



POLICY BRIEF

Addressing Unsafe Community-Level Antimicrobial Disposal to Strengthen Zambia's People-Centred AMR Response

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EXECUTIVE SUMMARY

Antimicrobial resistance (AMR) poses a growing threat to human, animal, and environmental health in Zambia. While AMR is driven by overuse and misuse of antibiotics in humans and animals, environmental pathways, particularly unsafe community-level disposal, remain under addressed. Further, transmission of resistance bacteria does not only occur in healthcare settings, but it also occurs in community settings through poor hygiene, contaminated water, and improper disposal of unused medicinal products by discharging them into sewage systems. Conventional wastewater treatment cannot fully remove antibiotics, allowing residues to enter water and soil systems. Antimicrobial residues in sludge and effluent enter the soil and surface water, thereby contributing to AMR related to environmental contamination.

While national AMR efforts have prioritized rational prescribing, surveillance, and stewardship within health facilities, unsafe disposal of antimicrobials at household and community levels remains largely overlooked. This gap allows antimicrobials to enter water systems, soil, and waste streams, creating environmental reservoirs of resistance that undermine public health gains.

Evidence from a youth-led pilot intervention in Ndola, Copperbelt Province, conducted by Alliance Against Antimicrobial Antipathy (AAA) in collaboration with Action on Antibiotic Resistance (ReAct) Africa during the World Antimicrobial Resistance Awareness Week 2025 and supported by a grant initiative from South Centre, highlighted that widespread storage and unsafe disposal of unused antibiotics in communities were very common. This practice is driven by poor access to disposal mechanisms, limited awareness, and people-centred barriers such as gender norms, stigma, and informal medicine access. These findings align with global evidence demonstrating that community-level antibiotic use and disposal are major contributors to environmental AMR, particularly in low- and middle-income countries (LMICs).

This policy brief argues that unsafe antimicrobial disposal is fundamentally a people-centred and environmental challenge, requiring integration into Zambia's AMR National Action Plan. Embedding community-based disposal systems within a People-Centred Approach to addressing AMR will protect ecosystems, empower communities, and strengthen Zambia's One Health response.

Key Message

Without people-centred and community-level antimicrobial disposal mechanisms, environmental contamination will accelerate AMR and undermine Zambia's investments in antimicrobial stewardship, awareness, surveillance, and universal health coverage.

Background: AMR, Communities, and Environmental Contamination

Zambia, like many LMICs, experiences high community-level antibiotic consumption, much of it occurring outside formal health facilities. Studies across sub-Saharan Africa show that over 60% of antibiotic use occurs at the community level, often through informal vendors, shared medicines, or incomplete prescription uptake (Ocan et al., 2021; O'Neill, 2016; WHO, 2019). These patterns result in substantial quantities of unused or partially used antibiotics in households. Furthermore, studies suggest that the majority of antimicrobial use occurs in the community, where such drugs are readily available and can be obtained without a prescription (Cortes et al, 2017; Nga Do et al., 2014). A recent study estimated that community antibacterial consumption comprised approximately 85% to 95% of total antibacterial consumption in all nations for which data were available (Dyffy et al, 2018). By implication, this means patients and community members decide for themselves at the community level on how to adhere to treatment, what they do to left over antibiotics, and how they store or dispose of the antibiotics.

In the absence of clear disposal guidance or take-back systems, households resort to:

- Disposal into pit latrines and household toilets
- Disposal into sinks and drainage systems
- Open dumping with domestic waste

These practices introduce active antimicrobial compounds into water sources, soil, and sanitation systems, where they exert selective pressure on environmental microbes and facilitate transfer of resistant genes, which eventually circle back to the human sector (Iskandar et al., 2025; Kinrys et al., 2028; Polianciuc et al., 2020; ReAct Group, 2023). The United Nations Environment Programme (2023) and Executive Agency for Health on Consumers (2023) identify domestic wastewater and unmanaged pharmaceutical waste as critical drivers of environmental AMR, particularly in settings with limited wastewater treatment infrastructure.

From a People-Centred Approach, unsafe disposal is not simply a technical failure but reflects:

- **Systems failure:** limited access to safe disposal options
- **Inadequate patient counselling and labelling**

- **Social norms around medicine storage and disposal.**
- **Power dynamics:** this is because health decisions are dominated by authority figures such as medical doctors, male household heads; as such, patients are not accorded an opportunity to question instructions or ask about disposal.
- **Gender roles:** Despite men making treatment decisions, women handle antibiotic storage and disposal, which is often overlooked or done inappropriately.
- **Youth exclusion from health decision-making:** Youth are largely excluded from health decision-making, limiting their role in antimicrobial disposal, education, and awareness.

Addressing disposal, therefore, requires solutions that are accessible, acceptable, and responsive to community realities.

Problem Statement

Unsafe disposal of antimicrobials at the community level is a hidden but significant contributor to environmental AMR in Zambia. While national AMR strategies emphasize rational use and surveillance, there are no structured mechanisms enabling communities to safely return or dispose of unused antibiotics.

Key challenges include:

- Widespread storage of leftover antibiotics in households due to early treatment cessation and/or poor adherence to the treatment schedule.
- Poor labelling and informal dispensing reduce adherence and understanding of treatment regimens.
- Disposal into pit latrines, flushable toilets, kitchen sinks, water systems, and open environments, contaminating ecosystems
- Absence of national or community-level medicines (including antimicrobials) take-back schemes
- Limited integration of environmental and community perspectives within AMR governance

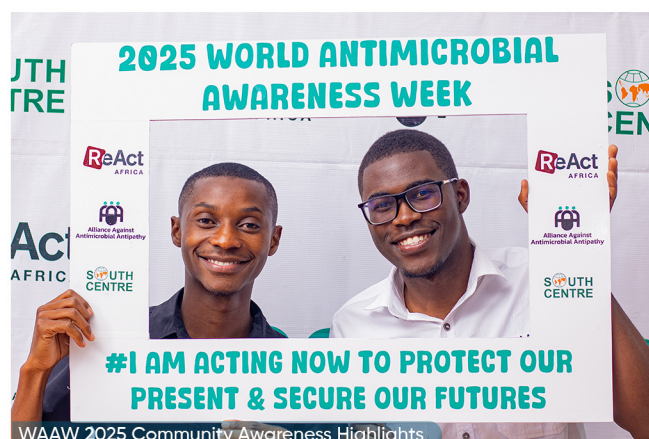
These gaps allow resistant organisms to emerge and circulate across human, animal, and environmental interfaces, directly undermining country efforts to contain and mitigate AMR.

Evidence from the Copperbelt Youth-Led Pilot

A structured youth-led antimicrobial disposal mop-up campaign and awareness initiative conducted during the 2025 World Antimicrobial Resistance Awareness Week in Ndola, Copperbelt Province, provides practical insights into community realities. This was a unique people-centred approach that engaged people across a wide range of communities in Ndola.

Key findings included:

- Antimicrobials constituted the majority of medicines collected, primarily originating from unknown sources, followed by local clinics and pharmacies, with antibiotics dominating the returned medicines.
- Large quantities of unused antibiotics indicate poor adherence and premature treatment discontinuation.
- Common disposal routes reported as pit latrines, household sinks, and general waste.
- Gender norms and stigma influenced access, use, and disposal of medicines, particularly among men, which exposed aspects of health-seeking behaviours.
- The pilot demonstrated that youth and community engagement can effectively surface hidden AMR risks and mobilize households around safe disposal when mechanisms are accessible and trusted.



WAAW 2025 Community Awareness Highlights



A.I Illustration of proper disposal route.



WAAW 2025 Community Awareness Highlights.



Inappropriate community disposal practices.



Policy Gaps

Despite growing recognition of AMR and the interconnection between human, animal, environmental and food health and safety, Zambia still has:

No national guidelines for antimicrobial take-back or household disposal.

Weak coordination between the pharmaceutical services, environmental health, water and sanitation, and waste management sectors.

Minimal investment in people-centred communication on environmental AMR pathways.

Policy Recommendations

1. Develop National Guidelines for Community Antimicrobial Disposal

- Establish clear, enforceable standards aligned with WHO guidance on unwanted pharmaceuticals, including community take-back models.

2. Scale Community-Based and Youth-Led Disposal Models

- Leverage youth groups, community health workers (CHWs), schools, and faith-based organizations to implement people-centred disposal systems.

3. Strengthen Labelling and Patient Counselling

- Improve dispensing practices to reduce leftover antibiotics, enhance adherence and understanding of the health effects of non-adherence to medication usage.

4. Invest in Public Awareness on Environmental AMR Pathways

- Communicate how household disposal contributes to environmental contamination, resistance emergence, and long-term health and economic costs.

Why This Matters

The mop-up campaign established that AMR associated with environmental contamination is a silent accelerator of resistance. Antibiotics that find their way into water and soil systems create reservoirs of resistance that cannot be controlled through clinical stewardship alone. As such, a People-Centred Approach ensures that communities are not passive recipients of policy, but active partners in protecting ecosystems and public health. Without addressing antimicrobial disposal, progress in awareness, stewardship, surveillance, and infection prevention will be compromised, threatening Zambia's health security and sustainable development goals.

Call to Action

Policymakers, regulators, and development partners must prioritize community-level antimicrobial disposal as a national AMR intervention. Investing in people-centred, environmentally sound, responsive solutions will strengthen Zambia's AMR response and safeguard health for future generations.

REFERENCES

1. Cortez J, Rosário E, Pires JE, Taborda Lopes J, Francisco M, Vlieghe E, et al. Antimicrobial storage and antibiotic knowledge in the community: a cross-sectional pilot study in north-western Angola. *Int J Infect Dis*. 2017; 60:83–7. Epub 2017/05/27. Pmid:28546075: <https://pubmed.ncbi.nlm.nih.gov/28546075/>
2. Duffy E, Ritchie S, Metcalfe S, Van Bakel B, Thomas MG. Antibacterials dispensed in the community comprise 85%–95% of total human antibacterial consumption. *J Clin Pharm Ther*. 2018;43(1):59–64. Epub 2017/08/24. Pmid:28833324: <https://pubmed.ncbi.nlm.nih.gov/28833324/>
3. Executive Agency for Health and Consumers. Study on the environmental risks of medicinal products. Final Report. 2013: https://health.ec.europa.eu/document/download/592edea4-27d9-4b36-933a-6009057960c1_en
4. Food and Agriculture Organisation (2020). Antimicrobial Stewardship in Low- and Middle-Income Countries
5. Iskandar, K., Kotb, R., Cherfane, M., Yeretizian, J., Bou Dib, J., Chahine, B., Hallit, S., Amin, R., Bahlol, M., Fekih-Romdhane, F., Hamed, F., Helmy, M., Irfan, M., Murugaiyan, J., Naser, A. Y., Taybeh, E. O., Pavlović, N., Rahme, D., Akl, M., ... Van Dongen, M. (2025). Household Knowledge of Clinical Risks, Storage, and Disposal of Leftover Antibiotics: A Multinational Study in Seven Developing Countries. *Antibiotics*, 14(12), 1212. <https://www.mdpi.com/2079-6382/14/12/1212>
6. Kinrys G, Gold AK, Worthington JJ, Nierenberg AA. Medication disposal practices: Increasing patient and clinician education on safe methods. *J Int Med Res*. 2018; 46:927–939: <https://pmc.ncbi.nlm.nih.gov/articles/PMC5972255/>
7. Nga Do TT, Chuc NT, Hoa NP, Hoa NQ, Nguyen NT, Loan HT, et al. Antibiotic sales in rural and urban pharmacies in northern Vietnam: an observational study. *BMC Pharmacol Toxicol*. 2014; 15:6. Epub 2014/02/22. Pmid:24555709. <https://pubmed.ncbi.nlm.nih.gov/24555709/>
8. O'Neill, J. (2016). Tackling Drug-Resistant Infections Globally. <https://www.scirp.org/reference/referencespapers?referenceid=2618400>
9. Ocan, M., et al. (2021). Community-based antibiotic access and use in six low-income and middle-income countries: Findings on antibiotic consumption outside formal health facilities. *PLoS Medicine*: <https://pubmed.ncbi.nlm.nih.gov/33713630/>
10. Polianciuc SI, Gurzău AE, Kiss B, Ștefan MG, Lughin F. Antibiotics in the environment: causes and consequences. *Med Pharm Rep*. 2020 Jul;93(3):231–240. doi: 10.15386/mpr-1742. Epub 2020 Jul 22. PMID: 32832887; PMCID: PMC7418837: https://pmc.ncbi.nlm.nih.gov/articles/PMC7418837/?utm_source=chatgpt.com#b31-cm-93-231
11. ReAct Network (2022). Policy Options for Tackling AMR in Africa
12. ReAct Group. (2023): New UNEP report – spotlight on environment and AMR: <https://www.reactgroup.org/news-and-views/news-and-opinions/2023-2/new-unep-report-spotlight-on-environment-and-amr/>
13. United Nations Environment Programme (2023). Environmental Dimensions of Antimicrobial Resistance. <https://www.unep.org/resources/report/summary-policymakers-environmental-dimensions-antimicrobial-resistance>
14. World Health Organisation (2017). Guidelines on the Safe Disposal of Unwanted Pharmaceuticals
15. World Health Organisation (2019). Antimicrobial Resistance: National Action Plans: <https://www.who.int/teams/surveillance-prevention-control-AMR/national-action-plan-monitoring-evaluation/library-of-national-action-plans>