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# Antibiotic ‘entanglements’: health, labour and everyday life in an urban informal settlement in Kampala, Uganda

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## ABSTRACT

Antibiotics are a routine part of everyday life in many contexts, contributing to the development of antimicrobial resistance (AMR). Our ethnographic research documents the ways that antibiotics have become a key part of everyday life for precariously employed urban day-wage workers living in a large informal settlement in Kampala, Uganda. We found that for many people, their daily work and ongoing health was *entangled* with antibiotic use; that is, people showed us how their antibiotic use cannot be separated from the realities of living in a politically, economically and environmentally degraded ‘informal’ landscape. Thinking through entanglement as itself a politics, we show how limited political power, inability to demand change, and inequitable access to good health care, are associated with high rates of infection and disease, precarious work, and polluted environments. Antibiotics, we argue, have become a way to negotiate the inequalities written into these informal urban landscapes; their use entangled with ongoing relations with labour, environment and bodily suffering. Through this approach, we show how antimicrobials are used in society, with an attention to how vulnerabilities, risks, and forms of abandonment and exclusion shape their everyday use. Antibiotic use is entangled with everyday life in informal settlements, and the politics that produce ‘informality’. In Kampala today, the entanglement of antibiotics with life in informal settlements reveals how forms of urban segregation, life in ‘slums’ and their everyday acceptance, shape the pathways and uses of antimicrobials.

## ARTICLE HISTORY

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Antibiotics; entanglement; informal settlements; informality; infrastructure

## Introduction

Diana, a young woman in her twenties, held out her wounded leg, revealing an injury she’d sustained in a motorcycle accident a few days prior. In the dry heat of the day, standing on a side road that connected the informal community *Namuwongo* with a busy access road in Kampala, she explained that she now had a fever as well, a side effect it seemed from her wound. Showing the wound, she said that a friend of hers had recommended a course of the ‘black and purple capsule’ antibiotics as treatment. She did not know the name of the antibiotic she was taking, but from our experience with an antibiotics survey in the community months earlier, we believed them to be ampicillin-cloxacillin. She also mentioned four red and black capsules that she had managed to purchase the day before, explaining that she was buying each day’s course of these medicines from a local drug shop, but only on the days she could afford them. Working a number of informal jobs washing clothes and making

food for builders at a nearby building site, she explained that she was rarely able to find work each day, but when she can she plans to buy more antibiotics to treat what she, in consultation with the local drug shop owner, had determined was an infection in her leg wound. Over the course of the conversation she expressed that what she was most worried about was the fever becoming too severe to be able to work. If that happened, she said, she wouldn't be able to afford more medicine, and recovery would be even more challenging. For Diana, precarious work, recovery and antibiotics were intertwined issues that could not easily be disentangled from each other.

Namuwongo is a large informal settlement, part of a low-income suburb located in Makindye division of Kampala, Uganda, home to more than 20,000 city dwellers. The settlement is bifurcated by a railway line, and located in a reclaimed wetland, contained on one side by the Nakivubo channel, the main watery artery that carries water and other waste from the city to Lake Victoria. Here, infectious disease, including cholera and other diarrhoea-related illnesses, are an ongoing concern, linked to poor water and sanitation infrastructures. In addition, like Diana, most residents' working conditions are precarious; typically made up of a mix of informal and piecemeal jobs and pay.

The realities of antibiotic use in informal settlements often jar with ongoing global health concerns related to antimicrobial resistance (AMR), and attempts to intervene on antimicrobial use (AMU). AMR is considered a global health crisis, threatening the effectiveness of antibiotics and putting people at risk of untreatable infections (WHO, 2015). The risk of AMR within urban informal settlements is a pressing issue. Globally the health and well-being of those living in informal settlements is often poor due to limited access to safe and secure housing, a lack of land rights, limited and inadequate infrastructures, and ongoing political marginalisation (Rugadya et al., 2008; UN-Habitat, 2017). Amid these constraints, informal settlements have the potential to become settings for a vicious cycle of infection and resistance: broken or non-existent urban sanitation systems lead to greater incidence of infection and disease, which leads to increased antibiotic use, which leads to more antimicrobial resistance (Fletcher, 2015; Fuhrmann et al., 2016).

AMU interventions often operate through the logics of reducing so-called 'inappropriate' use and/or correcting a so-called 'lack of knowledge' by users, an approach now widely critiqued for obscuring structural factors that shape and contribute to antibiotic use (Broom et al 2020; Broom et al 2021; Denyer Willis & Chandler, 2019; Khine Zaw et al., 2021; Haenssger et al., 2020; Will, 2018). In this paper, we broaden these conversations about antibiotics and structural factors through an engagement with the literatures on urban 'informality' and the politics of entanglement. We show how antibiotics have become a key part of everyday life for precariously employed urban day-wage workers living in an informal settlement. We found that for many people, their daily work and ongoing health was *entangled* with antibiotic use; that is, people showed us how their use of antibiotics cannot be separated from the realities of living in a politically, economically and environmentally degraded 'informal' landscape, amidst the politics that produce 'informality'. As Alex Nading (2014) describes it, we think of entanglement as 'a politics' (p. 12) demonstrating how 'persistent inequalities' link together infrastructures, bodies, and ways of knowing (pg. 13–14). In Namuwongo this means that residents' limited political power, inability to demand change, and inequitable access to good health care, are associated with high rates of infection and disease, precarious work, and polluted environments. Antibiotics, we argue, have become a way to negotiate the inequalities written into landscapes; their use entangled with ongoing relations with labour, environment and bodily suffering. In Kampala today, the entanglement of antibiotics with life in informal settlements reveals how forms of urban segregation, life in 'slums' and their everyday acceptance, shape the pathways and uses of antibiotics.

## Study site

A diverse population inhabits Namuwongo, including long-term residents and more transitory migrants from across Uganda and neighbouring countries. Despite the daily challenges for its residents, the settlement has a long history in the city as a popular space where it is possible to find affordable housing, to connect with others in community, and to locate labour networks and

opportunities (McFarlane & Silver 2017). Namuwongo is often negatively depicted as a 'slum', and characterised by outsiders as a space of violence and criminality, where people are illegally 'squating'. In 1986 there was an attempt made at 'slum upgrading', but Muchadenyika and Waiswa (2018) explain the policy was never pro-poor, and in fact this slum upgrading project had the effect of pushing the poorest into worse off areas of wetland, extending the settlement and further stigmatizing them as 'illegal squatters'. Moreover, the consequences of this failed project still linger today.

Residents of Namuwongo seek and receive health care from a range of sources. Ugandan health care provision includes a public system intended to be free at the point of access. At the same time there are multiple private paid-for biomedical services, and traditions of care and healing that extend beyond biomedicine. Most of the people involved in this study accessed care across the spectrum of this provision. In the informal settlement, there were both registered and unregistered drug shops which provided the bulk of pharmaceutical access. Pharmaceuticals are regulated through the National Drug Authority (NDA) which sets out to ensure the quality and safe distribution, storage and sale of medicines in Uganda. Regulation dictates antibiotics should only be available at premises with a prescribing clinician or an on-site pharmacist, which excludes drug shops (Mukonzo et al 2013). Nonetheless, antibiotic and other officially restricted medicines are often, in practice, available for sale in these settings (Mbonye et al 2016), whilst in public health centres they may be subject to stock outs (Batwala et al 2010)

### Urban 'Informality' and antibiotic use

Attending to how people access antibiotics in formal and informal settings is certainly important. Here, however, we follow scholars who have shifted away from attending to these categorisations as a binary. Sarah Pinto (2004), for example, has shown how many so-called informal health providers are given tacit acceptance by formal providers, or at least a blind eye, due to the lack of state resources to serve rural and marginal communities. As Ananya Roy (2009) explains, these very categories of formal and informal obscure more than they reveal. The so-called 'informal' is deeply entwined with urban 'formality' and vice versa. In turn, rather than take 'informal' and 'formal' as distinct and essential categories, Colin McFarlane (2012) shows that they help 'co-constitute' (p. 92) one another. The formal puts the informal to use: as sources of cheap labour, as places that can be blamed for illegality and crime; or as spaces where pollution and toxic industries can be displaced to and contained. Informality is better understood as a relation of power, rather than as a still and distinct category. Indeed, scholars have long argued that cities in the Global South are haunted by forms of colonial thought and violence that obscure structural harms and instead pinpoint blame on individuals themselves, casting individuals as somehow 'deficient', 'unfit', 'uneducated', and/or 'unclean' (Anderson, 2006; Benton et al., 2017; Vaughan, 1991). Urban scholars have demonstrated how, in these 'informal' spaces, people are forced into being creative strategists who must negotiate the city and its harms on their own. At the same time, these creative strategies to get by are typically categorised as 'informal', and then criminalised for it (Dent, 2012; McFarlane, 2012; Simone, 2006). Furthermore, much of this 'informal' work is characterized by its precarity. The concept of precarity initially captured the experience of late-stage capitalism and the shift towards irregular and contingent work opportunities. But precariousness is also more than this; often experienced as a sense of desperation, or a hopelessness in the future itself (Allison, 2013; Millar, 2014).

In spaces mired in narratives of informality and assumed illegality, and under precarious conditions, blaming practices linger. Current approaches to curtailing antibiotic use under the spectre of AMR across much of the Global South often depend on theories and models of individual behaviour change, placing responsibility for action at the individual level, and displacing the locus of responsibility from structural conditions that make avoiding antibiotic use nearly impossible. In this way, the individual becomes normalised as the constellation of risk variables that requires intervention through behaviour change, rather than casting a wider net to think critically about systemic oppressions that force people into situations where antibiotics become the go-to solution. As

Denyer Willis and Chandler (2019) have described, antibiotics often paper over ongoing issues of chronic infection, infrastructural deficiencies, and a lack of access to good care. They come to function as a kind of 'quick fix' infrastructure that obscure the inequitable arrangements of power and access that create the conditions for antibiotic use in the first place. This is a crucial point when considering antibiotic use in informal settlements specifically. As scholars of informal settlements have explained, lack of infrastructures in these spaces is rarely neutral, but rather a political outcome: Where the lives of the poor are devalued, there is little impetus to correct longstanding infrastructural absences (McFarlane, 2012; Roy, 2009). In the paper, we consider that term 'infrastructures' broadly, conceptualising them not just via their technical functions, but also as social materials that demonstrate how 'the political can be constituted' (Larkin, 2013, p. 329). In other words, what a critical attention to infrastructures does is denaturalise physical and infrastructural landscapes in order to consider how they come to be *made by politics* (Anand, 2011). In Namuwongo, infrastructures – and their absence – reveal a politics of exclusion and abandonment. These absences foster a reliance on antibiotics *as* infrastructure (Chandler, 2019), such that the system can function when other forms of infrastructure are withheld or neglected.

## Methods

This article relies on ethnographic research, as part of a project carried out through a collaborative partnership between researchers in Uganda and the United Kingdom. Fieldwork took place between May 2018 and March 2021. The research included a survey component concerning the everyday uses of antibiotics at the start and end of the study. Semi-structured interviews and participatory focus group discussions were spaced throughout the project. A total of 18 weeks were spent doing participant observation among selected day wage urban workers. We used a broad definition of day-wage labour that allowed us to include anyone who was working for someone else but not under contract or formally employed, such as construction labourers, and also those who were self-employed through income generating activities of their own, such as food or coal vending, tailoring, or shop keeping. While engaged in precarious day-wage labour, the majority of those we interviewed (63%) had lived in the community for most of their lives, while the rest suggested they had migrated from other regions at some point.

Participant observation involved spending extended periods of time in people's homes, their places of work, and spending time with them and their extended families and community networks. This included participation in a range of activities, from sharing meals, to visits to hair salons, to local mushroom foraging excursions, and accompanying people during work and their commuting time. Field notes were made in a notebook where feasible, but most often were written out at the end of each day. In addition, we carried out eighteen interviews, with residents ( $n = 11$ ), community health care workers ( $n = 3$ ), 'informal' pharmaceutical vendors ( $n = 2$ ), and community leaders ( $n = 2$ ). For the interviews, participants were identified during the observational research and were approached for a recorded interview. Interviews were semi-structured and lasted from one to two hours, focussing on health, work, education, their history of living in the settlement, and experiences with using and/or selling antibiotics. All participants in the research were invited to attend one of two participatory focus group discussions. Twelve participated in each focus group. Here, the researchers explained preliminary findings and analyses, and participants in turn gave their feedback. Their feedback shaped subsequent questions in interviews and ethnographic work. The research team shared and discussed summaries of the findings throughout the research process. The transcribed field notes, interviews and participatory focus group recordings were coded thematically using NVivo 12 (QSR International) qualitative data analysis software. The medicines surveys were carried out in 2018 at the start of the ethnographic work with 174 residents and again in 2020/2021 at the end of the project with 176 residents in neighbouring areas of the settlement. The surveys asked day-wage labourers living in the settlement about which antibiotics were most

commonly used. This group included a mix of men (94, 27%) and women (256, 73%), and their ages ranged from mid-twenties into their fifties. The methods and findings from the survey are published elsewhere (see Dixon et al 2019 for a discussion of methods and Nayiga et al. 2020).

## Results

Across the settlement, we found that antibiotics were used frequently; their use intertwined with ongoing struggles with infection and a need to speed recovery to return to work. Of the 350 day-wage labourers we surveyed, just under half (48%) reported antibiotic use in the past week. Many suggested that their frequent use of antibiotics helped them cope with frequent diarrhoea and abdominal cramping. Many described using antibiotics for chronic pain related to dental health and labour-related injuries and strain. A central finding was the high frequency of use of the antibiotic metronidazole, along with other antibiotics. Approaching half (43%) of those interviewed reported using metronidazole tablets the last time they used an antibiotic. In the week of the survey itself, 35% reported having used an antibiotic. Beyond metronidazole, survey participants reported using a wide range of antibiotics, including a quarter of participants reporting frequent amoxicillin use, and a quarter frequent ampicillin use. Interviews with residents, and observations at a local clinic, revealed that diarrhoea, and the pain associated with it, was commonly treated with metronidazole alongside other anti-diarrhoeal medicines, like Loperamide hydrochloride. The use patterns for antibiotics among residents varied, but in the case of metronidazole to treat diarrhoea and stomach pain, a clear pattern emerged during interviews and ethnographic research, wherein metronidazole was only used for the duration of the diarrhoea episode and discontinued as soon as there was an improvement. Any leftover medicines were stored and taken subsequently for every new diarrhoea episode – usually a few days each week. In the 2020/2021 follow-up survey, just under 75% of respondents who used metronidazole reported doing so for diarrhoea and gastrointestinal pain.

Metronidazole, then, emerged as an important antibiotic in this community based on the frequency with which it was used. Many residents described that the antibiotic was often prescribed by health care providers in public health facilities where participants sought care to treat a range of issues, beyond diarrhoea, and had become something like ‘the drug of choice’ when similar symptoms presented in the future. Likely due to this demand and experience with use, metronidazole was always readily available in private drug shops within the study site. Metronidazole is also one of the less expensive antibiotics in the study site. A strip of 10 tablets costed approximately \$0.15 USD and was also sold by tablet based on the money available to the patient.

### ***Environmental contamination, infection, and frequency of antibiotic use***

Throughout our research, we documented the significant and chronic infrastructural challenges residents in Namuwongo faced. We examine this – and its connections with antibiotic use – through three interconnected examples: flooding, toilet facilities, and water quality.

*Flooding.* During the course of the study we experienced flooding and its effects first hand and heard numerous reports of how flooding impacted everyday life. During the rainy season, certain areas consistently flooded, and residents would have to wake before dawn to start the process of physically removing both water and sludge from their homes; it was not uncommon to discover homes or pieces of homes that had fallen into water channels. A homeowner and long-term resident explained that during one flood near her house, the pit latrines nearby had overflowed, emptying into the rising drainage channels and into her home. Residents described how they would scoop the mud deposited by floods into trenches next to the railway. Their labour ensured that the railway line remained intact. They did this labour for free, residents explained, as a displaced railway line from a flood might attract attention from government officials. Residents worried that these officials might use the flooding as an excuse to evict people from the settlement. At one participatory focus group discussion, a woman who owns a local salon, and is a long-term resident in the settlement,



explained that flooding was not just linked to heavy rains. Rather, the water levels in drainage channels could also rise when water was dispatched from elite housing areas on the nearby hillsides. She explained,

One morning we woke up to a strong stench. No one knew what was going on but there was water flowing in the drainage. It was coming from . . . uphill, there was no rain, it was during the day, and the water was black! The stench made people uncomfortable, and yet there was nothing to do. You have to work, you have to survive, and you have to eat. So infections will never stop.

Indeed, flooding and contaminated water were often linked to infection and antibiotic use. In a participatory focus group, for example, residents suggested that health workers are quick to prescribe metronidazole 'because the Nakivubo channel ends up in our houses', while another reflected that metronidazole use was required because 'we live in a slum'. Health care providers and drug shop owners near the settlement explained that they did anticipate more infections during flooding periods. They stocked and prescribed metronidazole as cases of diarrhoea always rose with the flooding. In conversation with a former local leader in Namuwongo, he explained that flooding has been a chronic issue for the past two decades in the settlement. Many short-term and ad hoc projects have attempted to correct this, but he explained that most city officials shared an ambivalence about upgrading projects, stemming from their perception of the area as 'illegally occupied'. City leaders, he suggested, assumed that any formal plan for upgrading the settlement should focus first and foremost on the removal of these 'criminal' residents.

*Toileting.* The lack of legal status and ongoing threats of removal also lay at the centre of chronic infrastructural issues related to toileting. Throughout the settlement, there is a significant shortage in latrines, both public and private. Quantitative data on toileting access and practices are often challenging to gather (O'Reilly & Louis, 2014). Based on our ethnographic research, however, we can estimate that approximately five to ten families share each private toilet. Significantly more access the limited number of public toilets each day. One of the ongoing issues related to toileting in the area is the expense and lack of availability of public cesspool trucks that are required to empty out latrines and maintain them in good working order. Many private cesspool trucks charge 150,000–200,000 Ugandan Shillings (approximately \$40 to \$50 USD) for their service, a sum that is out of reach for most households. Across the settlement, we found that people faced considerable challenges in keeping latrines in functioning order, and many reported dissatisfactions with the Kampala City Council Authority (KCCA) over the lack of reliable servicing for community and household latrines. In interviews and focus groups, residents explained that households would often pool resources to pay for a private latrine to be emptied, but that many people were still unable to pay, even when the cost was shared. Financial barriers to accessing public latrines were widely cited as an ongoing problem across the settlement. Most public latrines charged 200 shillings (approximately 0.05 USD) for adult use, but many residents reported that they were unable to pay each time they needed latrine access, and so would employ both home bucket systems and the use of polythene bags. A woman with a young family who worked as an informal vendor described the multiple ways that one could choose to spend 200 shillings, from an onion to flavour a meal, to a matchbox necessary for cooking. Spending it on latrine access, she noted, would mean sacrificing spending it elsewhere. One problem that was frequently expressed was that public latrines were not open throughout the night; thus, buckets and bags were the only options. Many people disposed of their contents into channels and trenches in the morning, rather than pay to dispose in the latrines. Beyond questions of affordability and accessibility, many people feared that disease was spread by latrines due to their over-crowding and thus avoided using them. Overall, people described their practices around toileting as a process of having to balance a series of factors concerning affordability, accessibility, hygiene, and infection. Concerns about toileting practices and a lack of access to free, clean and safe latrines emerged in the context of discussion around antibiotic use and diarrhoea, as residents were aware that infections were likelier when they lacked access to good hygiene and sanitation systems.



*Water contamination.* Our research also revealed ongoing concerns over quality of water in the settlement. Numerous respondents cited issues around water discolouration, which, while more common in the rainy season, seemed to intermittently affect drinking water throughout the year. Residents reported having been aware of research studies that investigated water quality in the area but expressed frustration that few researchers took the time to return and explain the outcome of these studies. The prevalence of these studies, however, led to a widespread mistrust of the water supply, which many residents reported as unsafe to drink, but also costly to regularly boil. Public health posters throughout the settlement advised residents to boil water, citing both the risk of cholera and typhoid. As with toileting, residents were often forced to choose between 'bad' options, weighing up the cost and time associated with boiling water against the risk of disease. The 'choice' – or not – to boil their water was not about a lack of knowledge, but about making a complicated calculation of how best to allocate limited resources.

Residents describe themselves waging an uphill battle against infection, and antibiotics emerge as a form of protection. A resident community health worker, explaining her ongoing struggles with diarrhoea, described the antibiotic metronidazole as a constant companion: 'You find that you and medicine are inseparable . . . You strike an agreement with medicine, you are always taking medicine. Because of the situation in your area, you cannot spend a year without medicine'. Another resident that operates a retail shop within the settlement, in conversation about the ways that contaminated water impacts the community's children, said it leaves them constantly suffering from both diarrhoea and its effects, 'Why wouldn't we fall sick, get infections, and take our flagyl [metronidazole], when we are left with no other options?'

### ***Labour, precarity and antibiotic use***

In Namuwongo, we found that antibiotics kept a precarious labour force at work in interconnected ways. First, Namuwongo residents generally live in conditions of extreme poverty. Even when working, most cannot consistently afford housing, food, and school fees for their children. Money is always stretched, and many respondents explained that they sometimes had to make difficult compromises. When residents fall ill, they can rarely afford to take time off – for themselves, to care for a sick family member, or to visit a health centre for a diagnosis. Illness is common, however, and residents must make decisions about how to work while ill or accelerate recuperation. Most residents are engaged in piecemeal work within the informal economy, such as street vending, where no work means no wages. Using antibiotics, then, becomes a way to handle illness.

Residents frequently worked through illness episodes, relying on a range of antibiotics to do so. Most workers had to make money every day, as the money earned one day would pay for food the next day, and so on. Missing a day's work could have swift and severe consequences for them and those they supported. Workers feared that taking time off for illness would result in deducted wages, or even losing their job entirely. Most residents were engaged in informal labour in and around the settlement, typically piecemeal, involving vending small disposable items. Some found work at nearby factories for a daily wage, or were hired as cleaners in nearby affluent homes, typically with only a verbal contract. Many vendors would operate multiple businesses at once, as experience had taught them that businesses often failed and that it was better to spread your attempts over multiple initiatives.

In Namuwongo, antibiotics serve as a means of daily survival, linked not just to treating an illness, but entangled with a broader web of livelihood issues. One man, a driver and community health worker, explained, 'medicine has helped to promote everyday life. When you get better, you run to the market to go and work for a living. That is why we give ourselves those doses. If I take 3 tablets and I go to sell food and I do not pass out, then next week I will do the same. That means [medicines] are a part of my life'. A *boda boda* (motorcycle taxi) driver described how metronidazole was a necessary requirement to go to work, due to the chronic stomach pains he experienced. He explained how he was balancing taking care of his children with working while in

pain. He took metronidazole so that 'I could get back to work' because, 'my children needed something to eat'. Oftentimes this approach meant not seeing a health worker, but using medications that had worked in the past. One woman who experienced extensive headaches described how she would often use metronidazole as a pain relief medication because she rarely had the money – or time – to go to the clinic and see a health worker. But if metronidazole worked in the past, and continued to relieve her pain, she said, she would continue to rely on it to be able to get to work each day.

Some residents explained that they would attempt to accelerate recovery by increasing or concentrating their antibiotic dosages. One resident engaged in daily wage factory work described in an interview that unless his illness was somehow connected to his work, such as an injury related to machine work, he could not access work-related benefits, including sick leave. He explained that missing work for sickness meant losing money and potentially losing his job, and this meant that it sometimes made sense to modify his treatment or dose, 'For instance, they may prescribe a drug for you to take two tablets, once a day, and you decide to take them twice a day because you want to get better so fast and go back to work. Because if you are to spend a month taking medicine and not being paid, you will not survive'. This concentrated dosing was linked as well to a fear of being fired. A young man working as a security guard explained that antibiotics were essential when he fell ill, as he might lose his job if he took time off for sickness. In his line of work, he felt he was too easy to replace. He said, 'This is because they can deploy another person to your position who may refuse to leave after you come back and yet without food you cannot survive'. This approach is linked, as well, to the practice of taking medicines only when people can afford them or taking a shortened (and thus more affordable) course. If residents could not afford to purchase a full course of treatment, many explained that they would purchase treatment day by day. Although they understood that a full course of treatment was required, residents described the conflicting cycle of needing to work to earn money to pay for drugs, while needing drugs to be well-enough to work. Together this suggests that the costs of both health care and antibiotics are often in competition with other needs, meaning that antibiotics and other medicines can be accessed only selectively.

## Discussion and conclusion

In this article we show how everyday practices concerning antibiotic use in an informal settlement are entangled with precarious labour conditions, infrastructural deficiencies, and experiences of frequent illness. We pay attention to the ways that everyday forms of antibiotic use reveal how antibiotics have become a kind of infrastructure in themselves, filling in gaps in access to reliable hygiene and sanitation systems, labour, and care systems (Denyer Willis & Chandler, 2019).

Our study adds to the emerging literature on antibiotic use that attempts to elucidate how and why people might (over)use antibiotics. Here, though, we draw attention to the necessity of in-depth localised research. First, this is a long-term ethnographic study that carefully attends to the complex reasons that people use antibiotics in this setting. Second, this study prioritises the accounts and experiences of vulnerable people themselves; how their use of antibiotics makes sense in their everyday lives, rather than relying on more detached methods – such as a hospital snapshot obtained through a point prevalence survey – or from more privileged health professional accounts. Through this approach, we have been able to provide a detailed account of how antimicrobials are used in society, with an attention to how vulnerabilities, risks, and forms of abandonment and exclusion shape their everyday use. Our main finding is that antibiotic use is entangled with everyday life in informal settlements, and the politics that produce 'informality'. In this way, we use the concept of a 'politics of entanglement' (Nading, 2014) to think about the ways that antibiotics, bodies, infrastructures, and knowledge practices are knotted together. We use the word 'knotted' here because it draws attention to the complex relations between informality, precarity, infrastructural abandonment, local knowledge, and environmental toxicity that shape antibiotic use that are so often obscured through a language of behaviour and choice (see Nading, 2014, p. 212).

At first glance, it appears that any robust intervention must take seriously the need for better hygiene and sanitation systems in order to prevent AMR and have an effect on AMU. This is not misguided, and there is a need to position WaSH (water, sanitation and hygiene) at the centre of AMR policy (WHO, 2020). Our research here shows how practical interventions like this could have a significant effect on the health and well-being of vulnerable residents in informal settlements. Still, scholars of urban informality have long pointed out that these large-scale infrastructure upgrading projects often fail to materialise in spaces that are deemed ‘illegal’ or ‘criminal’, and therefore perceived as undeserving of recognition (Roy, 2009).

Policy conversations around AMR must then be coupled with calls for housing and land rights, and dignified residence. Amidst urban inequality, this is an acutely political consideration that reveals how certain populations are framed as problematic or unbelonging. As such, we will need to de-silo conversations about AMR and AMU. What this means most broadly is that the health and well-being of residents in urban informal settlements depends not just on individual behaviour interventions, or even on upgrading WaSH infrastructures, but instead must be premised in their recognition as citizens with rights, aspirations and futures. Attending to AMR requires attending to the politics of inequality and exclusion in the city today that often make this an impossible starting point.

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## References

- Allison, A. (2013). *Precarious Japan*. Duke University Press.
- Anand, N. (2011). Pressure: The politechnics of water supply in Mumbai. *Cultural Anthropology*, 26(4), 542–564. <https://doi.org/10.1111/j.1548-1360.2011.01111.x>
- Ananya Roy. (2009). Why India Cannot Plan Its Cities: Informality, Insurgence and the Idiom of Urbanization. *Planning Theory*, 8(1):76-87. <https://doi.org/10.1177/1473095208099299>
- Anderson, W. (2006). *Colonial pathologies: American tropical medicine, race, and hygiene in the Philippines*. Duke University Press.
- Batwala, V., Magnussen, P., & Nuwaha, F. (2010). Challenges to implementation of artemisinin combination therapy policy in Uganda. *International Health*, 2(4), 262–268. <https://doi.org/10.1016/j.inhe.2010.07.002>
- Benton, A., Sangaramoorthy, T., & Kalofonos, I. (2017). Temporality and positive living in the age of HIV/AIDS - A multi-sited ethnography. *Current Anthropology*, 58(4), 454–476. <https://doi.org/10.1086/692825>
- Broom, A., Kenny, K., Kirby, E., George, N., & Chittem, M. (2020). Improvisation, therapeutic brokerage and antibiotic (mis) use in India: A qualitative interview study of Hyderabad physicians and pharmacists. *Critical Public Health*, 30(1), 16–27. <https://doi.org/10.1080/09581596.2018.1516032>
- Broom, A., Kenny, K., Prainsack, B., & Broom, J. (2021). Antimicrobial resistance as a problem of values? Views from three continents. *Critical Public Health*, 31(4), 1–13. <https://doi.org/10.1080/09581596.2020.1725444>
- Chandler, C. I. R. (2019). Current accounts of antimicrobial resistance: stabilisation, individualisation and antibiotics as infrastructure. *Palgrave Communications*, 5(53), 1–13. <https://doi.org/10.1057/s41599-019-0263-4>

- Dent, A. S. (2012). Piracy, circulatory legitimacy, and neoliberal subjectivity in Brazil. *Cultural Anthropology*, 27(1), 28–49. <https://doi.org/10.1111/j.1548-1360.2012.01125.x>
- Denyer Willis, L., & Chandler, C. (2019). Quick fix for care, productivity, hygiene and inequality: Reframing the entrenched problem of antibiotic overuse. *BMJ Global Health*, 4(4), 4. <https://doi.org/10.1136/bmjgh-2019-001590>
- Dixon, J., MacPherson, E., Manyau, S., Nayiga, S., Khine Zaw, Y., Kayendeke, M., Nabirye, C., Denyer Willis, L., Hutchison, C., & Chandler, C. I.R. (2019). The Drug Bag Method: Lessons from anthropological studies of antibiotic use in Africa and south-east Asia. *Global Health Action*, 12(1), 1–11. <https://doi.org/10.1080/16549716.2019.1639388>
- Fletcher, S. (2015). Understanding the contribution of environmental factors in the spread of antimicrobial resistance. *Environmental Health and Preventive Medicine*, 20(4), 243–252. <https://doi.org/10.1007/s12199-015-0468-0>
- Fuhrimann, S., Winkler, M. S., Stalder, M., Niwagaba, C. B., Babu, M., Kabatereine, N. B., Halage, A., Utzinger, J., Cissé, G., & Nauta, M. (2016). Disease burden due to gastrointestinal pathogens in a wastewater system in Kampala, Uganda. *Microbial Risk Analysis*, 4, 16–28. <https://doi.org/10.1016/j.mran.2016.11.003>
- Haenssger, M. J., Charoenboon, N., Xayavong, T., & Althaus, T. (2020). Precarity and clinical determinants of healthcare-seeking behaviour and antibiotic use in rural Laos and Thailand. *BMJ Global Health*, 5(12), 1–12. <http://dx.doi.org/10.1136/bmjgh-2020-003779>
- Khine Zaw, Y., Seng Baw, J., & De Lima Hutchison, C. (2021). Negotiating authoritarian law and (dis)order: Medicines, drug shops, and regulators in a poor Yangon suburb. *Critical Public Health*, 1–13. <https://doi.org/10.1080/09581596.2021.1943314>
- Larkin, B. (2013). The politics and poetics of infrastructure. *Annual Review of Anthropology*, 42(1), 327–343. <https://doi.org/10.1146/annurev-anthro-092412-155522>
- Mbonye, A. K., Buregyeya, E., Rutebemberwa, E., Clarke, S. E., Lal, S., Hansen, K. S., Magnussen, P., and LaRussa, P. (2016). Prescription for antibiotics at drug shops and strategies to improve quality of care and patient safety: A cross-sectional survey in the private sector in Uganda. *BMJ Open*, 6(3), 1–6. <http://dx.doi.org/10.1136/bmjopen-2015-010632>
- McFarlane, C. (2012). Rethinking informality: Politics, crisis, and the city. *Planning Theory & Practice*, 13(1), 89–108. <https://doi.org/10.1080/14649357.2012.649951>
- McFarlane, C., & Silver, J. (2017). Navigating the city: dialectics of everyday urbanism. *Transactions of the Institute of British Geographers*, 42(3): 458–471. <https://doi.org/10.1111/tran.12175>
- Millar, K. (2014). The precarious present: Wageless labor and disrupted life in Rio de Janeiro, Brazil. *Cultural Anthropology*, 29(1), 32–53. <https://doi.org/10.15406/ca29.1.04>
- Muchadenyika, D., & Waiswa, J. (2018). Policy, politics and leadership in slum upgrading: A comparative analysis of Harare and Kampala. *Cities*, 82, 58–67. <https://doi.org/10.1016/j.cities.2018.05.005>
- Mukonzo, J. K., P. M. Namuwenge, G. Okure, B. Mwesige, O. K. Namusisi, & D. Mukanga. (2013). Over-the-counter suboptimal dispensing of antibiotics in Uganda. *Journal of Multidisciplinary Healthcare* 6, 303–310. <https://doi.org/10.2147/JMDH.S49075>
- Nading, A. (2014). *Mosquito trails: Ecology, health, and the politics of entanglement*. University of California Press.
- Nayiga, S., Kayendeke, M., Nabirye, C., Denyer Willis, L., Chandler, C., & Staedke, S. (2020). Use of antibiotics to treat humans and animals in Uganda: A cross-sectional survey of households and farmers in rural, urban and peri-urban settings. *JAC-Antimicrobial Resistance*, 2(4), 1–11. <https://doi.org/10.1093/jacamr/dlaa082>
- O'Reilly, K., & Louis, E. (2014). The toilet tripod: Understanding successful sanitation in rural India. *Health & Place*, 29, 43–51. <https://doi.org/10.1016/j.healthplace.2014.05.007>
- Pinto, S. (2004). Development without institutions: Ersatz medicine and the politics of everyday life in rural north India. *Cultural Anthropology*, 19(3), 337–364. <https://doi.org/10.1525/can.2004.19.3.337>
- Rugadya, M., Nsamba-Gayiiya, E., & Herbert, K. (2008). *Slums in Uganda: Situation analysis national slum upgrading strategy and action plan*. Ministry of Land, Housing and Urban Development, Department of Housing.
- Simone, A. (2006). Pirate towns: Reworking social and symbolic infrastructures in Johannesburg and Douala. *Urban Studies*, 43(2), 357–370. <https://doi.org/10.1080/00420980500146974>
- UN-Habitat. (2017). *Situation Analysis of Informal Settlements in Kampala*.
- Vaughan, M. (1991). *Curing their ills: Colonial power and African illness*. Stanford University Press.
- WHO. (2015). *Global action plan on antimicrobial resistance*. Geneva.
- WHO. (2020). Technical brief on water, sanitation, hygiene and wastewater management to prevent infections and reduce the spread of antimicrobial resistance.
- Will, C. (2018). Editorial: Beyond behavior? Institutions, interactions and inequalities in the response to antimicrobial resistance. *Sociology of Health and Illness*, 40(3), E1–E9. <https://doi.org/10.1111/1467-9566.12735>