2024	Compulsory Licensing as a Remedy Against Excessive Pricing of Life-Saving Medicines	Behrang Kianzad
198	31 May 2024	What Can Cambodia Learn from Thailand and India as It Prepares to Graduate from Least Developed Country Status?	Brigitte Tenni, Deborah Gleeson, Joel Lexchin, Phin Sovath, and Chalermsak Kittitrakul
199	10 June 2024	A Toss Up? Comparing Tax Revenues from the Amount A and Digital Service Tax Regimes for Developing Countries	Vladimir Starkov and Alexis Jin
200	26 June 2024	Transforming the Non-Military Structures of Global Governance Assessing Priorities for Chapter 5 of the Pact for the Future	Harris Gleckman
201	27 June 2024	Antimicrobial Resistance: Optimizing Antimicrobial Use in Food-Producing Animals	Viviana Munoz Tellez
202	28 June 2024	Constraints to and Prospects for Sustainable Livestock Sector Practices in Argentina with Emphasis on Antimicrobial Usage	David Oseguera Montiel
203	11 July 2024	The Vaccine Industry After the COVID-19 Pandemic: An International Perspective	Felix Lobo

204	24 July 2024	Negotiating Health and Autonomy: Data Exclusivity, Healthcare Policies and Access to Pharmaceutical Innovations	Henrique Zeferino De Menezes, Julia Paranhos, Ricardo Lobato Torres, Luciana Correia Borges, Daniela De Santana Falcão and Gustavo Soares Felix Lima
205	30 July 2024	Foreign Direct Investment Screening for 'National Security' or Sustainable Development: a blessing in disguise?	Daniel Uribe Teran
206	28 August 2024	Equity and Pandemic Preparedness: Navigating the 2024 Amendments to the International Health Regulations	Nirmalya Syam
207	29 August 2024	Discussions on Draft Provisions on Damages in the Investor-State Dispute Settlement System in UNCITRAL Working Group III	José Manuel Alvarez Zárate
208	10 September 2024	Catalyzing Policy Action to Address Antimicrobial Resistance: Next Steps for Global Governance	Anthony D. So
209	25 September 2024	AMR in Aquaculture: Enhancing Indian Shrimp Exports through Sustainable Practices and Reduced Antimicrobial Usage	Robin Paul
210	30 September 2024	Decision 15/9 and the Nagoya Protocol: Who should get what in the Multilateral Benefit-Sharing Mechanism?	Joseph Henry Vogel, Natasha C. Jiménez-Revelles, Xavier A. Maldonado-Ramírez de Arellano
211	14 October 2024	The Implications of Treaty Restrictions of Taxing Rights on Services, Especially for Developing Countries	Faith Amaro, Veronica Grondona, Sol Picciotto
212	15 November 2024	Régulation internationale des dessins et modèles industriels : l'Accord sur les ADPIC à l'aune du droit de l'Union européenne	Adèle Sicot
213	13 December 2024	Navigating the WTO's Working Group on Trade and Transfer of Technology: A Critical Analysis from the Perspective of Developing Countries	Nirmalya Syam
212	9 January 2025	International Regulation of Industrial Designs: The TRIPS Agreement in the Light of European Union Law	Adèle Sicot
214	15 January 2025	Application of the Bolar Exception: Different Approaches in the EU	Dmytro Doubinsky

215	23 January 2025	Assessing Five Years of the African Continental Free Trade Area (AfCFTA): Proposals on Potential Amendments	Kiiza Africa
216	27 February 2025	Will the Pact for the Future Advance a Common Global Agenda on the Challenges Facing Humanity?	Viviana Munoz Tellez, Danish, Abdul Muheet Chowdhary, Nirmalya Syam, Daniel Uribe
214	20 March 2025	Application de l'Exception Bolar: Différentes approches dans le droit de l'UE	Dmytro Doubinsky
217	20 May 2025	Cross-Border Enforcement of Copyright: A Special Emphasis on Court Decisions and Arbitral Awards	Hany Salem
218	12 June 2025	Winds of Change: The BRICS Club of Nations Chipping Away at Western Dominance - The Dawn of the New South	Len Ishmael, PhD
219	16 June 2025	Reducing the Cost of Remittances – A Priority for the Global South	Danish
220	25 June 2025	Harnessing Open Account Trade — A Major Enabler for Illicit Financial Flows from Developing Countries	Yuefen Li
221	15 July 2025	The AI Race: A Tightrope Walk Between Innovation, Inclusivity and Prosperity for All	Daniel Uribe Terán
222	16 July 2025	Designing an Independent Panel on Evidence for Action on Antimicrobial Resistance: Lessons from Selected Bodies in Global Health, Climate Change and Biodiversity	Viviana Munoz Tellez and Francesca Chiara

SOUTH CENTRE

International Environment House 2
Chemin de Balexert 7-9
1219 Geneva
Switzerland

Telephone: (41) 022 791 8050
E-mail: south@southcentre.int

Website:
http://www.southcentre.int

ISSN 1819-6926