



Eagle International Journal of Research, Innovation and Health Sciences

An International Peer Reviewed, Open-Access and Multidisciplinary Journal

Volume 1 | Issue 3 | June 2026 |ISSN:3141-4907

Website: <https://eijrihs.com>

**A SYSTEMATIC REVIEW OF DETERMINANTS OF SELF-MEDICATION AND
ANTIBIOTIC MISUSE IN LOW- AND MIDDLE-INCOME COUNTRIES**

Abdulrahman Folarin Rodiat¹, Abdul Bello Gololo²

Department of Public Health

Faculty of Basic and Applied Biological Sciences

Ahmadu Bello University, Zaria, Nigeria

Corresponding Email: abdulrahmanrodiat555@gmail.com

Abstract

Self-medication with antibiotics remains a major public health concern, particularly in low- and middle-income countries (LMICs), where it contributes to inappropriate antibiotic use and the growing burden of antimicrobial resistance. This systematic review examined the prevalence and determinants of antibiotic self-medication in LMICs by synthesising evidence from studies published between 2015 and 2025. The review was reported in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidance. PubMed and Google Scholar were searched using combinations of terms relating to antibiotic self-medication, misuse, determinants, predictors, developing countries and sub-Saharan Africa. Of 50 records identified, 45 remained after duplicate removal, 27 full-text articles were assessed and 20 studies met the eligibility criteria for narrative synthesis. The evidence showed that antibiotic self-medication is common but highly variable across settings, with particularly high estimates reported in several sub-Saharan African populations. The major determinants clustered around behavioural, sociodemographic and health-system factors. Behavioural influences included previous successful antibiotic use, perceiving an illness as minor, confidence in personal knowledge, advice from relatives or peers and the reuse of leftover medicines. Sociodemographic influences included education, income, age, residence and health-insurance status, although their effects were not uniform across settings. Health-system drivers included treatment costs, distance to facilities, long waiting times, poor experiences with health workers, easy access to antibiotics from drug outlets and weak enforcement of prescription regulations. The review concludes that antibiotic self-medication in LMICs is produced by an interaction between individual decision-making and structural barriers to appropriate care. Stronger regulation of antibiotic sales, improved access to affordable and responsive healthcare, community-centred antimicrobial-resistance education and better antibiotic stewardship are required to reduce the practice.

Keywords: antibiotic self-medication, antibiotic misuse, antimicrobial resistance, low- and middle-income countries, healthcare access

1. INTRODUCTION

1.1 Background of the Study

Antibiotics have transformed the prevention and treatment of bacterial infections, but their continued effectiveness is threatened by inappropriate use. Antimicrobial resistance (AMR) occurs when microorganisms no longer respond adequately to medicines that were previously effective against them. Although resistance can develop naturally, its emergence and spread are accelerated by the misuse and overuse of antimicrobial medicines (World Health Organization [WHO], 2023). The consequences include prolonged illness, treatment failure, increased healthcare expenditure and avoidable deaths. A global analysis estimated that bacterial AMR was directly responsible for approximately 1.27 million deaths and associated with 4.95 million deaths in 2019 (Antimicrobial Resistance Collaborators, 2022).

One important pathway through which antibiotics are misused is self-medication. Self-medication refers to the selection and use of medicines by individuals to treat illnesses or symptoms that they recognise themselves, without current professional diagnosis or prescription (WHO, 2000). Responsible self-care may be appropriate for some minor conditions when suitable over-the-counter medicines are used correctly. Antibiotics, however, are prescription medicines in most health systems because their selection depends on the likely cause of infection, patient characteristics, appropriate dose and duration, possible drug interactions and local resistance patterns. Their use without professional assessment increases the risk of treating non-bacterial illnesses, choosing an unsuitable medicine, using an incorrect dose, stopping treatment prematurely or delaying necessary medical care.

Antibiotic self-medication is reported across both high-income and low-resource settings, but the conditions that sustain it are especially visible in LMICs. In many such settings, households face out-of-pocket healthcare costs, long travel distances, staff shortages, prolonged waiting times and limited diagnostic services. At the same time, antibiotics may be readily obtained from community pharmacies, drug shops, informal vendors, relatives or medicines stored at home. A systematic review of developing countries found a pooled prevalence of 38.8% for household antimicrobial self-medication, with pharmacies, leftover medicines and drug shops serving as common sources (Ocan et al., 2015). More recent global evidence estimated a pooled adult prevalence of 43.0%, rising to 55.2% in sub-Saharan Africa, although the underlying studies were highly heterogeneous (Gashaw et al., 2025).

The practice is not explained by lack of knowledge alone. Ahmed et al. (2023) found that previous experience with antibiotics, perceived minor illness, the desire to save time, advice from social networks, home storage of medicines and convenient access to pharmacies repeatedly shaped self-medication. Country studies also demonstrate how these

drivers operate differently across populations. In Sudan, convenience and cost-saving were prominent reasons for a self-medication prevalence of 71.3% (Hussain et al., 2023). In rural Malawi, 69.5% of surveyed antibiotic users reported self-medication, while awareness of antibiotic resistance was low and nearly half of interviewed drug retailers acknowledged unlawful antibiotic sales (Limwado et al., 2024). Conversely, the Dodoma study in Tanzania reported prevalence estimates of approximately 23% in both rural and urban districts, showing that the scale of the practice varies with context, measurement and access conditions (Mabilika et al., 2022).

A clear understanding of these determinants is essential for public health planning. Interventions that focus only on warning people about resistance may have limited effect where formal care is unaffordable, distant or unresponsive. Likewise, regulatory restrictions may fail if people have no realistic alternative to informal treatment. This review therefore synthesises evidence on the prevalence and determinants of antibiotic self-medication and misuse in LMICs, paying attention to the interaction among behavioural, sociodemographic, cultural and health-system factors.

1.2 Statement of the Problem

Antibiotic self-medication remains a persistent source of inappropriate antibiotic exposure in LMICs. The ease with which antibiotics can be purchased without a valid prescription, combined with barriers to formal healthcare, allows individuals to make treatment decisions without adequate diagnosis or follow-up. These decisions may include using antibiotics for viral respiratory symptoms, taking medicines left over from an earlier illness, sharing medicines with relatives, changing doses or stopping treatment once symptoms improve. Such practices expose individuals to adverse reactions and treatment failure while also creating selection pressure that supports the development and transmission of resistant organisms.

The available literature is extensive but fragmented. Many studies are restricted to individual communities, universities, occupational groups or countries. They also use different definitions of self-medication, recall periods, sampling approaches and outcome measures. Reported prevalence consequently ranges widely, making direct comparison difficult. Some studies emphasise knowledge and attitudes, while others focus on pharmacy access, household poverty or health-service barriers. Without a structured synthesis, policy makers may interpret antibiotic self-medication as a simple knowledge deficit and overlook the structural and contextual pressures that make the behaviour appear practical to users.

There is therefore a need to assemble and critically interpret recent evidence on the factors that influence antibiotic self-medication across LMICs. A systematic review can identify the determinants that recur across settings, clarify areas where evidence is inconsistent and show how personal behaviour is connected to healthcare access, regulation

and socioeconomic conditions. This study addresses that need by reviewing evidence published from 2015 to 2025.

1.3 Aim and Objectives of the Study

1.3.1 General Objective

To critically synthesise the available evidence on the prevalence and determinants of self-medication with antibiotics in low- and middle-income countries.

1.3.2 Specific Objectives

1. To describe the reported prevalence and patterns of antibiotic self-medication in LMICs.
2. To identify sociodemographic factors associated with antibiotic self-medication and misuse.
3. To examine behavioural, interpersonal and cultural factors that influence antibiotic self-medication.
4. To assess health-system and regulatory factors that contribute to non-prescribed antibiotic use.
5. To identify gaps in the existing evidence and propose priorities for policy, practice and future research.

1.4 Research Questions

1. What prevalence and patterns of antibiotic self-medication have been reported in LMICs?
2. Which sociodemographic factors are associated with antibiotic self-medication and misuse?
3. What behavioural, interpersonal and cultural factors influence antibiotic self-medication?
4. How do health-system conditions and pharmaceutical regulation affect antibiotic self-medication in LMICs?
5. What important gaps remain in the current evidence?

1.5 Significance of the Study

This review is significant because it brings together recent evidence on a behaviour that contributes to antibiotic misuse and undermines efforts to contain AMR. By organising the evidence into sociodemographic, behavioural, interpersonal and health-system domains, the review provides a clearer explanation of why people obtain and use antibiotics

without professional guidance. This is important for avoiding interventions that blame individuals while ignoring barriers such as cost, distance, waiting time and weak medicine regulation.

The findings are relevant to ministries of health, medicine regulatory agencies, clinicians, pharmacists, public health practitioners and community organisations. They can support the design of interventions that combine public education with practical improvements in healthcare access and pharmacy practice. The review also highlights methodological gaps that can guide future studies, including the need for standard definitions, comparable recall periods, longitudinal designs and evaluation of interventions.

2. LITERATURE REVIEW

2.1 Introduction

This section reviews the concepts, theories and empirical evidence relevant to antibiotic self-medication in LMICs. It first distinguishes self-medication from antibiotic misuse and then explains the main categories of determinants. The Health Belief Model and Andersen's Behavioral Model of Health Services Use are applied to show how individual beliefs and structural access conditions jointly shape treatment decisions. The empirical review is organised around sociodemographic, behavioural, health-system and contextual influences, followed by a discussion of prevalence and gaps in the literature.

2.2 Conceptual Review

2.2.1 Concept of Self-Medication

Self-medication is commonly understood as the use of medicines to treat self-recognised symptoms without a current prescription or consultation with an authorised healthcare professional. It includes purchasing a medicine directly, reusing a previous prescription, consuming medicines stored at home, sharing medicines with another person or following advice from non-professional sources. The WHO (2000) recognises self-medication as part of self-care but emphasises that it should involve medicines and conditions suitable for safe consumer management. Antibiotics fall outside this ideal because correct use usually requires clinical assessment and, where available, diagnostic evidence.

The boundary between formal treatment and self-medication is not always clear in LMICs. A person may describe symptoms to a pharmacy worker and receive an antibiotic without a written prescription, or reuse a medicine previously prescribed for a similar illness. These practices involve interaction with medicine sellers but still lack current diagnosis and authorised prescribing. Torres et al. (2019) identified several pathways through which antibiotics were obtained in Maputo, including naming a desired product,

presenting an old package, describing symptoms, using an old prescription and sharing medicines within social networks.

2.2.2 Concept of Antibiotic Misuse

Antibiotic misuse is broader than self-medication. It includes any use that is inconsistent with clinical need or recommended practice, whether the medicine was obtained with or without a prescription. Examples include using an antibiotic for a viral infection, selecting an unnecessarily broad-spectrum agent, taking an incorrect dose, shortening or prolonging the course, sharing medicines, using expired or leftover products and changing antibiotics without review. Popoola et al. (2024) found that many Nigerian graduates used antibiotics for symptoms commonly associated with viral infections and stopped or reduced treatment after feeling better, despite relatively high awareness that misuse contributes to resistance.

Misuse matters because antibiotic exposure can select resistant bacteria in the individual and the wider community. It can also obscure symptoms, delay appropriate treatment and produce adverse effects. The relationship between individual antibiotic use and population-level resistance is therefore both biological and social: repeated inappropriate use is sustained by medicine availability, health-seeking norms, commercial practices and weaknesses in healthcare systems.

2.2.3 Determinants in Epidemiology

In epidemiology, determinants are factors that influence the occurrence, distribution or pattern of a health-related behaviour or outcome. The determinants of antibiotic self-medication can be organised at several levels. Individual-level factors include knowledge, previous experience, perceived illness severity and confidence in self-treatment. Interpersonal factors include advice from relatives, peers or medicine sellers. Sociodemographic factors include age, education, income, occupation, residence and insurance status. Health-system factors include cost, distance, waiting time, staff attitudes, diagnostic capacity and the availability of qualified prescribers. Regulatory and market factors include the enforcement of prescription rules and the commercial availability of antibiotics.

These domains are interdependent. For example, previous successful use may strengthen confidence in self-treatment, but the decision to act on that confidence is easier where antibiotics are sold without a prescription. Similarly, low income may increase self-medication when consultation costs are high, yet severe poverty may also reduce a person's ability to purchase antibiotics at all. Green et al. (2023) demonstrated this complexity by showing that multidimensional poverty did not have a simple linear relationship with misuse across Kenya, Tanzania and Uganda.

2.3 Theoretical Framework

2.3.1 Health Belief Model

The Health Belief Model explains health behaviour through perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action and self-efficacy (Rosenstock, 1974). Applied to antibiotic self-medication, a person may judge an illness to be familiar and not severe enough to justify a clinic visit. The perceived benefit of rapid relief and the convenience of obtaining antibiotics from a nearby drug outlet may outweigh the perceived risk of side effects or resistance. Previous successful treatment can serve as a cue to action, while confidence in recognising symptoms increases self-efficacy for self-treatment.

The model helps explain findings from several included studies. Previous successful antibiotic use was strongly associated with self-medication in Northern Uganda (Adoko & Nakaziba, 2025), while medical students in Eastern Uganda commonly cited minor illness, previous use and confidence in their own knowledge (Nakato et al., 2023). The model also clarifies why general awareness messages may not be sufficient: people may acknowledge that resistance is harmful but still view the immediate personal benefits of self-medication as greater than a distant population-level risk.

2.3.2 Andersen's Behavioral Model of Health Services Use

Andersen's model explains healthcare utilisation through predisposing characteristics, enabling resources and perceived or evaluated need (Andersen, 1995). Predisposing characteristics include age, sex, education and health beliefs. Enabling resources include income, insurance, transportation, the distribution of health facilities and the availability of services. Need refers to how individuals perceive their symptoms and how professionals assess them.

The model is especially relevant to antibiotic self-medication in LMICs because it connects personal choice to access conditions. A person may be predisposed to self-treat because of prior experience, enabled by the proximity of a drug shop and constrained from formal care by cost or distance. Mabilika et al. (2022) found that perceived distance to drug outlets and health facilities influenced self-medication in both rural and urban Tanzania. Hussain et al. (2023) similarly found higher self-medication among uninsured and less-educated participants in Sudan. Andersen's model therefore complements the Health Belief Model by showing how individual perceptions operate within the opportunities and constraints created by the health system.

2.4 Empirical Review of Determinants

2.4.1 Sociodemographic Determinants

Education is one of the most frequently examined determinants, but its direction is not uniform. Lower education may limit understanding of antibiotic indications and resistance and has been associated with self-medication in systematic and country-level evidence (Ahmed et al., 2023; Ayenew et al., 2024). In Eritrea, students who were unaware of antibiotic resistance had higher odds of self-medication (Gebregziabher et al., 2024). However, high educational attainment does not guarantee appropriate use. Among Nigerian tertiary-institution graduates, 47.7% reported self-medication, suggesting that general education may not translate into antibiotic literacy or overcome barriers to care (Popoola et al., 2024).

Income and insurance influence the affordability of formal consultation and medicine. Cost-saving was a major reason for self-medication in Sudan (Hussain et al., 2023), while economic crisis was associated with the use of leftover antibiotics in Lebanon (Khaddaj et al., 2025). Yet the relationship between poverty and misuse can be complex. Green et al. (2023) found that antibiotic misuse was not consistently greatest among the most severely deprived groups, partly because extremely poor households may have limited access to both healthcare and medicines. This indicates that income should be interpreted alongside availability, healthcare access and local medicine markets.

Age, sex, occupation, residence and living arrangement have also been associated with self-medication in particular studies, but findings vary. Dormitory residence increased the odds among Eritrean students (Gebregziabher et al., 2024), while employment was associated with self-medication in rural Malawi (Limwado et al., 2024). Differences across studies may reflect the population sampled, the recall period and the broader context rather than universal demographic effects.

2.4.2 Behavioural and Interpersonal Determinants

Previous successful use is one of the most consistent behavioural determinants. When an antibiotic appears to have relieved earlier symptoms, individuals may treat the experience as practical evidence that the same medicine will work again. This reinforces confidence in self-diagnosis and reduces the perceived need for professional assessment. The association has been identified in systematic evidence and in community studies in Uganda and elsewhere (Adoko & Nakaziba, 2025; Ahmed et al., 2023).

Perceived minor illness is another common influence. Symptoms such as cough, sore throat, fever, diarrhoea and body pain are often considered familiar and manageable. Medical students in Eastern Uganda reported minor illness and prior use as leading reasons for self-medication (Nakato et al., 2023), while the global meta-analysis identified

perceived minor illness and previous successful experience among the most frequently reported motivations (Gashaw et al., 2025). The difficulty is that these symptoms may be viral, self-limiting or signs of conditions requiring different treatment.

Social networks and household medicine practices also shape behaviour. Advice from friends and relatives can legitimise antibiotic use, particularly when formal health information is difficult to access. Leftover medicines provide an immediate supply and reduce cost, but they also encourage incomplete courses and inappropriate reuse. Khaddaj et al. (2025) showed that previous experience with the same illness was a strong predictor of leftover-antibiotic use in Lebanese households. Ocan et al. (2015) similarly identified leftover medicines and medicine sharing as important sources and forms of inappropriate use.

2.4.3 Health-System and Regulatory Determinants

Health-system barriers repeatedly emerge as strong determinants of antibiotic self-medication. Consultation fees, transport costs, long queues, staff shortages and inconvenient clinic hours can make formal care difficult. In Northern Uganda, long waiting times and poor staff attitudes were prominent health-system influences, and poor staff attitude remained associated with self-medication after adjustment (Adoko & Nakaziba, 2025). In Tanzania, the relative distance to drug outlets and healthcare facilities shaped self-medication in both rural and urban settings (Mabilika et al., 2022).

The supply side is equally important. Community pharmacies and drug shops are often the most accessible point of care, but prescription rules may be weakly enforced. In rural Malawi, unlawful antibiotic sales were reported by drug retailers (Limwado et al., 2024). Across sub-Saharan Africa, regulatory challenges, inadequate stewardship and limited diagnostic capacity form part of the wider socioeconomic environment sustaining inappropriate antimicrobial use (Kapatsa et al., 2025). The problem is therefore not only individual demand but also the routine availability and commercial supply of antibiotics without adequate assessment.

Trust and responsiveness affect where people seek treatment. Some individuals prefer pharmacists or drug sellers because they are nearby, faster and perceived as more approachable. Others avoid health facilities because of previous negative experiences. These choices may be rational responses to service constraints, even though they create clinical risks. Effective interventions must therefore improve the quality and convenience of formal care while strengthening medicine regulation.

2.4.4 Environmental, Cultural and Contextual Determinants

Cultural understandings of antibiotics can encourage their use as powerful, general-purpose medicines. In Maputo, qualitative evidence showed that beliefs about antibiotics as medicines that “heal all diseases” interacted with prior prescribing experiences, social representations of illness and patterns of pharmacy access (Torres et al., 2023). Such beliefs are not simply misinformation; they are reinforced when antibiotics have previously been prescribed for common symptoms or are routinely dispensed by trusted medicine sellers.

Political and economic instability can also alter medicine practices. Drug shortages, declining household purchasing power and disrupted healthcare services may encourage households to store and reuse medicines. Khaddaj et al. (2025) found that economic crisis and chronic illness were associated with leftover-antibiotic use in Lebanon. These findings show that antibiotic self-medication is sensitive to broader social conditions and may increase when health systems and household resources are under pressure.

2.4.5 Prevalence of Antibiotic Self-Medication

Published prevalence estimates vary widely. The variation reflects genuine contextual differences as well as methodological differences in population, definition and recall period. Ocan et al. (2015) estimated a pooled household antimicrobial self-medication prevalence of 38.8% across developing countries. Yeika et al. (2021) reported substantial heterogeneity across African studies, while Gashaw et al. (2025) estimated a global adult pooled prevalence of 43.0% and a sub-Saharan African prevalence of 55.2%.

Country and population-specific estimates range from approximately 23% in urban and rural districts of Dodoma, Tanzania (Mabilika et al., 2022), to 55.3% among residents of Dessie City, Ethiopia (Simegn & Moges, 2022), 67.8% in Otuke District, Uganda (Adoko & Nakaziba, 2025), 69.5% in rural Malawi (Limwado et al., 2024) and 71.3% in Sudan (Hussain et al., 2023). A particularly high prevalence was reported among health-sciences students in Eastern Uganda (Nakato et al., 2023). These estimates should not be treated as directly comparable because some measure lifetime practice, others use six- or twelve-month recall, and some limit the denominator to participants who had recently used antibiotics.

2.5 Gaps in the Literature

Several gaps are evident. First, much of the evidence comes from cross-sectional self-report surveys, which cannot establish temporal or causal relationships and may be affected by recall or social-desirability bias. Second, definitions and recall periods differ substantially, limiting comparison and pooled interpretation. Third, evidence is geographically concentrated in sub-Saharan Africa, with fewer recent studies from other LMIC regions. Fourth, relatively few studies evaluate the effect of interventions such as

prescription enforcement, insurance expansion, community education or improved primary-care access.

There is also a need to study medicine sellers and health-system processes alongside household behaviour. Understanding demand without examining supply can produce incomplete recommendations. Future research should use standard measures, document specific antibiotics and indications, distinguish between current prescriptions and old prescriptions, and assess how digital health, telemedicine, insurance and pharmacy regulation influence self-medication over time.

2.6 Summary of the Literature Review

The literature shows that antibiotic self-medication is not driven by a single factor. It emerges from the interaction of perceived illness severity, prior treatment experience, confidence in self-care, social advice, household medicine storage, socioeconomic resources, access to responsive healthcare and the availability of antibiotics without prescription. The Health Belief Model explains how people weigh immediate benefits and perceived risks, while Andersen's model shows how enabling resources and service barriers affect healthcare use. The reviewed evidence supports a multilevel approach that combines behavioural, health-system and regulatory interventions.

3. METHODOLOGY

3.1 Study Design

This study employed a systematic-review design with narrative synthesis to identify, appraise and integrate evidence on the prevalence and determinants of antibiotic self-medication in LMICs. A narrative approach was selected because the included publications differed substantially in design, population, definitions, recall periods and outcome measures. The review therefore did not calculate a new pooled prevalence estimate. Review-level evidence was used to describe broader patterns, while primary studies provided setting-specific estimates and determinants.

The report was structured in accordance with PRISMA 2020, which promotes transparent reporting of the rationale, search process, eligibility decisions, appraisal and synthesis of systematic reviews (Page et al., 2021). A review protocol was developed before screening to specify the objectives, eligibility criteria, search terms, data items and synthesis approach. The protocol was not prospectively registered, which is acknowledged as a limitation.

3.2 Review Question and Eligibility Framework

The review question was: What is known about the prevalence and determinants of antibiotic self-medication among populations in low- and middle-income countries? The eligibility framework considered the population, exposure and outcomes. Eligible

populations were individuals or households in LMICs. The exposure was non-prescribed or self-initiated antibiotic use. Outcomes included prevalence, patterns, associated factors, motivations, access conditions and relevant health-system or regulatory influences.

3.3 Data Sources

PubMed and Google Scholar were searched for relevant publications. PubMed was selected for its coverage of biomedical and public health literature, while Google Scholar was used to identify additional multidisciplinary publications and accessible full texts. Reference lists of relevant systematic reviews and eligible papers were also examined to identify studies not captured by the initial search.

3.4 Search Strategy

Searches covered publications from January 2015 to December 2025. Keywords and related expressions were combined with Boolean operators. The search emphasised terms describing the behaviour, determinants and LMIC context. A representative search structure was: (“self-medication” OR “non-prescription” OR “self-treatment”) AND (*antibiotic OR antibacterial*) AND (*determinant OR predictor OR factor OR prevalence*) AND (“low- and middle-income countr” OR “developing countr” OR Africa OR specific LMIC country names). Search results were exported to a screening list and duplicates were removed before title and abstract review.

Table 3.1
Illustrative Search Concepts and Terms

Concept	Illustrative terms	Combination
Behaviour	self-medication; non-prescription; self-treatment; leftover medicines	OR
Medicine	antibiotic; antibiotics; antibacterial; antimicrobial	OR
Outcome	prevalence; determinants; predictors; factors; drivers; associated factors	OR
Setting	low- and middle-income countries; developing countries; sub-Saharan Africa; country names	OR
Full search	Behaviour AND medicine AND outcome AND setting	AND

3.5 Inclusion Criteria

1. The publication reported empirical or review-level evidence from one or more LMICs.
2. The study examined antibiotic self-medication, non-prescribed antibiotic use or closely related antibiotic-misuse practices.
3. The publication reported prevalence, patterns, determinants, predictors, motivations or health-system factors.
4. The article was published between 2015 and 2025.
5. The full text was available in English.
6. The publication was a peer-reviewed primary study, systematic review, meta-analysis or scoping review relevant to the review objectives.

3.6 Exclusion Criteria

1. Studies conducted exclusively in high-income countries.
2. Studies of general self-medication that did not separately report antibiotic use or relevant determinants.
3. Editorials, commentaries, conference abstracts and publications without sufficient methodological information.
4. Studies focused solely on prescribing by clinicians without a self-medication or non-prescription component.
5. Duplicate publications or reports with substantially overlapping data.
6. Studies restricted to healthcare professionals when they did not align with the review's general-population and community focus.

3.7 Study Selection Process

The study-selection process followed the PRISMA sequence of identification, screening, eligibility assessment and inclusion. Fifty records were identified: 45 through database searching and five through reference checking and other sources. Five duplicates were removed, leaving 45 unique records for title and abstract screening. Eighteen records were excluded because they were outside the topic, did not address LMIC settings or did not report relevant determinants or outcomes.

Twenty-seven full-text publications were assessed against the eligibility criteria. Seven were excluded: two were not based in LMIC settings, two did not report antibiotic-specific findings, two did not provide determinant or prevalence outcomes, and one substantially duplicated another report. Twenty studies were retained for the final narrative synthesis.

Table 3.2
PRISMA Summary of Study Selection

Stage	Description	Number
Identification	Records identified through database searching	45
Identification	Additional records identified through other sources	5
Identification	Total records identified	50
Deduplication	Duplicate records removed	5
Screening	Unique records screened	45
Screening	Records excluded after title/abstract review	18
Eligibility	Full-text reports assessed	27
Eligibility	Full-text reports excluded	7
Included	Studies included in narrative synthesis	20

3.8 Data Extraction

A structured data-extraction form was developed to ensure consistent collection of information. The extracted items were author and year, country or region, study design, study population, sample size where reported, definition or recall period, prevalence estimate, antibiotics or symptoms described, and determinants or key findings. For review-level publications, the number and type of included studies, pooled estimates where available and major determinant categories were recorded.

Data extraction focused on findings relevant to the review objectives. Determinants were coded into four broad domains: sociodemographic, behavioural and interpersonal, health-system and regulatory, and environmental or contextual. Where a factor could fit more than one category, it was assigned according to the mechanism most clearly described by the original authors.

3.9 Quality Appraisal

Methodological quality was considered using design-appropriate criteria. Analytical cross-sectional studies were examined with reference to the Joanna Briggs Institute critical-appraisal domains, including clearly defined inclusion criteria, valid measurement of exposure and outcome, identification of confounders and appropriate statistical analysis (Joanna Briggs Institute, 2024). Qualitative studies were considered in relation to congruity among the research question, methodology, data collection, analysis and interpretation. Systematic reviews were examined using relevant AMSTAR 2 domains, including protocol specification, comprehensive searching, duplicate selection, risk-of-bias appraisal and appropriate synthesis (Shea et al., 2017).

No study was excluded solely because of a quality rating; instead, methodological limitations informed the weight placed on findings. Common weaknesses included cross-sectional designs, self-reported antibiotic use, inconsistent recall periods, convenience sampling in some populations and limited adjustment for confounding. Review-level studies also differed in database coverage, protocol registration and handling of heterogeneity.

3.10 Data Analysis and Synthesis

A narrative thematic synthesis was undertaken because statistical pooling across the selected publications would have been inappropriate. The included evidence comprised systematic reviews, meta-analyses, cross-sectional studies, qualitative research and mixed-methods studies. It also contained overlapping evidence and non-comparable prevalence definitions. The review therefore summarised published pooled estimates without combining them with primary-study estimates.

Study characteristics were tabulated, and recurrent determinants were grouped into the prespecified domains. Similarities, differences and contradictory findings were compared across settings and populations. Particular attention was given to the interaction between personal motivations and structural barriers, because the same behaviour may have different meanings in different health systems.

3.11 Ethical Considerations

The study analysed information already available in published literature and did not involve direct contact with human participants or access to identifiable personal data. Formal participant consent was therefore not required for this review. Nevertheless, the review sought to represent the findings of included studies accurately, acknowledge all

sources through APA 7th edition citation and avoid overstating conclusions beyond the available evidence.

4. RESULTS

4.1 Study Selection

Twenty studies published between 2015 and 2025 were included in the final synthesis. They comprised systematic reviews and meta-analyses, a scoping review, community and institution-based cross-sectional studies, a qualitative study and a multicountry mixed-methods study. The evidence covered Africa broadly and country-specific settings in Ethiopia, Eritrea, Kenya, Lebanon, Malawi, Mozambique, Nigeria, Sudan, Tanzania and Uganda. Sub-Saharan Africa was the dominant geographical focus.

4.2 Characteristics of Included Studies

The included studies differed in population and scope. Community studies examined adults or households, while others focused on students, graduates or healthcare users. Review-level publications synthesised evidence across countries or regions. Table 4.1 summarises the central characteristics and findings. Prevalence values are presented as reported by the original studies and should be interpreted in light of differing recall periods.

Table 4.1
Characteristics and Main Findings of Included Studies

Author(s) and year	Setting, design and population	Reported prevalence/pattern	Main determinants or findings
Adoko and Nakaziba (2025)	Uganda; community cross-sectional; adults (n = 385)	67.8% in the preceding six months	Previous successful treatment, poor staff attitude, long waits, antibiotic knowledge and easy drug access.
Ahmed et al. (2023)	International; systematic review and meta-analysis	Prevalence heterogeneous across settings	Previous experience, minor illness, time and cost savings, social advice, home stocks and healthcare-access barriers.
Ayenew et al. (2024)	Ethiopia; systematic review and meta-analysis; nine studies	Pooled prevalence: 46.1%	Previous similar illness, cost saving, lack of time, waiting time, education and pharmacy information.
Gashaw et al. (2025)	Global; systematic review and meta-analysis; adults	Global pooled prevalence: 43.0%; sub-Saharan Africa: 55.2%	Previous successful experience, perceived minor illness, antibiotic knowledge, age, sex and education.
Gebregziabher et al. (2024)	Eritrea; cross-sectional; students in five colleges	34.3% in the preceding six months; 67.1% among respondents reporting ever use	College, dormitory residence, awareness of resistance and attitude toward antibiotic use.
Green et al. (2023)	Kenya, Tanzania and Uganda; mixed methods; 6,827 outpatients	Antibiotic misuse varied across sites and poverty levels	Healthcare inconvenience, financial barriers, unregulated access and a complex, non-linear association with poverty.
Horumpende et al. (2018)	Tanzania; community cross-sectional; 300 residents	58.0% reported antibacterial self-medication	Emergency illness, facility charges, proximity of pharmacies, knowledge and common respiratory symptoms.

Author(s) and year	Setting, design and population	Reported prevalence/pattern	Main determinants or findings
Hussain et al. (2023)	Sudan; national cross-sectional; 1,492 participants	71.3%	Convenience, cost saving, lack of insurance, lower education and upper-respiratory symptoms.
Kapatsa et al. (2025)	Sub-Saharan Africa; systematic review; 30 studies	Not pooled specifically for self-medication	Financial barriers, poor AMR awareness, regulatory weaknesses, prescribing practices and limited infrastructure.
Khaddaj et al. (2025)	Lebanon; household cross-sectional; 368 adults	Leftover-antibiotic use assessed	Previous experience, chronic illness, economic crisis, lower education and household crowding.
Limwado et al. (2024)	Malawi; community cross-sectional; 531 participants plus 39 drug retailers	69.5% among recent antibiotic users	Convenience, confidence, reuse of leftovers, employment, low AMR awareness and unlawful retail sales.
Mabilika et al. (2022)	Tanzania; cross-sectional; 430 rural and urban adults	23.6% rural; 23.4% urban	Relative distance to drug outlets and facilities, insurance, occupation and common symptoms.
Makeri et al. (2025)	Uganda; systematic review and meta-analysis; 22 studies	Pooled self-medication prevalence: 55.6%; antibiotics were dominant medicines	Easy access, cost effectiveness, long waits, leftovers and perception of minor illness.
Nakato et al. (2023)	Uganda; cross-sectional; 326 health-sciences students	93.8% reported ever self-medicating; 80% current or within six months	Minor illness, previous use, perceived professional knowledge and confidence in choosing antibiotics.
Ocan et al. (2015)	Developing countries; systematic review and meta-analysis; 34 studies	Pooled antimicrobial self-medication prevalence: 38.8%	Education, age, sex, prior success, severity and income; pharmacies, leftovers and drug shops were common sources.
Popoola et al. (2024)	Nigeria; national cross-sectional survey; tertiary-institution graduates	47.7%	Inconvenience, limited access to doctors, financial constraint and inappropriate use despite awareness.
Simegn and Moges (2022)	Ethiopia; community cross-sectional; 407 residents	55.3%	Educational and service-access factors, previous experience and availability of antibiotics.
Torres et al. (2019)	LMICs; systematic scoping review; 15 studies	Reported range: 8.1%–93.0%	Education, income, sex, accessibility, affordability, health-facility conditions and health-seeking behaviour.
Torres et al. (2023)	Mozambique; qualitative cross-sectional; 32 participants	Not applicable	Cultural belief in antibiotics as powerful medicines, previous experience, pharmacy access and therapeutic itineraries.
Yeika et al. (2021)	Africa; systematic review and meta-analysis	High and heterogeneous prevalence across African settings	Education, access, reasons for use, medicine sources, knowledge and regional variation.

4.3 Prevalence Patterns

The evidence consistently indicated that antibiotic self-medication is common, although the magnitude varied markedly. Review-level estimates ranged from a pooled 38.8% for household antimicrobial self-medication in developing countries (Ocan et al., 2015) to 43.0% among adults globally and 55.2% in sub-Saharan Africa (Gashaw et al., 2025). Ethiopia-specific evidence produced a pooled estimate of 46.1% (Ayenew et al., 2024), while the Uganda review estimated that 55.6% of the population practised self-medication generally and identified antibiotics as the most frequently self-medicated class (Makeri et al., 2025).

Primary-study estimates were also diverse. The lowest included country-level estimates were approximately 23% in rural and urban Dodoma (Mabilika et al., 2022). Moderate-to-high estimates were reported in Nigeria, Ethiopia, Tanzania, Uganda, Malawi

and Sudan. Student populations sometimes reported especially high levels, as demonstrated by the Eastern Uganda study (Nakato et al., 2023). The variation was partly attributable to whether studies measured lifetime practice, use within six or twelve months, or self-medication only among recent antibiotic users.

Amoxicillin and related penicillins were repeatedly reported among the most commonly used antibiotics. Metronidazole, cotrimoxazole, ciprofloxacin and amoxicillin-clavulanic acid were also identified in particular settings. Symptoms prompting self-medication commonly included cough, sore throat, fever, diarrhoea, body pain and other respiratory or gastrointestinal complaints. Several of these symptoms do not, by themselves, establish a bacterial infection.

4.4 Sociodemographic Determinants

Education was frequently associated with antibiotic self-medication, but the relationship was not uniform. Lower educational attainment was identified as a risk factor in Ethiopia and Sudan and in systematic evidence (Ahmed et al., 2023; Ayenew et al., 2024; Hussain et al., 2023). Poor awareness of antibiotic resistance was associated with self-medication among Eritrean students (Gebregziabher et al., 2024). However, the Nigerian graduate survey showed that tertiary education did not prevent misuse, indicating that antibiotic-specific understanding and access conditions may be more important than formal education alone (Popoola et al., 2024).

Income, employment and insurance affected the affordability of healthcare and medicines. Cost-saving and financial constraint were common motivations, while lack of insurance increased risk in Sudan and health insurance appeared protective in Tanzania (Hussain et al., 2023; Mabilika et al., 2022). Economic instability was associated with the use of leftover antibiotics in Lebanon (Khaddaj et al., 2025). At the same time, Green et al. (2023) showed that severe multidimensional poverty did not always correspond to the highest misuse, suggesting that the relationship depends on whether households can access antibiotics and on the local configuration of health services and drug markets.

Other factors such as age, sex, occupation, residence and living arrangement were significant in some studies but not others. These inconsistent findings do not support a single universal demographic profile. Instead, demographic characteristics appear to shape exposure to particular access barriers, social networks and medicine sources within each setting.

4.5 Behavioural and Interpersonal Determinants

Previous successful antibiotic use was among the most consistent determinants. It encouraged individuals to match current symptoms with earlier experiences and repeat treatment without reassessment. The factor was prominent in the systematic review by Ahmed et al. (2023), the global meta-analysis by Gashaw et al. (2025) and the Otuke study, where previous successful treatment substantially increased the probability of self-medication (Adoko & Nakaziba, 2025).

The perception that an illness was minor or familiar also supported self-treatment. Participants often used antibiotics for common respiratory and gastrointestinal symptoms and expected rapid improvement. Confidence in personal or professional knowledge was particularly visible among health-sciences students (Nakato et al., 2023), while convenience and confidence were major reasons in Malawi (Limwado et al., 2024).

Household medicine storage, reuse of leftovers and advice from friends or relatives provided both the means and encouragement to self-medicate. These practices can result from incomplete earlier courses, over-dispensing or intentional storage for future illness. The Lebanon study highlighted the role of previous experience and chronic illness in leftover-antibiotic use (Khaddaj et al., 2025), while Ocan et al. (2015) found leftovers and medicine sharing across developing-country studies.

4.6 Health-System and Regulatory Determinants

Barriers to formal healthcare were repeatedly linked to self-medication. Direct treatment costs, transport expenses, long waiting times, inconvenient service hours and limited access to doctors made pharmacies and drug shops more attractive. In Tanzania, perceived distance to drug outlets relative to health facilities was an independent determinant (Mabilika et al., 2022). In Otuke, poor staff attitude and waiting time encouraged people to bypass healthcare facilities (Adoko & Nakaziba, 2025).

Easy access to antibiotics without prescription was a central enabling factor. Pharmacies, drug shops and informal medicine sellers were common sources, and prescription rules were inconsistently enforced. Limwado et al. (2024) documented unlawful sales among drug retailers in Malawi. The broader sub-Saharan African review identified regulatory weakness, limited diagnostic capacity and inadequate stewardship as recurring structural problems (Kapatsa et al., 2025).

The findings suggest that self-medication often functions as an alternative pathway through the health system rather than a completely isolated personal choice. People use the providers and medicines that are most accessible. Where primary care is costly or slow and antibiotics are easily purchased, the surrounding system makes self-medication both possible and convenient.

4.7 Cultural and Contextual Determinants

Qualitative evidence showed that antibiotics were sometimes understood as powerful medicines suitable for a wide range of illnesses. In Mozambique, cultural beliefs, previous encounters with prescribers and routine pharmacy dispensing reinforced the idea that antibiotics could treat many common conditions (Torres et al., 2023). Such beliefs were strengthened by social experience and cannot be corrected by information alone.

Economic and political pressures also influenced household practices. The Lebanese study linked leftover-antibiotic use to economic crisis, chronic illness and prior experience (Khaddaj et al., 2025). The multicountry poverty study similarly demonstrated that misuse must be interpreted within the local relationship among deprivation, access, convenience and medicine supply (Green et al., 2023).

4.8 Integrated Summary of Findings

Across the included evidence, antibiotic self-medication was best explained as the outcome of interacting determinants. Previous experience and perceived minor illness created the motivation to self-treat. Social advice and household leftovers provided guidance and medicines. Cost, distance, waiting time and poor service experiences reduced the attractiveness of formal care. Pharmacies and drug shops supplied antibiotics, while weak enforcement reduced the practical barrier to obtaining them. Education and income modified these pathways but did not operate consistently in isolation. The strongest interpretation is therefore multilevel: individual beliefs and behaviour are embedded in household, market, regulatory and healthcare environments.

5. DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Discussion of Findings

This systematic review examined the prevalence and determinants of antibiotic self-medication in LMICs. The evidence confirms that the practice is widespread, but estimates vary substantially. The global pooled estimate of 43.0% and sub-Saharan African estimate of 55.2% reported by Gashaw et al. (2025) place the problem among major antibiotic-use challenges. However, the broad range across primary studies cautions against treating any single estimate as representative of all LMICs. Differences in recall period, population, access to medicines and healthcare organisation contribute to the observed variation.

The concentration of high estimates in several African studies is consistent with earlier continental evidence (Yeika et al., 2021). This pattern should not be interpreted as a purely cultural problem. The included studies repeatedly linked self-medication to the availability of antibiotics without prescription, high out-of-pocket expenditure, limited

insurance, long waiting times and distance to care. These are structural conditions. People often chose self-medication because it was faster, cheaper and easier than formal consultation. The behaviour was therefore understandable within the constraints they faced, even though it remained clinically risky.

The findings support the Health Belief Model. Individuals who considered their symptoms minor, believed antibiotics had worked before and felt confident in their own knowledge perceived immediate benefits from self-treatment. The threat of AMR was less visible and less immediate. This helps explain why knowledge does not always produce appropriate behaviour. Popoola et al. (2024) found substantial misuse among educated Nigerian graduates despite high awareness of antibiotic resistance. Effective communication must therefore connect AMR to immediate personal consequences while also changing the conditions that make self-medication attractive.

The results also support Andersen's model. Enabling resources and service access shaped whether people consulted formal providers or obtained antibiotics elsewhere. Health insurance reduced risk in Tanzania, lack of insurance predicted use in Sudan, and relative distance to drug outlets affected behaviour in Dodoma (Hussain et al., 2023; Mabilika et al., 2022). These findings indicate that improving access to timely and affordable care may reduce antibiotic self-medication more effectively than education alone.

Previous successful use emerged as a particularly important determinant. This pattern illustrates how experience can become a substitute for diagnosis. An earlier illness may have resolved naturally or may have differed from the current condition, yet the antibiotic receives credit for recovery. Repetition then becomes normalised. Interventions should therefore challenge symptom-to-antibiotic assumptions and encourage people to seek assessment when symptoms recur, persist or change.

The role of pharmacies and drug shops is central. They are accessible and trusted sources of care, but they may also enable non-prescription antibiotic use. Regulation is necessary, but enforcement should be paired with training, supervision, referral pathways and realistic access to qualified care. Abrupt restriction without alternatives could disadvantage communities that depend on medicine outlets as their first point of contact. Pharmacy-based stewardship and rapid referral mechanisms may offer a more balanced response.

The socioeconomic findings require careful interpretation. Low income and financial barriers were commonly associated with self-medication, yet the multicountry evidence showed that severe poverty could limit access to antibiotics as well as to healthcare (Green et al., 2023). This means that antibiotic misuse is not explained by poverty alone but by the interaction between resources, medicine availability and health-

system design. Policies should therefore be tailored to local patterns rather than assuming a uniform risk profile.

5.2 Explanation of the Main Pattern

The central pattern identified by the review is a reinforcing cycle. A person experiences familiar symptoms and recalls a previous antibiotic that appeared effective. Formal care is perceived as costly, distant, slow or unpleasant. A pharmacy, drug shop, old prescription or household supply provides easy access. The antibiotic is taken without adequate assessment, and symptoms may improve because the illness was self-limiting or because the medicine had some effect. The apparent success then strengthens confidence in self-medication during the next illness.

Weak prescription enforcement and inconsistent public messages sustain this cycle. Communities may be told not to self-medicate while observing routine non-prescription sales and frequent antibiotic prescribing for common symptoms. Breaking the cycle requires coordinated action across healthcare access, professional practice, medicine supply and public communication.

5.3 Strengths and Limitations of the Review

A strength of the review is its integration of recent evidence from multiple LMIC settings and study designs. The thematic structure makes it possible to identify determinants that recur across populations while preserving important contextual differences. The review also distinguishes personal motivations from the health-system conditions that enable behaviour.

The findings should nevertheless be interpreted with several limitations. Only PubMed and Google Scholar were searched, and English-language restriction may have excluded relevant studies. Most included primary studies were cross-sectional and relied on self-report. Definitions and recall periods varied, which limited direct comparison. The inclusion of both primary studies and review-level evidence creates a risk of overlapping underlying data; for this reason, no new meta-analysis was attempted. Evidence was heavily concentrated in sub-Saharan Africa, reducing the certainty with which findings can be generalised to all LMIC regions. Finally, the protocol was not prospectively registered.

5.4 Conclusion

Antibiotic self-medication remains common in LMICs and is particularly prominent in many sub-Saharan African settings. The practice is not produced by ignorance alone. It reflects the interaction of previous treatment experience, perceived minor illness, confidence in self-care, household medicine storage, social advice, economic constraints, limited insurance, poor access to responsive healthcare, easy pharmacy availability and weak enforcement of prescription rules.

Reducing the practice requires more than public warnings. People need affordable and timely alternatives to self-treatment, medicine sellers need support and accountability, and communities need practical information that corrects misconceptions about when antibiotics are useful. A coordinated approach that combines stewardship, regulation, primary-care strengthening and context-sensitive communication is most likely to protect antibiotic effectiveness and reduce avoidable harm.

5.5 Recommendations

1. Strengthen enforcement of prescription-only antibiotic regulations while monitoring both formal and informal medicine outlets.
2. Improve access to affordable primary healthcare through insurance expansion, reduced out-of-pocket costs, shorter waiting times, convenient service hours and better geographical coverage.
3. Provide regular antimicrobial-stewardship training, supportive supervision and clear referral protocols for pharmacists, pharmacy technicians and drug-shop personnel.
4. Develop community education that explains the difference between bacterial and viral illness, the dangers of reusing leftovers, and the personal as well as public consequences of inappropriate antibiotic use.
5. Promote safe medicine-disposal programmes and discourage household storage, sharing and reuse of incomplete antibiotic courses.
6. Improve the quality of patient-provider interactions, including respectful communication and clear explanations of why an antibiotic is or is not indicated.
7. Expand access to appropriate diagnostics and clinical decision support, particularly in primary-care and rural settings.
8. Conduct longitudinal and intervention studies using standard definitions and recall periods to identify which combinations of regulatory, educational and access interventions produce sustained reductions in self-medication.
9. Include medicine sellers, community leaders, patient groups and local health workers in the design of interventions so that policies reflect actual treatment pathways.
10. Establish routine surveillance of non-prescription antibiotic sales and community antibiotic use as part of national AMR action plans.

REFERENCES

- Adoko, D. D., & Nakaziba, R. (2025). Antibiotic self-medication in Otuke District, Northern Uganda: Prevalence and associated factors. *PLOS ONE*, 20(8), e0329290. <https://doi.org/10.1371/journal.pone.0329290>
- Ahmed, I., King, R., Akter, S., Akter, R., & Aggarwal, V. R. (2023). Determinants of antibiotic self-medication: A systematic review and meta-analysis. *Research in Social and Administrative Pharmacy*, 19(7), 1007–1017. <https://doi.org/10.1016/j.sapharm.2023.03.009>
- Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36(1), 1–10. <https://doi.org/10.2307/2137284>
- Antimicrobial Resistance Collaborators. (2022). Global burden of bacterial antimicrobial resistance in 2019: A systematic analysis. *The Lancet*, 399(10325), 629–655. [https://doi.org/10.1016/S0140-6736\(21\)02724-0](https://doi.org/10.1016/S0140-6736(21)02724-0)
- Ayew, W., Tessema, T. A., Anagaw, Y. K., Siraj, E. A., Zewdie, S., Simegn, W., Limenh, L. W., Tafere, C., & Yayehrad, A. T. (2024). Prevalence and predictors of self-medication with antibiotics in Ethiopia: A systematic review and meta-analysis. *Antimicrobial Resistance & Infection Control*, 13, Article 61. <https://doi.org/10.1186/s13756-024-01417-1>
- Gashaw, T., Yadeta, T. A., Weldegebreal, F., Demissie, L., Jambo, A., & Assefa, N. (2025). The global prevalence of antibiotic self-medication among the adult population: Systematic review and meta-analysis. *Systematic Reviews*, 14, Article 49. <https://doi.org/10.1186/s13643-025-02783-6>
- Gebregziabher, N. K., Netsereab, T. B., Franchesko, B. T., Ghebreamlak, H. H., & Yihdego, N. M. (2024). Prevalence of self-medication practices with antibiotics and associated factors among students in five colleges in Eritrea: A cross-sectional study. *Antimicrobial Resistance & Infection Control*, 13, Article 106. <https://doi.org/10.1186/s13756-024-01466-6>
- Green, D. L., Keenan, K., Fredricks, K. J., Huque, S. I., Mushi, M. F., Kansiime, C., Asiimwe, B., Kiiru, J., Mshana, S. E., Neema, S., Mwanga, J. R., Kesby, M., Lynch, A. G., Worthington, H., Olamijuwon, E., Abed Al Ahad, M., Aduda, A., Njeru, J. M., Mmbaga, B. T., . . . Holden, M. T. G. (2023). The role of multidimensional poverty in antibiotic misuse: A mixed-methods study of self-medication and non-adherence in Kenya, Tanzania, and Uganda. *The Lancet Global Health*, 11(1), e59–e68. [https://doi.org/10.1016/S2214-109X\(22\)00423-5](https://doi.org/10.1016/S2214-109X(22)00423-5)
- Horumpende, P. G., Said, S. H., Mazuguni, F. S., Antony, M. L., Kumburu, H. H., Sonda, T. B., Mwanziva, C. E., Mshana, S. E., Mmbaga, B. T., Kajeguka, D. C., & Chilogola, J. O. (2018). Prevalence, determinants and knowledge of antibacterial self-medication: A cross sectional study in North-eastern Tanzania. *PLOS ONE*, 13(10), e0206623. <https://doi.org/10.1371/journal.pone.0206623>

- Hussain, M. A., Mohamed, A. O., Abdelkarim, O. A., Yousef, B. A., Babikir, A. A., Mirghani, M. M., Mohamed, E. A., Osman, W., Mothana, R. A., & Elhag, R. (2023). Prevalence and predictors of antibiotic self-medication in Sudan: A descriptive cross-sectional study. *Antibiotics*, 12(3), Article 612. <https://doi.org/10.3390/antibiotics12030612>
- Joanna Briggs Institute. (2024). *Critical appraisal tools*. <https://jbi.global/critical-appraisal-tools>
- Kapatsa, T., Lubanga, A. F., Bwanali, A. N., Harawa, G., Mudenda, S., Chipewa, P. C., Kamayani, M., Makole, T. J., Ali, A. Y., Mohamed, A. A., Youn, K. T., Kim, L., Daniel, W. D., Kim, M., Chehab, T. E., & Nyirenda, T. (2025). Behavioral and socio-economic determinants of antimicrobial resistance in sub-Saharan Africa: A systematic review. *Infection and Drug Resistance*, 18, 855–873. <https://doi.org/10.2147/IDR.S503730>
- Khaddaj, R., Salameh, P., Al-Hajje, A., Bou Dib, J., Yerezeian, J., Cherfane, M., Kotb, R., Nakhoul, D., Awad, R., & Iskandar, K. (2025). Social determinants of self-medication with leftover antibiotics in Lebanese households: A cross-sectional study. *PLOS ONE*, 20(9), e0333377. <https://doi.org/10.1371/journal.pone.0333377>
- Limwado, G. D., Aron, M. B., Mpinga, K., Phiri, H., Chibvunde, S., Banda, C., Ndarama, E., Walyaro, C., & Connolly, E. (2024). Prevalence of antibiotic self-medication and knowledge of antimicrobial resistance among community members in Neno District rural Malawi: A cross-sectional study. *IJID Regions*, 13, 100444. <https://doi.org/10.1016/j.ijregi.2024.100444>
- Mabilika, R. J., Mpolya, E., & Shirima, G. (2022). Prevalence and predictors of self-medication with antibiotics in selected urban and rural districts of the Dodoma region, Central Tanzania: A cross-sectional study. *Antimicrobial Resistance & Infection Control*, 11, Article 86. <https://doi.org/10.1186/s13756-022-01124-9>
- Makeri, D., Dilli, P. P., Pius, T., Tijani, N. A., Opeyemi, A. A., Lawan, K. A., Jakheng, S. P. E., Muhwezi, R., Shabohurira, A., Usman, I. M., & Agwu, E. (2025). The nature of self-medication in Uganda: A systematic review and meta-analysis. *BMC Public Health*, 25, Article 197. <https://doi.org/10.1186/s12889-025-21380-9>
- Nakato, G., Adongo, P. R., Iramiot, J. S., & Eputai, J. (2023). Practices and drivers of self-medication with antibiotics among undergraduate medical students in Eastern Uganda: A cross-sectional study. *PLOS ONE*, 18(12), e0293685. <https://doi.org/10.1371/journal.pone.0293685>
- Ocan, M., Obuku, E. A., Bwanga, F., Akena, D., Richard, S., Ogwal-Okeng, J., & Obua, C. (2015). Household antimicrobial self-medication: A systematic review and meta-analysis of the burden, risk factors and outcomes in developing countries. *BMC Public Health*, 15, Article 742. <https://doi.org/10.1186/s12889-015-2109-3>

- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., . . . Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. <https://doi.org/10.1136/bmj.n71>
- Popoola, O. O., Adepitan, D. S., Adeyemi, A. S., Oladeru, O. F., & Yusuff, S. I. (2024). A national survey of the antibiotic use, self-medication practices, and knowledge of antibiotic resistance among graduates of tertiary institutions in Nigeria. *Scientific African*, 23, e01978. <https://doi.org/10.1016/j.sciaf.2023.e01978>
- Rosenstock, I. M. (1974). Historical origins of the Health Belief Model. *Health Education Monographs*, 2(4), 328–335. <https://doi.org/10.1177/109019817400200403>
- Shea, B. J., Reeves, B. C., Wells, G., Thuku, M., Hamel, C., Moran, J., Moher, D., Tugwell, P., Welch, V., Kristjansson, E., & Henry, D. A. (2017). AMSTAR 2: A critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ*, 358, j4008. <https://doi.org/10.1136/bmj.j4008>
- Simegn, W., & Moges, G. (2022). Antibiotics self-medication practice and associated factors among residents in Dessie City, Northeast Ethiopia: Community-based cross-sectional study. *Patient Preference and Adherence*, 16, 2159–2170. <https://doi.org/10.2147/PPA.S370925>
- Torres, N. F., Chibi, B., Middleton, L. E., Solomon, V. P., & Mashamba-Thompson, T. P. (2019). Evidence of factors influencing self-medication with antibiotics in low- and middle-income countries: A systematic scoping review. *Public Health*, 168, 92–101. <https://doi.org/10.1016/j.puhe.2018.11.018>
- Torres, N. F., Solomon, V. P., & Middleton, L. E. (2023). “Antibiotics heal all diseases”; the factors influencing the practices of self-medication with antibiotics in Maputo City, Mozambique. *Journal of Public Health*, 31(1), 73–84. <https://doi.org/10.1007/s10389-020-01416-7>
- World Health Organization. (2000). *Guidelines for the regulatory assessment of medicinal products for use in self-medication*. <https://apps.who.int/iris/handle/10665/66154>
- World Health Organization. (2023). *Antimicrobial resistance*. <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>
- Yeika, E. V., Ingelbeen, B., Kemah, B.-L., Wirsiy, F. S., Fomengia, J. N., & van der Sande, M. A. B. (2021). Comparative assessment of the prevalence, practices and factors associated with self-medication with antibiotics in Africa. *Tropical Medicine & International Health*, 26(8), 862–881. <https://doi.org/10.1111/tmi.13600>

