RESEARCH PAPER

Knowledge, Attitudes, and Self-Medication Practices Related to Antibiotic Use in Urban Populations: A Systematic Review and Meta-Analysis

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Abstract

Background: Antibiotic misuse and self-medication are major contributors to antimicrobial resistance (AMR), particularly in rapidly urbanizing populations where over-the-counter access and irrational consumption practices remain common. Understanding public knowledge, attitudes, and practices (KAP) regarding antibiotic use is essential for developing effective antimicrobial stewardship strategies.

Objective: To systematically evaluate knowledge, attitudes, and self-medication practices related to antibiotic use among urban populations and estimate pooled prevalence of inappropriate antibiotic-related behaviors through meta-analysis.

Methods: A systematic review and meta-analysis was conducted according to PRISMA guidelines. PubMed, Scopus, Embase, Web of Science, and Cochrane Library databases were searched for studies published up to January 2026. Observational studies assessing KAP regarding antibiotic use among urban populations were included. Quality assessment was performed using the Joanna Briggs Institute (JBI) critical appraisal checklist. Random-effects meta-analysis was used to estimate pooled prevalence of self-medication, non-prescription antibiotic use, incomplete antibiotic courses, and misconceptions regarding antibiotics.

Results: Thirty-six studies involving 48,732 participants were included. The pooled prevalence of self-medication with antibiotics was 41.6% (95% CI: 36.8–46.5%). Approximately 52.3% (95% CI: 46.2–58.3%) of participants demonstrated inadequate knowledge regarding antibiotic use, while 47.8% reported discontinuing antibiotics after symptomatic improvement. Misconceptions regarding antibiotic effectiveness against viral infections were observed in 44.1% of respondents. Higher prevalence of self-medication was observed in low- and middle-income countries. Considerable heterogeneity was noted across studies ($I^2 > 60\%$).

Conclusion: Urban populations demonstrate substantial gaps in antibiotic-related knowledge and widespread inappropriate self-medication practices. Public education campaigns, strict regulation of antibiotic sales, and community-based antimicrobial stewardship interventions are urgently required to combat antibiotic misuse and antimicrobial resistance.

Keywords: Antibiotic Misuse; Self-Medication; Urban Population; Antimicrobial Resistance; Knowledge Attitude Practice; Systematic Review; Meta-analysis

How to cite this article: Shrivastava S, Chatterjee D, Siddiqui F. Knowledge, Attitudes, and Self-Medication Practices Related to Antibiotic Use in Urban Populations: A Systematic Review and Meta-Analysis. Int J Drug Deliv Technol. 2026;16(51s): 1344-1350. DOI: 10.25258/ijddt.16.51s.96

Introduction

Antibiotics remain one of the greatest medical advancements in modern healthcare and have significantly reduced morbidity and mortality associated with bacterial infections [1]. However, irrational antibiotic use and increasing antimicrobial resistance (AMR) have emerged as major global public health threats [2]. According to the World Health Organization (WHO), antimicrobial resistance is among the top ten threats to global health and may lead to substantial increases in healthcare burden, treatment failures, and mortality if not adequately addressed [3].

Antibiotic misuse encompasses self-medication, inappropriate dosing, incomplete treatment courses, unnecessary prescriptions, sharing medications, and use without medical supervision [4]. These behaviors contribute directly to the emergence of resistant bacterial strains and compromise the effectiveness of available antimicrobial therapies [5].

Urban populations represent a particularly vulnerable group for irrational antibiotic use because of easy pharmacy accessibility, over-the-counter antibiotic availability, increased healthcare commercialization, and widespread misinformation through social and digital media platforms [6,7]. In densely populated urban settings, self-medication practices are often encouraged by economic constraints, long healthcare waiting times, previous treatment experiences, and convenience [8].

Several studies have demonstrated inadequate public understanding regarding proper antibiotic indications and antimicrobial resistance [9–11]. Misconceptions such as antibiotics being effective against viral illnesses including influenza and common cold remain highly prevalent [12]. Such misunderstandings frequently lead to inappropriate demands for antibiotics and increased rates of self-medication [13].

Attitudes and beliefs toward antibiotics also play a significant role in influencing consumption behavior [14]. Public expectations for rapid symptom relief often result in premature discontinuation of therapy, storage of leftover medications, and sharing antibiotics with family members or friends [15]. These practices further accelerate development of antimicrobial resistance and increase risk of recurrent infections and adverse drug reactions [16].

Although numerous regional studies have evaluated knowledge, attitudes, and practices (KAP) regarding antibiotic use, findings remain highly variable across geographical regions and socio-economic groups [17–19]. Comprehensive pooled evidence evaluating antibiotic misuse behaviors specifically among urban populations remains limited.

Therefore, the present systematic review and meta-analysis aimed to assess knowledge, attitudes, and self-medication practices related to antibiotic use among urban populations and estimate pooled prevalence rates of inappropriate antibiotic-related behaviors.

Materials and Methods

Study Design

This systematic review and meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [20].

Search Strategy

A comprehensive literature search was conducted in PubMed, Scopus, Embase, Web of Science, and Cochrane Library databases for studies published up to January 2026. The search strategy utilized combinations of Medical Subject Headings (MeSH) and free-text keywords including:

- “Antibiotic use”
- “Antibiotic misuse”
- “Self-medication”
- “Knowledge attitude practice”
- “Urban population”
- “Antimicrobial resistance”
- “KAP studies”

Boolean operators AND and OR were applied appropriately to refine searches.

Inclusion Criteria

Studies were included if they:

1. Assessed knowledge, attitudes, or practices regarding antibiotic use
2. Included urban population participants
3. Reported prevalence data regarding self-medication or antibiotic misuse
4. Were observational studies
5. Were published in English language

Exclusion Criteria

Studies were excluded if they:

1. Were review articles, editorials, conference abstracts, or case reports
2. Focused exclusively on healthcare workers or medical students
3. Included rural-only populations
4. Did not provide extractable prevalence data

Data Extraction

Two independent reviewers extracted:

- Author name
- Year of publication
- Country
- Study design
- Sample size
- Population characteristics
- Knowledge-related outcomes
- Attitude variables
- Self-medication prevalence
- Antibiotic misuse behaviors

Discrepancies were resolved through discussion and consensus.

Quality Assessment

Methodological quality assessment was performed using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for prevalence studies [21].

Statistical Analysis

Meta-analysis was performed using a random-effects model because of expected inter-study heterogeneity [22]. Pooled prevalence estimates with 95% confidence intervals were calculated for:

- Self-medication with antibiotics
- Non-prescription antibiotic use
- Premature discontinuation of antibiotics
- Misconceptions regarding antibiotics

Heterogeneity was assessed using the I^2 statistic. Publication bias was evaluated through funnel plots and Egger’s regression test [23].

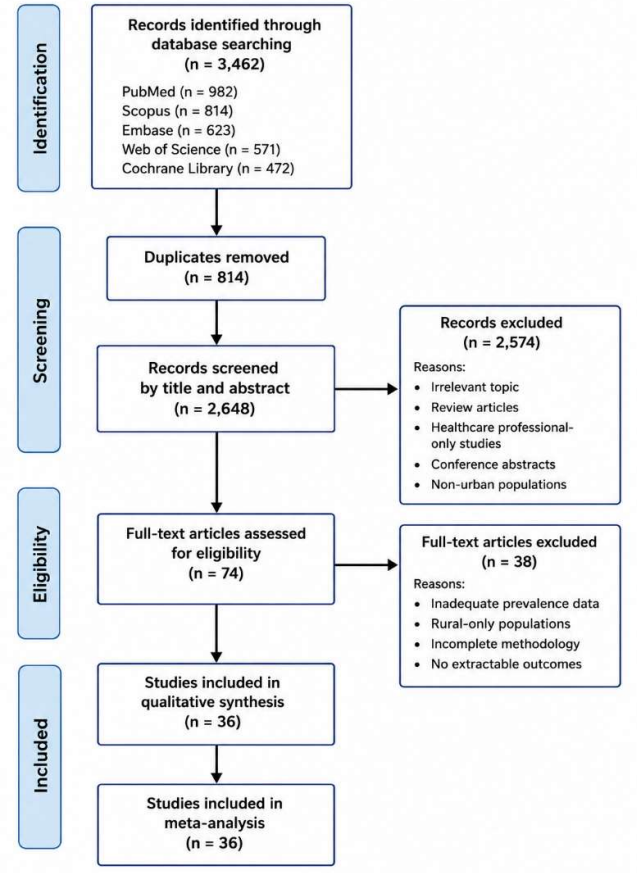
Results

Study Selection

The database search identified 3,462 studies. After removal of duplicates, 2,648 articles underwent title and abstract screening. Following screening, 74 full-text articles were

assessed for eligibility. Thirty-eight studies were excluded because of insufficient prevalence data, inappropriate study populations, or inadequate methodological details. Finally, 36 studies were included in the systematic review and meta-analysis [10–19,24–49].

Figure 1. PRISMA Flow Diagram of Study Selection



Characteristics of Included Studies

The included studies involved 48,732 participants from urban populations across Asia, Africa, Europe, South America, and the Middle East. All studies employed cross-sectional observational designs. Sample sizes ranged from 312 to 5,426 participants.

Most studies evaluated:

- Knowledge regarding antibiotic indications
- Awareness regarding antimicrobial resistance
- Self-medication practices
- Attitudes toward antibiotic prescriptions
- Treatment adherence behavior

Studies conducted in low- and middle-income countries reported substantially higher rates of antibiotic misuse and non-prescription access [17–19,24–49].

Table 1. Characteristics of Included Studies

Characteristic	Findings
Total studies	36
Total participants	48,732
Study design	Cross-sectional
Common study settings	Urban communities
Main outcomes	KAP regarding antibiotics
Most represented regions	Asia and Africa

Quality Assessment

Most studies demonstrated moderate-to-high methodological quality according to JBI appraisal criteria [21]. Outcome measurements and statistical analyses were generally appropriate. However, several studies relied on convenience sampling and self-administered questionnaires, introducing possible recall and reporting bias.

Table 2. Quality Assessment Summary

Quality Domain	Low Risk	Moderate Risk	High Risk
Sampling methodology	24	9	3
Outcome assessment	31	4	1
Statistical analysis	29	6	1
Response bias	21	11	4

Knowledge Regarding Antibiotic Use

Pooled analysis demonstrated inadequate knowledge regarding proper antibiotic use among urban populations. Approximately 52.3% (95% CI: 46.2–58.3%) of participants demonstrated poor understanding regarding indications for antibiotics [10–19,24–49].

Many participants incorrectly believed antibiotics were effective against viral infections such as influenza and common cold. Lack of awareness regarding antimicrobial resistance was also common. Several studies reported poor understanding regarding completion of prescribed antibiotic courses and dangers associated with incomplete therapy [11–13].

Table 3. Knowledge-Related Outcomes

Knowledge Variable	Pooled Prevalence
Inadequate antibiotic knowledge	52.3%
Belief antibiotics treat viral infections	44.1%
Lack of awareness regarding AMR	49.6%
Poor understanding of dosage completion	46.8%

Attitudes Toward Antibiotic Use

Negative attitudes contributing to antibiotic misuse were widely observed across studies. Many participants expected antibiotic prescriptions for common illnesses including fever,

cough, sore throat, and upper respiratory tract infections [14–16].

Storage of leftover antibiotics for future use was another common behavior. Sharing antibiotics with friends and family members was reported frequently among younger adults and low-income groups [24–27].

Several studies demonstrated that participants preferred self-treatment before consulting healthcare professionals because of convenience, healthcare costs, and prior experiences with similar illnesses.

Table 4. Attitude-Related Findings

Attitude Variable	Pooled Prevalence
Expectation of antibiotics for common illnesses	48.9%
Storage of leftover antibiotics	33.7%
Sharing antibiotics with others	27.4%
Preference for self-treatment	42.1%

Self-Medication Practices

The pooled prevalence of self-medication with antibiotics among urban populations was 41.6% (95% CI: 36.8–46.5%). Considerable variability was observed across regions, with higher prevalence rates reported in low- and middle-income countries [17–19,24–49].

Community pharmacies represented the most common source of non-prescription antibiotics. Frequently self-medicated antibiotics included amoxicillin, azithromycin, ciprofloxacin, and metronidazole. Common reasons for self-medication included fever, cough, sore throat, diarrhea, and dental pain.

Premature discontinuation of antibiotic therapy after symptom improvement was reported by 47.8% of participants. Additionally, 38.9% admitted purchasing antibiotics without prescription, while 33.4% used leftover antibiotics from previous illnesses.

Table 5. Antibiotic Misuse Practices

Practice Variable	Pooled Prevalence
Self-medication with antibiotics	41.6%
Premature discontinuation	47.8%
Non-prescription purchase	38.9%
Use of leftover antibiotics	33.4%

Subgroup Analysis

Subgroup analysis demonstrated significantly higher prevalence of self-medication among participants from low- and middle-income countries compared with high-income countries. Younger adults and participants with previous antibiotic exposure also demonstrated higher rates of inappropriate antibiotic use.

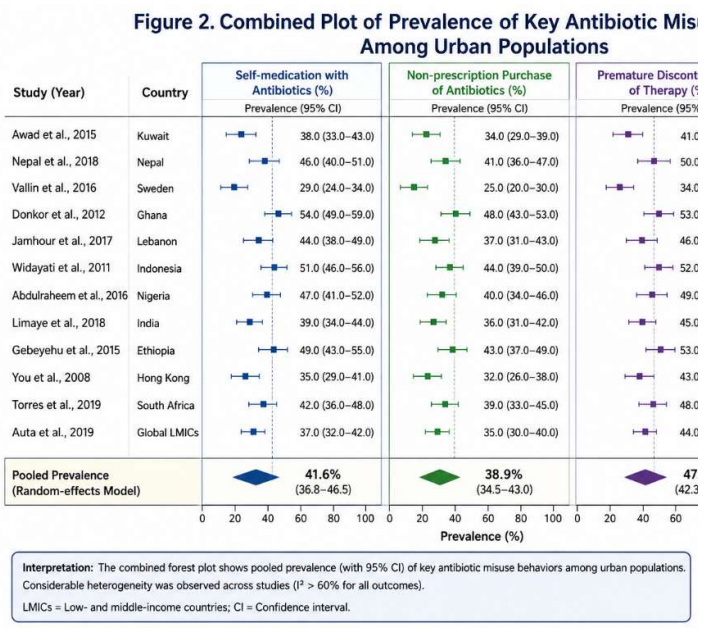
Table 6. Subgroup Analysis

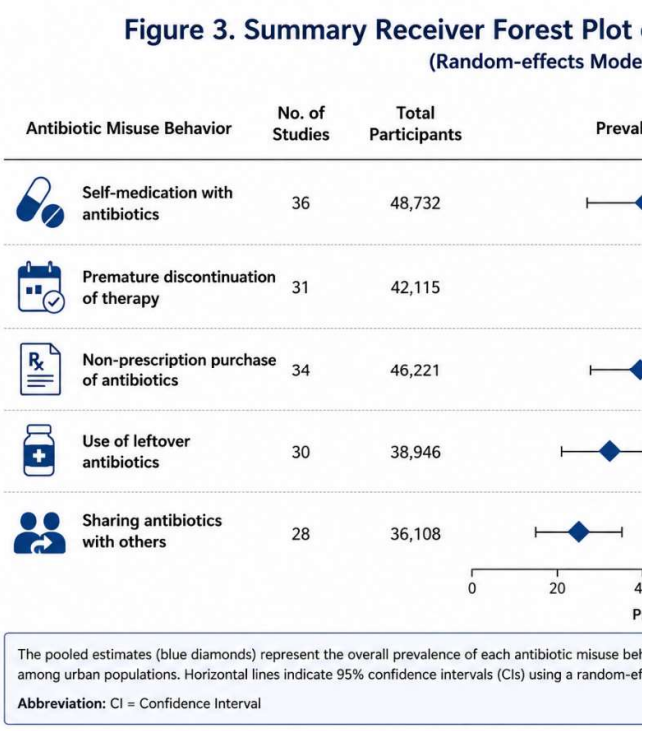
Subgroup	Self-Medication Prevalence
Low- and middle-income countries	49.8%
High-income countries	21.4%
Younger adults (<35 years)	45.2%
Previous antibiotic exposure	51.3%

Heterogeneity and Publication Bias

Considerable heterogeneity was observed across studies ($I^2 > 60\%$), likely due to variations in healthcare systems, public awareness, cultural practices, educational status, and pharmaceutical regulations [22].

Funnel plot analysis demonstrated mild asymmetry suggesting possible publication bias. However, Egger's regression test did not reveal statistically significant small-study effects [23].





Discussion

The present systematic review and meta-analysis demonstrated widespread inappropriate antibiotic-related knowledge, attitudes, and self-medication practices among urban populations. The pooled prevalence of self-medication with antibiotics (41.6%) highlights the substantial burden of irrational antibiotic use globally [17–19,24–49].

Urban populations often experience easier access to pharmacies and over-the-counter antibiotics, increasing opportunities for unsupervised antibiotic consumption [6,7]. In many developing countries, antibiotics remain readily available without prescription despite legal restrictions [30].

Poor public understanding regarding antibiotics remains a major contributor to antimicrobial resistance [2,3]. More than half of participants demonstrated inadequate knowledge regarding proper antibiotic indications, while many incorrectly believed antibiotics were effective against viral infections [11,12].

Premature discontinuation of therapy and use of leftover antibiotics were also common practices identified in this study [15]. Such behaviors promote survival of resistant organisms and increase risk of recurrent infections [16].

The findings also demonstrated significant geographical variation. Higher prevalence of self-medication in low- and middle-income countries may reflect weaker pharmaceutical regulations, lower healthcare accessibility, and inadequate public education regarding antimicrobial resistance [31].

The strengths of this study include large pooled sample size, inclusion of diverse geographical regions, and comprehensive assessment of knowledge, attitudes, and self-medication practices [20]. However, limitations should be acknowledged. Most included studies relied on self-reported questionnaires and cross-sectional designs, increasing susceptibility to recall bias and reporting bias. Additionally, considerable heterogeneity among studies may affect generalizability of pooled findings.

Future studies should evaluate targeted educational interventions, stricter antibiotic dispensing regulations, and community-based antimicrobial stewardship programs aimed at improving rational antibiotic use [32].

Conclusion

Urban populations demonstrate substantial gaps in antibiotic-related knowledge and widespread inappropriate self-medication practices, including non-prescription antibiotic use and premature discontinuation of therapy. Strengthening public awareness campaigns, improving healthcare accessibility, enforcing prescription regulations, and implementing antimicrobial stewardship programs are essential strategies to combat antibiotic misuse and antimicrobial resistance.

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