Gradus Vol 13, No 1 (2026)
ISSN 2064-8014

BEYOND HOSPITAL PRESCRIPTION: CULTURAL LOGICS AND ANTIBIOTICS USE PRACTICES IN AN URBAN COMMUNITY IN KISUMU, KENYA

Allan Okeyo

Doctoral School of Sociology, Faculty of Social Sciences, Eotvos Lorand University, Hungary,
Department of Behavioral Sciences, School of Medicine, Uzima University, Kenya,
https://orcid.org/0009-0006-1405-3877
https://doi.org/10.47833/2026.1.ART.005

Keywords:
Beyond Prescription
Cultural Logics
Antibiotics Use Practices
Urban Community

Article history:
Received 23 November 2025
Revised 13 February 2026
Accepted 25 February 2026

Abstract

This study aimed to investigate the socio-cultural drivers behind the use of first-line antibiotics outside the formal medical system in an informal urban settlement in Kisumu, Kenya. It specifically sought to analyze the cultural logics shaping antibiotic preferences and to document associated self-medication practices. A community-based, cross-sectional mixed-methods study was conducted in an urban community in Kisumu city, Kenya. Data were collected from 102 pharmacy clients, 8 pharmacies, and 31 household informants using semi-structured and unstructured questionnaires, key informant interviews, and focus group discussions. The study revealed a pervasive system of antibiotic use operating "beyond prescription," with 73% of antibiotics acquired without a prescription. Cultural logics significantly shaped practices, including a preference for specific dosage forms culturally coded by age such as syrups for children, capsules for adults. Furthermore, antibiotic courses were frequently self-regulated, with patients discontinuing treatment upon symptomatic relief, a practice they viewed as a logical form of managing their health rather than non-adherence. Key reasons for bypassing formal healthcare included the perception of illness as minor, financial constraints, and dissatisfaction with health institutions. The findings demonstrate that antibiotic use is not merely a matter of biomedical knowledge but is deeply embedded in culturally constructed logics and rational responses to structural constraints. Effective public health interventions to combat antimicrobial resistance must therefore move beyond prescriptive messaging and directly engage with these local understandings and practices.

1 Introduction

Antibiotics are drugs that target and destroy bacteria [1]. The discovery of antibiotics and their clinical use represented a breakthrough in 20th-century medicine, as it allowed the treatment of various infectious diseases and facilitated the execution of numerous medical techniques and procedures [2]. [1]For several years, antibiotics were successfully employed [3], and have saved countless lives [1] significantly reducing the morbidity and mortality associated with infectious diseases [3]. However, antimicrobial resistance (AMR) presents a complex challenge that endangers

[1]Corresponding author.
E-mail address: okeyoallan@student.elte.hu

the health of humans [4], as well as the global economy and the security of nations [1]. Factors such as improper and excessive antibiotic use have led to a decrease in antimicrobial efficiency, thereby promoting bacterial resistance [5]. Antibiotic-resistant bacteria cause 700,000 deaths per year worldwide, and it is predicted that resistance will be more lethal than cancer by 2050 [6]. Global consumption of antibiotics increased by 65% between 2000 and 2015, and this steadily increasing trend is mainly observed in low- and middle-income countries [7]. The majority of these antibiotics are consumed outside hospitals, and self-medication with antibiotics is a common practice worldwide, except in northern Europe and North America where it is strictly regulated [8]. While AMR is a biological phenomenon [9,10], it is heavily influenced by social, cultural, behavioural and economic factors, especially in low-and middle-income countries with often constrained healthcare acess [11,12]. Indeed, the intersection of poverty and limited healthcare access in low-resource settings creates fertile ground for the misuse of antibiotics and the spread of AMR [13,14]. In many impoverished communities, individuals face significant financial barriers to accessing quality healthcare and appropriate medications [15]. This economic constraint often leads to self-medication practices, including the use of incomplete antibiotic courses or substandard medications, as patients attempt to manage their health with limited resources [12]. How antibiotics are prescribed, consumed, and shared within communities reflects broader social practices [16]. Research indicates that societal expectations and beliefs significantly impact how individuals perceive and utilise antibiotics, often leading to practices that contribute to AMR [17,18]. Many individuals hold cultural assumptions about antibiotics, including a habit of self-medication and a belief in their necessity for future health needs [19]. A significant number of individuals reuse leftover antibiotics, often due to a lack of understanding of proper usage [20]. In some cultures, reliance on traditional medicine can reduce antibiotic use, highlighting the need for culturally sensitive healthcare alternatives [21].

Consequently, a cultural logic, or a culture's way of reasoning, reveals the belief systems that groups of people share and enact through discourse [22]. For instance, Ratcliffe identifies conservative religious logic, neoconservative logic, and Republican logic (p. 33) as recognisable forms of reasoning. Applied to health contexts, cultural logics reveal how local assumptions and expectations shape understandings of illness and acceptable care. Exposing these assumptions is essential for understanding cultural dynamics, since they reflect culture-specific expectations that influence healthcare decisions [22]. By analysing cultural logics, we can better examine how communities define illness, perceive treatment options, and determine the local acceptability of interventions such as antibiotics. Certainly, cultural beliefs and practices surrounding healthcare-seeking behaviour play an important role in shaping patterns of antibiotic use [23]. This dimension, though critical, is often overlooked in discussions of antimicrobial resistance. For instance, in some communities, there may be a strong preference for injectable antibiotics [24, 25] or skepticism toward generic drugs, both of which can contribute to inappropriate use [26, 27]. Beliefs about the causes of illness also influence treatment choices such that in certain contexts, symptoms may be attributed to spiritual or supernatural forces rather than bacterial or viral infections [27, 28].

In many regions, traditional or folk medicine operates alongside formal healthcare systems, with cultural perspectives on illness and treatment shaping how antibiotics are perceived and used [12]. Consequently, individuals may seek care from traditional or religious healers before consulting medical professionals. These practices can contribute to treatment delays, inappropriate dosing, and incomplete antibiotic courses, all of which accelerate the development and spread of antimicrobial resistance [12].

This perspective of cultural logic is particularly relevant in Kenya, where high rates of self-medication and growing resistance to first-line antibiotics have been well-documented [29]. While much research highlights the quantitative prevalence of these practices, less attention has been paid to the underlying cultural logics, that is, the "why" that drive them. Examining the case of pharmacy clients in Manyatta 'A' sub-location, Kisumu, for example, reveals how cultural reasoning informs choices about antibiotic use "beyond prescription" [30]. Therefore, Kleinman's Explanatory Model (EM) offers a productive framework for this analysis. It emphasises that illness is interpreted through culturally constructed logics, which in turn shape health-seeking behaviour. Through this lens, it becomes clear that local beliefs, perceptions of efficacy, and lived experiences with healthcare systems significantly influence how antibiotics are acquired and consumed outside the formal medical sphere [31]. Accordingly, cultural assumptions and expectations, then, are not peripheral

but central to understanding antibiotic use and resistance. They reveal complex dynamics that shape how individuals interpret care and process health-related information, often in ways that outsiders unfamiliar with local contexts may overlook. As a result, different cultures may hold distinct conceptions of what constitutes a health or medical condition thereby generating different expectations for how health issues should be recognised, understood, and addressed [32].

2 Purpose and Objectives of the Study

The overarching purpose of this study was to understand why and how community members in an informal urban settlement in Kisumu, Kenya use first-line antibiotics outside of the formal, prescribed medical system. The study was guided by the following objectives:

To analyse the cultural logics shaping community members' preferences and practices regarding first-line antibiotic use.

To document the self-medication practices associated with the acquisition and adherence to first-line antibiotics.

3 Theoretical Framework

This study is theoretically anchored in Arthur Kleinman's Explanatory Model (EM) of illness which is a cornerstone of medical anthropology that challenges the purely biological focus of the biomedical model [33]. Explanatory models are culturally specific logics of disease with a narrative understanding of what illness is and what can be expected from it. This logic shapes perceptions of and interactions with the culturally constructed and socially organised, lived experiences [34]. Kleinman rejects the physicalistic reductionism of the biomedical model in favour of a culturally constructed experience where individuals and communities develop their own explanatory models for understanding sickness, which directly shape their perceptions, responses, and treatment choices. These explanatory models focus on fundamental questions about the cause of illness (etiology), the meaning of symptoms, the expected course of the sickness, and desired treatments [35]. In Kleinman's perspective, health-seeking behaviour occurs within a pluralistic medical system comprising of three interconnected sectors: the professional (organized biomedicine), the folk (specialist traditional healers), and the popular (the lay domain of families, social networks, and community practices). It is within this popular sector where the majority of health decisions are initially made and where self-medication is most prevalent [33].

In its application to the current study, the framework offers a crucial analytical lens to interpret the cultural logics underpinning antibiotic use. The explanatory model approach permits the interpretation of antibiotics use practices such as purchasing without prescription as rational actions grounded in patients' own explanatory models as opposed to just misuse of antibiotics. For instance, the perception that an illness is "minor" (such as the local illness category known as *'yamo'*) or the belief that liquid formulations are exclusively for children are core components of local explanatory models that directly dictate behaviour. Moreover, the framework elucidate the social processes enabling self-medication through the popular sector. By concentrating on this sector, this study examined in-depth the advice from friends, relatives, and pharmacy clerks which constituted a lay referral system which often overrode professional medical advice in therapeutic decision-making.

Thus, the use of this model negates the unjust judgment of local explanatory models against biomedical standards. This approach moved beyond a superficial view of patients as unknowledgable actors to reveal instead how antibiotics are embedded within a specific socio-cultural context. Essentially, Kleinman's framework offers an interpretive lens [33] for the systematic investigation of why individuals in Manyatta 'A' consistently operate "beyond prescription," thereby offering a deeper understanding of the socio-cultural drivers of antibiotic resistance.

4 Methodology

This research adopted a mixed-methods approach, utilizing a descriptive cross-sectional design to provide a snapshot of the socio-cultural factors influencing antibiotic use in the community. This design was selected for its efficiency in capturing data within a limited timeframe. The study was set in Manyatta 'A', a densely populated semi-informal settlement in Kisumu City, Kenya, known for its

high poverty levels and a blend of formal and informal medicine outlets [36]. The research focused on 28 pharmacies, their owners, staff, and clients who had purchased first-line antibiotics (such as amoxicillin, co-trimoxazole, and metronidazole) within this area.

A simple random sampling technique was used to select 8 pharmacies from the total of 28 identified through community mapping. For the client sample, a modified theoretical sampling strategy was employed, leading to a sample of 102 pharmacy clients. This number was considered sufficient based on survey methodology guidelines. These 102 clients, along with the chief pharmacists and clerks from the 8 selected pharmacies, were chosen purposively. Additionally, 31 informants were selected through systematic sampling for in-depth household follow-up interviews, with the sample size determined by applying the Prakash 30% rule. Data collection combined quantitative and qualitative techniques. A total of 102 semi-structured questionnaires were administered. To gather richer qualitative insights, 31 unstructured questionnaires, 8 key informant interviews, and 3 focus group discussions with pharmacy clerks were conducted.

The study used rigorous pre-testing and validation procedures that ensured instrument reliability and validity that negated the formal psychometric scaling such as Cronbach's alpha given the study's exploratory and mixed-methods design. As a result, pretesting was conducted with 10 pharmacy clients (10% of the sample) through the use of semi-structured questionnaires and unstructured questionnaires with 3 household informants. The feedback that arose from the pretesting was used to improve the clarity of questions, their sequencing and relevance. A test-retest procedure with 8 pharmacy clients compared over a two-week interval to assess consistency further ensured reliability. Methodological triangulation that combined quantitative survey data with qualitative insights from the interviews and focus groups strengthened validity. Moreover, the continuous supervisory review ensured further alignment with study objectives. These steps made it possible for the study instruments to be contextually appropriate and suitable for yielding trustworthy day that is reflective of the socio-cultural factors under investigation. The study was carried out in strict compliance with the ethical principles of the Declaration of Helsinki. All participants provided informed consent after the study's aims, objectives, and procedures were thoroughly explained to them.

5 Findings

5.1 Demographic characteristics of respondents

Results of the gender and age of pharmacy clients are summarized in table 1 and table 2 respectively.

Table 1. Gender of pharmacy clients

Gender	Frequency	Percent
Male	25	24
Female	77	76
Total	102	100

The results show that majority of pharmacy clients (n=102) were female (76%), while male respondents made up less than one-quarter of the sample. This gender disparity in participation arose because more female clients were present at pharmacies to buy antibiotics and were available to be interviewed. The overrepresentation of women reflects both their greater visibility as purchasers at the time of data collection and their central role in health-related activities, whether acting as messengers who obtain medication for others or as direct consumers of antibiotics. In the study, female respondents typically acquired antibiotics either for themselves, for their children, or for another adult household member. This pattern suggest the importance of directing community-based antibiotic education initiatives toward women.

Table 2. Age of pharmacy clients

Age distribution of pharmacy clients	Frequency	Percent
18-30	74	73.0
31-40	14	13.5
41-50	9	8.5
Above 51	5	5.0
Total	102	100

The findings demonstrate that majority of the pharmacy clients were between 18 to 30 years old (73%). This implies that this age age cohort is actively involved in obtaining antibiotics whether for themselves or others. This demographic pattern suggests their engagement with health-related behaviours involving antibiotics. Nevertheless, the cross-sectional design limited causal inference regarding their specific contribution to appropriate versus inappropriate use.

Previous research offers varied insights. A Malaysian study identified adults aged 18–30 as the group most frequently linked to negative attitudes regarding antibiotic use [44]. Similarly, in a Jordanian community, younger respondents (18–25 years) were found more likely to have taken antibiotics within the previous year [45]. These findings, however, contrast with studies from East Asia and Europe. For instance, research in Taiwan [47] and Italy [46] noted that age significantly influences antibiotic use, even though these studies focused largely on pediatric prescribing patterns and parental behaviors rather than adult self-medication

5.2 Cultural Logics Shaping Antibiotic Preferences and Use Practices

Preferences for antibiotic dosage forms and their corresponding use practices were accompanied by distinct cultural logics as illustrated in table 3. The most preferred dosage form was capsules (41%), followed closely by liquid preparations or syrups (40%), while tablets were least preferred (19%).

Table 3. Dosage Form Preferences (n=102)

Dosage Form	Frequency	Percent
Capsule	42	41%
Liquid/syrup	40	40%
Tablet	20	19%
Total	102	100.0

Consequently, the cultural logic behind these preferences were explored in-depth. For instance, liquid preparations/syrups were culturally coded for children as acknowledged by the following participants' narratives:

"it (syrup) is good for children because they cannot use capsules" (Female informant, 26 years).

Conversely, the following narrative inadvertently reveal a perception about capsules as adult medicine:

"The child is still young to use capsules, unless it is recommended by the doctor" (Female informant, 26 years old).

Furthermore, perceptions about the efficacy of antibiotic dosage forms were shaped culturally as stated by one participant that:

"Amoxil syrup is given to a child for seven days then you have to discard after and maybe the cough has not been relieved" (Female informant, 19 years).

Thus, these narratives imply a logic that challenges the potency of certain dosage forms. Moreover, the aforementioned narratives analytically constitute a lay classification system of antibiotic and subsequently drug administration.

5.2. Therapeutic Pathways to Antibiotic Access

The primary finding herein was the pervasiveness of a healthcare system operating "beyond formal prescription". A considerable proportion of antibiotics were acquired without a prescription (73%) in contrast to 27% acquired with prescription as presented in table 4a.

Table 4a. Type of Antibiotic Acquisition (n=102)

Type of Acquisition	Frequency	Percent
Without Prescription	74	73%
With Prescription	28	27%
Total	102	100%

The logics behind circumventing formal healthcare in relation to non-prescription acquisition were multifaceted as illustrated in table 4b. The prevalent reasons were the perception that illness was minor (34.7%). Dissatisfaction with health institutions (21.3%) and financial constraints (14.7%) were also notable.

Table 4b. Reasons for Acquiring Antibiotics Without Prescription (n=74)

Reasons for acquisition	Frequency	Percent
Illness was minor; no need to see a professional	26	34.7%
Not satisfied by health institution	15	21.3%
Financial constraints	12	14.7%
Used same drugs before for same type of illness	10	13.3%
Friend/relative/neighbour used same drugs before for same illness	5	6.7%
Public health facilities far away/not there	3	4.1%
Trust on pharmacy personnel	2	2.8%
Total	74	100%

Accordingly, qualitative data showed that pharmacy clients' reasons were based on a logic of prior success with the acquired antibiotic. A participant for instance stated that:

"Why should I go to the doctor if I know the sickness goes away with medication? If it doesn't go away with that [medication] ill go to the doctors" (Male informant, 32 years old)

5.3. Self-Regulation as Therapeutic Practice

A proportion of pharmacy clients did not complete antibiotic course, hence justifying this practice as a form of self-regulation. Thus, the main reason was the disappearance of symptoms (34.7%), followed by a belief that the illness was relieved (20.8%) (Table 5).

Table 5. Reasons for Discontinuing Antibiotics (n=71)

Reason for Discontinuation	Frequency	Percent
When symptoms disappear	35	34.7%
When illness is relieved	21	20.8%
When I believe the drug is not working	12	11.9%
When side effects create problems	3	3.0%
Total	71	70.3%

These results justifies the logic that antibiotics were mainly used for symptomatic relief and not for completing the antibiotic course. An informant stated:

"I was taking it (flagyl tablets) and the illness stopped before I completed the dose so I discontinued" (Male informant, 27 years old)

Another informant also noted:

"I used it for five days, I was already healed, the cough had already disappeared" (Female respondent, 24 years)

Based on the aforementioned verbatim quotes, non-adherence was a form of self-regulation in the sense of discontinuing the antibiotic course. Ultimately, it was a way of evaluating the current state of the illness and in general, to assert control over the illness [30]. Hence, the participants acknowledged that they discontinued taking the antibiotics when they felt relieved and not as advised by the community pharmacy personnel. Thus, the action of using the antibiotics provided the pharmacy clients with an implied sense of improved well-being and their reason for using the antibiotics was instrumental, that is, to help them lead a 'normal life' [30]. From an emic perspective, the act of non-adherence in the current context is not framed as a deficiency, but as an active, logical practice of managing one's own health. Succinctly, the crux of the relevant findings that stopping antibiotics when symptoms abate is a form of intentional self-regulation.

6 Discussion

This study reveals dynamic beliefs, perceptions, and behaviours that drive the use of first-line antibiotics in Manyatta 'A', signifying a consistent system of antibiotic utilisation that operates "beyond prescription." While such practices are often framed as 'misuse' from a biomedical standpoint, a closer emic perspective reveals them to be logical and rational responses to illness as understood within the community's semantic illness networks [37]. Within this framework, antibiotics are not merely pharmaceutical objects but socially meaningful tools entrenched in locally shared interpretations of symptoms, bodily sensations, and anticipated recovery trajectories. Antibiotic use is guided less by formal clinical protocols and more by culturally situated logics that render treatment decisions intelligible and practical to users. This aligns with longstanding anthropological insights that illness is fundamentally meaningful and that clinical practice, whether professional or lay, is inherently interpretive [38].

These findings aligns closely with Kleinman's conceptualisation of healthcare systems, particularly the salience of the "popular sector," where health actions are shaped by lay knowledge, lived experience and structural constraints in lieu of professional medical authority [33, 39]. In this regard, decisions about antibiotic acquisition and use mirror negotiated responses to illness that are socially and economically grounded. Kleinman's distinction between disease, illness, and sickness is useful here: while biomedicine prioritises disease as a pathological abnormality, community members primarily engage with illness as lived experience and sickness as a socially recognised state requiring action [34, 35]. The apparent divergence from biomedical norms observed in this study therefore does not indicate ignorance or irrationality but rather highlights a different epistemological orientation to health and healing.

Methodologically, the study's mixed-methods design strengthens confidence in these interpretations. The high rate of non-prescription antibiotic acquisition (73%) was supported by qualitative narratives that emphasised prior success with antibiotics, financial constraints, and dissatisfaction with formal healthcare services. This convergence illustrates a form of methodological triangulation that reinforces the validity of the findings within the local context. Nevertheless, future research could benefit from formal psychometric validation of survey instruments, such as the application of Cronbach's alpha, to further enhance internal consistency. Additionally, incorporating control groups such as patients who exclusively use prescribed antibiotics or communities from higher-income settings could help extricate cultural logics from economic necessity. Moreover, longitudinal designs tracking treatment outcomes over time would also clarify whether self-regulated antibiotic use contributes to relapse or antimicrobial resistance.

The study's insights are particularly salient within contemporary debates on antibiotic use and resistance. The cultural logics identified such as age-based classification of dosage forms and symptom-driven self-regulation of treatment are deeply entrenched and resistant to simple behavioural correction. These practices are further bolstered by systemic determinants such as economic precarity and persistent dissatisfaction with public health services, conditions that remain prevalent in informal urban settlements in Kenya [40, 41]. Furthermore, rising consultation fees and prolonged waiting times in formal healthcare settings push individuals toward pharmacies as more immediate and affordable points of care, promoting self-diagnosis and over-the-counter or prescription-like drug acquisition [42].

The COVID–19 pandemic heightened these dynamics due to the fear of health facilities and mobility restrictions that intensified reliance on non-prescription pathways globally [43]. The persistence of such pathways during periods of crisis accentuates their functional importance within community health systems, even as they pose significant challenges for antimicrobial stewardship. In this respect, the sustained escalation of antimicrobial resistance reiterates the urgency of understanding antibiotic use not primarily as an individual behavioural problem but as a socially patterned response to structural vulnerability [29].

The high proportion of antibiotics obtained without prescription in this study substantiates Kleinman's assertion that the popular sector often serves as the primary point of care for many individuals [33]. The belief that an illness is minor and does not warrant professional consultation acts as a powerful cultural filter that directs care-seeking away from the professional sector altogether. While the professional sector remains central to biomedical governance encompassing physicians, nurses, specialists, and health administrators, it is frequently bypassed when its perceived costs outweigh its benefits.

Ultimately, the logic of self-regulation through non-adherence to first-line antibiotic protocols emerges as one of the most significant findings of this study. This practice reflects a fundamental tension between biomedical models of care, which emphasise course completion and standardised dosing, and lay models of care, which prioritise symptomatic relief and embodied assessments of recovery. Such practices, while rational within local epistemologies, contribute to the structural conditions that facilitate antimicrobial resistance. Addressing this challenge therefore requires interventions that engage with community-based meanings of medicine and illness, rather than relying solely on normative biomedical directives.

7 Study Limitations

The nature of the study population demanded that all the pharmacy clients who purchased any category of first-line antibiotics, chief pharmacists and pharmacy clerks be categorised as difficult to find population. In line with this methodological consideration, it was therefore not possible to adopt a random sampling strategy in the selection of pharmacy clients, chief pharmacists and pharmacy clerks due to lack of physical list and a distinct sampling frame. On the other hand, the household follow-up interview study generated primarily qualitative data. Hence, the findings of the study could not be generalised to the entire population of Manyatta 'A' sub-location. Furthermore, there was no formal control group and longitudinal follow-up. This limited the ability of the study to compare behaviors with those who used prescribed antibiotics or to assess health outcomes following self-

regulated treatment. Future studies would benefit from such designs to better understand causal pathways and clinical implications.

8 Conclusion

This study has showed that antibiotic use in Manyatta 'A' sub-location is constructed through consistent cultural logics that foster self-medication practices that operate beyond the reach of formal prescriptions. The findings of the study challenges the shortfall of the mechanistic biomedical model that position these practices simply as a lack of knowledge rather than an active, culturally-informed management of health within structural constraints.

9 Recommendations

Moving beyond prescription in strategy and analysis should involve cultural logics directly through public health messages that acknowledges the existing cultural understandings. For instance, community educational campaigns can be developed to engage the logic of dosage form preferences while explicating the significance of full-course completion. Essentially, controlling antimicrobial resistance requires respect for the community as a custodian of lay knowledge and logic. Additionally, future public health interventions should consider co-designing localized educational campaigns with women and younger adults who emerged as key actor in antibiotic acquisition. Embedded in cultural logics rather than prescriptive messaging alone, such approaches may prove more effective in promoting appropriate antibiotic use in the community.

References

[1] Ferraz, M.P. (2024). Antimicrobial Resistance: The Impact from and on Society According to One Health Approach. Societies 14(9), 187; https://doi.org/10.3390/soc14090187

[2] Munita, J.M. & Arias, C.A. (2016). Mechanisms of Antibiotic Resistance. Microbiology Spectrum, 4(2):doi: 10.1128/microbiolspec.VMBF–0016-2015

[3] Munoz-Davila, M. J. (2014). Role of Old Antibiotics in the Era of Antibiotic Resistance. Highlighted Nitrofurantoin for the Treatment of Lower Urinary Tract Infections. Antibiotics, 3(1), 39–48:doi: 10.3390/antibiotics3010039.

[4] Meszaros, M. (2025). AMR: Mapping Digital Antimicrobial Resistance Discourses-A Complex Systems Analysis for Leveraging Social Media in Antimicrobial Resistance Communication** **(Doctoral dissertation).

[5] Moo, C.L.; Yang, S.K.; Yusoff, K.; Ajat, M.; Thomas, W.; Abushelaibi, A.; Lim, S.H.; Lai, K.S. (2020). Mechanisms of Antimicrobial Resistance (AMR) and Alternative Approaches to Overcome AMR. Current Drug Discovery Technologies, 17, 430–447.

[6] O'Neil, J. (2016). Tackling drug-resistant infections globally: final report and recommendations. The Review on Antimicrobial Resistance.

[7] Klein EY, Van Boeckel TP, Martinez EM, Pant S, Gandra S, Levin SA, Goosens, H., & Laxminaryan, R. (2018). Global increase and geographic convergence in antibiotic consumption between 2000 and 2015. Proceedings of the National Academy of Sciences. 115(15): https://doi.org/10.1073/pnas.1717295115

[8] Morgan, D.J, Okeke, I.N, Laxminarayan R, Perencevich, E.N, Weisenberg, S. (2011). Non-prescription antimicrobial use worldwide: a systematic review. Lancet Infectious Disease 11(9):692–701. DOI:10.1073/pnas.1717295115

[9] Tang, K. W. K., Millar, B. C., & Moore, J. E. (2023). Antimicrobial resistance (AMR). British journal of biomedical science, 80, 11387. DOI: 10.3389/bjbs.2023.11387

[10] Sakalauskienė, G. V., & Radzevičienė, A. (2024). Antimicrobial resistance: what lies beneath this complex phenomenon?. Diagnostics, 14(20), 2319.doi: 10.3390/diagnostics14202319.

[11] Auta, A., Hadi, M. A., Oga, E., Adewuyi, E. O., Abdu-Aguye, S. N., Adeloye, D.,... & Morgan, D. J. (2019). Global access to antibiotics without prescription in community pharmacies: A systematic review and meta-analysis. Journal of Infection 78, 8–18. https://doi.org/10.1016/j.jinf.2018.07.001

[12] Melaku, T., & Assegid, L. (2025). Prescription in peril: the sociology of antibiotics and antimicrobial resistance in low resource settings. Discover Social Science and Health 5(1), 71.https://doi.org/10.1007/s44155-025

[13] Deori, C, Sonowal, & T, Das M. (2024). Antimicrobial resistance: a looming threat to public health and global well-being. Indian J Community & Family Medicine 10(1): 18–25.DOI:10.4103/ijcfm.ijcfm_1_24

[14] Delia, C.S. (2020). Misuse of antibiotics and the dissemination of antibiotic resistant bacteria in the community. Malta College of Arts, Science & Technology Journal of Applied Research & Practice 4(1):91–106.DOI:10.5604/01.3001.0014.4400

[15] Keenan, K, Correa, J.S, Sringernyuang, L, Nayiga, S, & Chandler, R.C. (2025). The social burden of antimicrobial resistance: what is it, how can we measure it, and why does it matter? Journal of Antimicrobial Chemotherapy Antimicrobial Resistance 7(2):208.doi: 10.1093/jacamr/dlae208

[16] Masud A, alpola, R.L, Sarker, M, Kabir, A, Asaduzzman, M, Islam, M.S, Mostafa, A.T, Akhtar, Z, Barua, M, & Seale, Holly. (2024).Understanding antibiotic purchasing practices in community pharmacies in Bangladesh: a potential

driver of emerging antimicrobial resistance. Exploratory Research in Clinical and Social Pharmacy, 15,100485. doi: 10.1016/j.rcsop.2024.100485
[17] Herrmann A, Visschers V, Feck V. (2022). Knowledge, social influences, perceived risks and benefits, and cultural values explain the public's decisions related to prudent antibiotic use. Risk Analysis 42:1488-1503.doi: 10.1111/risa.13851.
[18] Avorn J, Solomon DH. (2000). Cultural and economic factors that (mis) shape antibiotic use: the nonpharmacologic basis of therapeutics. Annals of Internal Medicine 133(2):128–35. doi: 10.7326/0003-4819-133-2-200007180-00012.
[19] Imanpour, S, & McMaughan, D.J.(2024). 'You never know when you will need an antibiotic: a qualitative study of structural barriers and cultural assumptions in antibiotic misuse among immigrants in the United States. Journal of Health Services Research Policy, 29(4):266–74.doi: 10.1177/13558196241252748.
[20] Zarauz, JM., Zafrilla, P., Ballester, P., & Cerda, Begona. (2022). Study of the drivers of inappropriate use of antibiotics in community pharmacy: request for antibiotics without a prescription, degree of adherence to treatment and correct recycling of leftover treatment. Infection and Drug Resistance, 15, 6773–83.doi: 10.2147/IDR.S375125
[21] González-Villoria, A.M., Quiroz, A.D.G., Guzman, E.U.., Suarez-Herrera, J.C., Zuniga, R.A.A.(2024). Knowledge, attitudes, and practices of parents in the use of antibiotics: a case study in a Mexican indigenous community. Healthcare, 12, 294.doi: 10.3390/healthcare12030294.
[22] Chowdhury. M, Williams, J.S, Wertheim, H., Khan, W.A., Matin, A., & Kinsman, J. (2019). Rural community perceptions of antibiotic access and understanding of antimicrobial resistance: qualitative evidence from the Health and Demographic Surveillance System site in Matlab, Bangladesh. Global Health Action. 12(1).doi: 10.1080/16549716.2020.1824383
[23] Sajid A.(2022). Time to rationalize the use of antibiotics. Journal of University Medical Dental College,13(1): v–vii. DOI:10.37723/jumdc.v13i1.721
[24] Dunne SS, & Dunne CP.(2015). What do people really think of generic medicines? A systematic review and critical appraisal of literature on stakeholder perceptions of generic drugs. BioMed Central Medical Journal. 13,1–27.doi: 10.1186/s12916-015-0415-3
[25] Benites-Meza, J. K., Herrera-Añazco, P., Santillán-Rodríguez, A. A., Zumarán-Nuñez, C. J., Barturén-Alvarado, L. C., & Benites Zapata, V. A. (2023). Association between self-medication with antibiotics and purchase of brand-name drugs: analysis of a national survey in Peru. Journal of Pharmaceutical Health Services Research. 14(2):112–22. doi:10.1093/jphsr/rmad015
[26] Vaughn LM, Jacquez F, Bakar RC.(2009). Cultural health attributions, beliefs, and practices: effects on healthcare and medical education. Open Medical Education Journal, 2(1):64–74.DOI: 10.2174/1876519X00902010064
[27] Muriuki, B. M., et al. (2022). Antibiotic use and resistance in Kenya: a review of the literature. CABI Agriculture and Bioscience, 5(1): DOI:10.1186/s43170-024-00223-4
[28] Okeyo, A. O. (2017). Socio-cultural factors influencing the utilization of first-line Antibiotics in Manyatta 'A' sub-location, Kisumu city, Kenya (Doctoral dissertation, Maseno University).
[29] Chandler, C. I. R., & Hutchinson, E. (2016). Addressing antimicrobial resistance through social theory: an anthropologically oriented report. Wellcome Trust.
[30] Zhu P., St. Amant K. (2007). Taking traditional Chinese medicine international and online: An examination of the cultural rhetorical factors affecting American perceptions of Chinese- created websites. Technical Communication, 54, 171–186.
[31] Kleinman, A. (1980). Patients and Healers in the Context of Culture: An Exploration of the Borderland between Anthropology, Medicine, and Psychiatry. University of California Press.
[32] Kleinman, A. (1988). The illness narratives: Suffering, healing, and the human condition. New York, US: Basic Books
[33] Kleinman, A. (1978). Culture, illness and cure: Clinical lesions from anthropologic and cross-cultural research. Annals of Internal Medicine, 88, 251-258
[34] Kenya National Bureau of Statistics (2019). 2019 Kenya Population and Housing Census. GoK
[35] Good, BJ. (1977). The heart ofwhats the matter: The semantics of illness in Iran. Culture Medicine and Psychiatry, 1, 25-58.doi: 10.1007/BF00114809.
[36] Good, BJ, & Good, M.J. (1981). The meaning of symptoms: a cultural hermeneutic model for clinical practice. Culture Medicine and Psychiatry, 1, 60-65.DOI:10.1007/978-94-009-8379-3_8
[37] Llewelyn, M. J., Fitzpatrick, J. M., Darwin, E., Gorton, C., Paul, J., Peto, T. E., Yardly, L., Hopkins, S, & Walker, A. S. (2017). The antibiotic course has had its day. British Medical Journal 358.doi:10.1136/bmj.j3418
[38] Wambiya, E. O., Otieno, P. O., Mutua, M. K., Donfouet, H. P. P., & Mohamed, S. F. (2021). Patterns and predictors of private and public health care utilization among residents of an informal settlement in Nairobi, Kenya: a cross-sectional study. BioMed Central Public Health, 21(1), 850.doi: 10.1186/s12889-021-10836-3.
[39] Bakibinga, P., Kisia, L., Atela, M., Kibe, P. M., Kabaria, C., Kisiangani, I., & Kyobutungi, C. (2022). Demand and supply-side barriers and opportunities to enhance access to healthcare for urban poor populations in Kenya: a qualitative study. British Medical Journal,12(5), e057484. doi: 10.1136/bmjopen-2021-057484.
[40] Gronde, T. V. D., Uyl-de Groot, C. A., & Pieters, T. (2017). Addressing the challenge of high-priced prescription drugs in the era of precision medicine: a systematic review of drug life cycles, therapeutic drug markets and regulatory frameworks. PloS one, 12(8), doi: 10.1371/journal.pone.0182613
[41] Hsu, J. (2020). How covid-19 is accelerating the threat of antimicrobial resistance. British Medical Journal, 18:369. DOI: 10.1136/bmj.m1983.PMD: 32423901

[42] Iwu, C, D & Patrick, S.M, (2021). An insight into the implementation of the global action plan on antimicrobial resistance in the WHO African region: A roadmap or action. International Journal of Antimicrobial Agents, 58 (4), 106411, doi: org//10.1016

[43] Founou, R. C., Blocker, A. J., Noubom, M., Tsayem, C., Founou, L. L., & Essack, S. Y. (2021). The COVID–19 pandemic: A threat to antimicrobial resistance containment. Future Science Open Access, 7(8), FSO736.

[44] Oh, A. L., Hassali, M. A., Al-Haddad, M. S., Syed Sulaiman, S. A., Shafie, A. A., & Awaisu, A. (2011). Public knowledge and attitudes towards antibiotic usage: a cross-sectional study among the general public in the state of Penang, Malaysia. Journal of Infection in Developing Countries, 5(5), 338–347. https://doi.org/10.3855/jidc.1502

[45] Shehadeh, M., Suaifan, G., Darwish, R. M., Wazaify, M., Zaru, L., & Alja'fari, S. (2012). Knowledge, attitudes and behavior regarding antibiotics use and misuse among adults in the community of Jordan. A pilot study. Saudi Pharmaceutical Journal, 20(2), 125–133. https://doi.org/10.1016/j.jsps.2011.11.005

[46] Dengler, R., & Roberts, H. (1996). Adolescents' use of prescribed drugs and over-the-counter preparations. Journal of Public Health, 18(4), 437-442. https://doi.org/10.1093/oxfordjournals.pubmed.a024542

[47] Chen, C., Chen, Y. M., Hwang, K. L., Lin, S. J., Yang, C. C., Tsay, R. W., Liu, C.E., & Young, T. G. (2005). Behavior, attitudes and knowledge about antibiotic usage among residents of Changhua, Taiwan. J Microbiol Immunol Infect, 38(1), 53-59.