Antibiotic treatment of pediatric infections in primary healthcare setting: evaluation and comparison of 80 national treatment guidelines with the WHO AWaRe book recommendations

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Summary

Background Antibiotic recommendations for pediatric infections in national standard treatment guidelines (STGs) vary widely, particularly for Access and Watch antibiotics. The WHO AWaRe book recommends Access antibiotics as first-line treatment for over 80% of common infections managed in primary healthcare. This study aims to evaluate the agreement between first and second-line antibiotics in national STGs with AWaRe book recommendations and the inclusion of these antibiotics in Essential Medicine Lists (EMLs).

Methods National STGs of 80 countries were systematically collected from databases and grey literature (up to May 2025). Antibiotic recommendations for the ten most common primary healthcare infections in children were compared with the WHO AWaRe book (2022), the WHO Essential Medicines List for children (EMLc) and national Essential Medicines Lists (nEMLs) where available.

Findings A median of eight STGs per country were collected, with higher numbers in LMICs due to guidelines for cholera and enteric fever. A total of 1124 first-line and 841 second-line antibiotic recommendations were identified. Over 70% of first-line recommended treatments were Access antibiotics, while Watch antibiotics accounted for more than 50% of second-line recommended treatments. First-line recommendations showed strong agreement with WHO guidance, whereas second-line treatments exhibited lower agreement and greater variability across regions. More than 80% of first-line antibiotics were included in the EMLc and nEMLs, although some high-income countries lacked nEMLs.

Interpretation First-line antibiotic recommendations in national pediatric STGs largely align with the WHO AWaRe book guidance focusing on Access antibiotic use. In contrast, second-line treatments vary considerably, commonly recommending Watch antibiotics. Strengthening the evidence base of national STGs and aligning second-line recommendations with the WHO AWaRe book could help meet the 79th UNGA High-Level Meeting on AMR target, which aims for 70% of all human antibiotic use to come from the Access group.

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Keywords: Pediatric infections; Primary healthcare settings; National standard treatment guidelines; STGs; AWaRe book

Research in context

Evidence before this study

Antibiotic use in children remains high, particularly in low- and middle-income countries, with a substantial proportion of prescriptions involving Watch antibiotics, while the WHO AWaRe book recommends Access antibiotics as first-line treatment in over 80% of cases in primary healthcare. We conducted a literature search (January 2025) to identify previous analyses of pediatric antibiotic recommendations globally. To our knowledge, no study has comprehensively collected and compared pediatric STGs across all six WHO regions, nor benchmarked them against the AWaRe Book as a reference standard.

Added value of this study

This study comprehensively evaluates and compares antibiotic recommendations for ten pediatric infections across 80 countries, covering all six WHO regions, examining alignment with the WHO AWaRe book (2022), and comparing recommended antibiotics with those included in the WHO Essential Medicines List for children (EMLc), and national Essential Medicines Lists (nEMLs). Our findings provide insights into regional variations in antibiotic prescribing practices by identifying discrepancies in locally recommended first- and second-line treatments.

Implications of all the available evidence

Our findings demonstrate that while first-line antibiotic recommendations in national pediatric STGs generally align with WHO AWaRe book guidance, second-line treatments exhibit greater variability and increased use of Watch antibiotics.

Harmonizing national standard treatment guidelines with WHO AWaRe recommendations for both first- and second-line therapies could support the 79th UNGA High-Level Meeting on AMR goal of 70% Access antibiotic use, enhancing antimicrobial stewardship, particularly in regions where variability is highest.

Introduction

Antimicrobial resistance is now recognized as one of the major global health threats and a leading cause of mortality worldwide. In 2019, antimicrobial resistance was estimated to be directly responsible for 1.27 million deaths and to have contributed indirectly to 4.59 million deaths.[1] One in five deaths attributed to antimicrobial resistance infections occurs in children under 5 years of age, with the vast majority of these deaths occurring in low- and middle-income countries (LMICs).[1]

Antibiotic use is influenced by local and national clinical guidelines and protocols, prescribers' expertise, knowledge of local pathogen susceptibility, and the availability of essential medicines.

To address this, since 1977, the WHO has issued an updated Essential Medicines List (EML) biannually,[2] detailing medicines that should be consistently available in appropriate dosage forms.[2] In 2007, recognizing pediatric needs, the WHO introduced the Essential Medicines List for Children (EMLc), which includes 45 antibiotics (Table S1).[3]

In 2017, the WHO Expert Committee further categorized EML antibiotics into three groups: Access, Watch, and Reserve (AWaRe classification), along with a "not recommended" category, to guide appropriate use and limit resistance (Table S2).[4] Updated biannually, the 2023 AWaRe list includes over 250 antibiotics, extending beyond the EML: 87 Access, 141 Watch, and 29 Reserve. Access antibiotics should be prioritized as first-line therapy due to their efficacy, safety, and lower potential to drive antimicrobial resistance.[5] To promote appropriate use, the 79th United Nations General Assembly (UNGA) High-Level Meeting on antimicrobial resistance, held in September 2024, established a global target: by 2030, 70% of all human antibiotic use should come from the Access group.[6]

This target underscores the urgent need for global health systems to strengthen adherence to treatment guidelines, prioritize antimicrobial stewardship initiatives, and ensure the availability and affordability of Access group antibiotics, particularly in LMICs.

Moreover, the availability of Standard Treatment Guidelines (STGs)—such as national regulatory documents, scientific societies' publications, and local therapeutic protocols—varies across countries. A key challenge is the lack of specific pediatric guidelines, due to gaps in knowledge on antibiotic pharmacokinetics and dynamics in children,[7] as well as limited representation of pediatric societies in various regions.[7] To address this, the WHO published the AWaRe book in 2022, providing guidelines for 35 of the most common clinical infections in both adults and children, in hospital and community settings.[8,9] While the AWaRe Book offers global recommendations, it does not account for potential regional variations. National STGs remain essential, as they can be adapted to local epidemiology, incorporating specific factors such as the prevalence of infections and local antimicrobial susceptibility

patterns. However, the extent to which national pediatric guidelines align with the AWaRe classification remains unclear.

Methods

This study was conducted in two steps: first, the collection of pediatric STGs; second, the analysis of the recommended first- and second-line antibiotic treatments, comparing them with AWaRe book, WHO EMLc and nEML.

The primary aim of our study was to compare first- and second-line antibiotic recommendations for pediatric infections in various national STGs with those in the WHO AWaRe Book, focusing on antibiotic agent and AWaRe group.

The secondary aim was to compare antibiotics recommended in national STGs with the WHO EMLc or nEML.

Ethics

As the study is based exclusively on data extracted from already published national guidelines, no ethical approval was required.

First STEP–collection of STGs

Countries and infectious diseases selected

Eighty countries were selected based on the availability of national STGs to represent all six WHO regions: African Region (AFR), Region of the Americas (AMR), South-East Asia Region (SEAR), European Region (EUR), Eastern Mediterranean Region (EMR), and Western Pacific Region (WPR).

Based on the AWaRe book's primary health care section,[9] the main infections included in our study were: Upper Respiratory Tract Infections (URTIs), such as acute otitis media (AOM), pharyngitis, and acute sinusitis; Community-acquired pneumonia (CAP); odontogenic infections (periodontitis, bacterial gingivostomatitis, and odontogenic abscess); gastrointestinal infections, such as acute gastroenteritis (including acute hemorrhagic diarrhea like shigellosis), cholera, and enteric fever; skin and soft tissue infections (SSTIs), including impetigo and cellulitis; and urinary tract infections (UTIs).

Search strategy

The bibliographic search was conducted in MEDLINE, EMBASE, SCOPUS using keywords like "national standard treatment guidelines," and "national antibiotic guidelines". Grey literature was reviewed to ensure comprehensive coverage, including pediatrics, infectious diseases, and general medicine National Scientific Societies' library (last search in May 2025). Additionally, for LMICs, public archives from Ministries of Health, drug regulatory agencies, national centers for the control of infectious diseases, and national reference institutes were consulted for STGs (last search in May 2025).

Inclusion and exclusion criteria

Documents developed or published by national institutions, the national Ministry of Health, national societies, or centers were included if they focused on pediatric (i.e., aged <18 years) recommendations for single or multiple infectious diseases.

In cases of uncertainty regarding the validity of the documents, collaborators of Antibiotic Data to Inform Local Action project (ADILA) working in the relevant country were contacted.

Documents published or endorsed by international societies were excluded, unless they had been officially adapted by national societies.

Data extraction and collection

For each country and each infection with available STGs, data were collected for the three first-line and three second-line antibiotics recommended, including route of administration, daily dose (in mg/kg/day or IU/kg/day when available), frequency of administration, length of therapy, and recommendations for penicillin-allergic patients.

Second STEP—comparison between national STGs and AWaRe book, EMLc and nEML

Creating a quantitative metric of guideline agreement

The AWaRe groups, and whether that specific antibiotic was included in the WHO EMLc and nEMLs were then assessed for each antibiotic. If an antibiotic was not listed in the AWaRe classification (even in the "Not recommended group"), it was classified as "Not included". The nEMLs were extracted from the WHO public National EML database when available.[10]

A specific metric was developed to quantify the level of agreement between each country's first- or second-line antibiotic guidelines and the WHO AWaRe book, considering the AWaRe group, antibiotic class and agent through a hierarchical structure. A score of 0 was assigned when the antibiotics differed in all three dimensions—AWaRe group, class, and agent. If the antibiotics belonged to the same AWaRe group but differed in both class and agent, the score was 1. A score of 2 was given when the antibiotics shared both the same AWaRe group and class but differed in the specific agent. Finally, full agreement—meaning same AWaRe group, class, and agent—was scored as 3.

Agreement with the WHO-recommended treatment line (first- or second-line) for antibiotics that share at least the same AWaRe classification was then evaluated.

A score of 2 was assigned when the recommendation in the national guideline matched the WHO-recommended treatment line (either first or second

line); a score of 1 was assigned when the recommended treatment line differed (i.e., mismatch between first and second line).

The final results, obtained by summing these two scores, range from 0 to 5.

Statistics

The completeness of national STGs was assessed by the number of guidelines available per country.

AWaRe classes and antibiotics recommended for first- and second-line treatments were analyzed by country and infection.

Agreement scores between nSTGs and WHO AWaRe book were assessed across states and infections using the median and interquartile range (IQR). Overall differences were analyzed using the Kruskal–Wallis test, while pairwise comparisons were conducted using the Wilcoxon Rank Sum test.

The presence of the recommended antibiotics in the EMLc and nEML was evaluated by WHO regions for first- and second-line recommendations.

Finally, the association between AWaRe agreement scores and socioeconomic factors of the countries was analyzed using a log-binomial regression model, with results presented as Relative Risk (RR) and 95% Confidence Intervals (CIs). Socioeconomic factors considered were population, as reported by the United Nations in 2022,[11] average life expectancy, as reported by the United Nations,[11] infants mortality rate in children under 5 years of age, as reported by the United Nations in 2022,[11] Current Health Expenditure (CHE) as % Gross Domestic Product (GDP), as reported by WHO Global Health Expenditure Database report in 2022,[12] and Current Health Expenditure (CHE) per Capita in US$, as reported by WHO report in 2022.[12] All statistical analyses were performed using SAS software, version 9·4 (SAS Institute, 17 Inc., Cary, NC, USA) and R Statistical Software version 3.6.1 (R Foundation for Statistical Computing, Vienna, Austria). Hypothesis tests were two-sided with a type I error of 0.05.

Role of funding source

The funder of the study had no role in study design, data collection, data analysis, data interpretation, and writing of the report.

Results

This systematic review identified 6553 documents, with 3544 documents assessed after duplicates were removed. Of these, 113 documents from databases and other 250 from grey literature were eligible. After careful evaluation, 175 documents were included (Figure S1).

Overall, we collected STGs for 80 countries across all six WHO regions: 16 in AFR, 11 in AMR, 7 in EMR, 29 in Europe, 6 in SEAR, and 11 in WPR (Table S3).

Completeness of standard treatment guidelines (STGs)

Considerable variation in the level of completeness of STGs was observed across countries. The median number of guidelines for the 10 infections was 8 (6–9) (Fig. 1, Table S4).

Stratified by WHO region, STGs from the AFR demonstrated the highest level of inclusion, covering 85% of infections, whereas the EUR had the lowest coverage, at 66%.

In terms of specific infections, URTIs and LRTIs were the most frequently covered globally, with AOM, pharyngitis, sinusitis, and pneumonia at 93.8%, 95.0%, 80.0%, and 90.0%, respectively. Odontogenic and gastrointestinal infections, particularly typhoid fever and cholera, were included in only 47.5% to 60.0% of countries.

AWaRe group recommendations

A total of 1124 first-line and 841 second-line antibiotic recommendations were collected from the different STGs.

Over 70% of first-line antibiotic recommendations belonged to the Access group. Only a few STGs recommended as first-line treatment antibiotics from the AWaRe "Not recommended" group, such as ampicillin-cloxacillin or ampicillin-flucloxacillin for SSTIs treatment in African countries (Nigeria, Kenya, United Republic of Tanzania). Additionally, some first-line antibiotics, like nalidixic acid and sulfisoxazole, were not classified in the WHO AWaRe system.

Over 50% of second-line antibiotics belong to the Watch group, with Reserve antibiotics rarely recommended (Fig. 2).

Antibiotics recommended by different guidelines

The most commonly recommended first-line antibiotics were amoxicillin, co-amoxiclav, and phenoxymethylpenicillin, while cephalosporins and macrolides were more frequently recommended as second-line treatments. Trimethoprim-sulfamethoxazole was equally recommended for both lines (Fig. 3).

Stratifying the type of antibiotics recommended by diagnosis, amoxicillin, co-amoxiclav and phenoxymethylpenicillin were most commonly recommended as first-line treatment for AOM, CAP, oral infection, pharyngitis, sinusitis, SSTI, and UTI. Cephalosporins and macrolides were more commonly recommended as first-line for cholera, enteric fever, and gastrointestinal infections (Fig. 4) while also being frequently recommended as second-line antibiotics for nearly all infections.

Agreement with WHO AWaRe book

The analysis showed a strong alignment with WHO AWaRe recommendations for first-line treatments across most WHO regions, with greater variability observed in the AFR ($p = 0.02$). In contrast, second-line treatments had lower agreement, with greater variability across all regions ($p = 0.30$) (Fig. 5A and B).

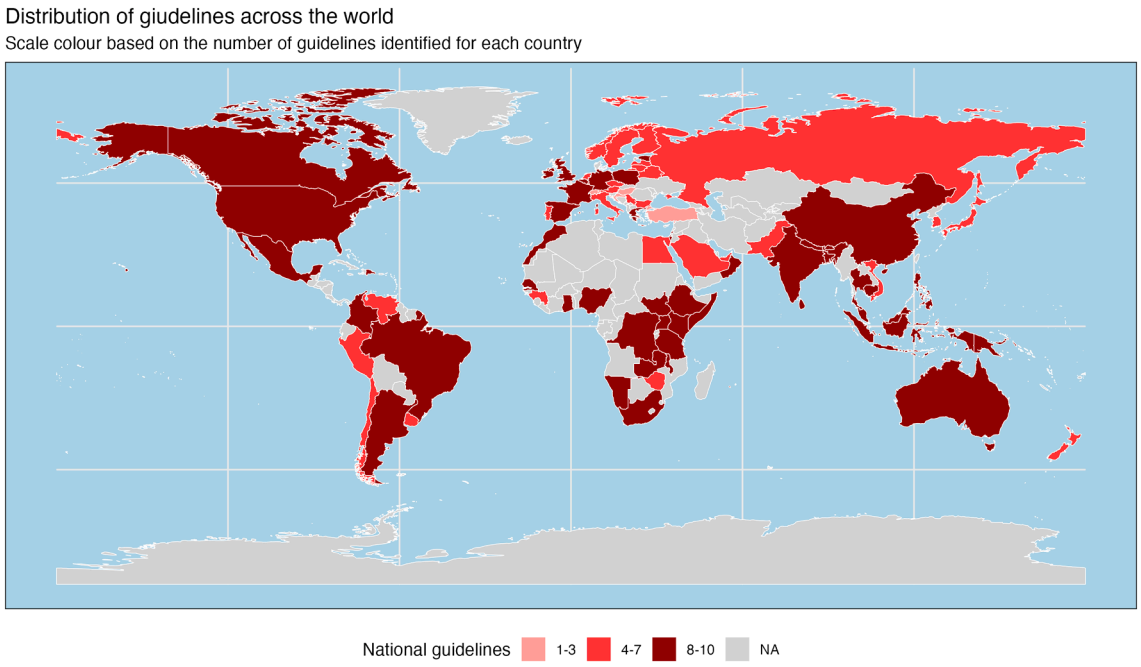

Fig. 1: The number of national guidelines in each country included.

Considering agreement between first-line treatment recommended by WHO and those recommended by different guidelines stratified by infections, a higher agreement was identified for AOM, oral infection, pharyngitis, sinusitis, and SSTIs, and, lower agreement for cholera, enteric fever, gastrointestinal infection, CAP and UTI ($p < 0.0001$, Fig. 5C and D). Instead, considering second-line treatment, concordance was generally lower, with a much higher variability between different infections.

Inclusion of recommended antibiotics in WHO EMLc and nEMLs

First-line antibiotics recommended by STGs were included in the WHO EMLc in almost 100% of cases in EMR and over 90% of cases in the other regions (Figure S2). Second-line antibiotics were less frequently included in the EMLc (78–92%).

Overall, for 59 of the 80 countries included in the study (73.8%) a nEML was available from the WHO database. Most countries without nEML belong to the EUR (16/29) and represent high-income countries. Over 80% of first-line antibiotics recommended were included in the available nEMLs. For second-line antibiotics, listing rates were also high across all regions, though slightly lower in AMR, WPR, and SEAR (Figure S2).

Association between socioeconomic factors and agreement score

No significant association was found between socio-economic factors and concordance scores for first- and second-line treatment (Table S5).

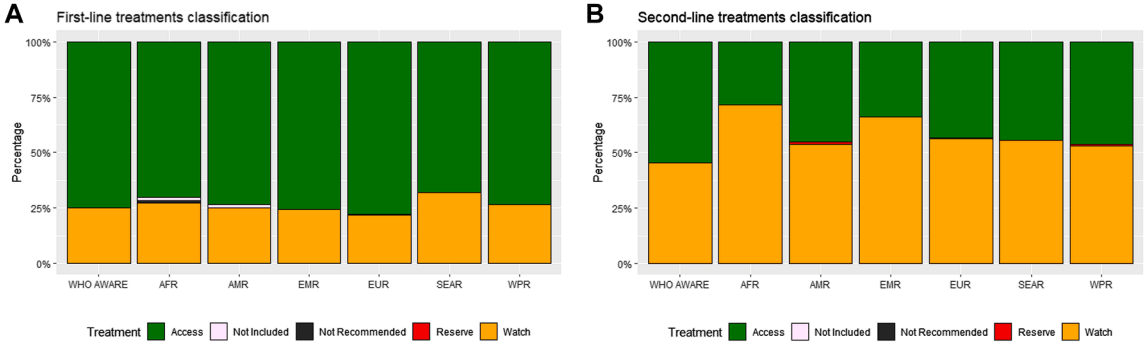

Fig. 2: Distribution of AWaRe classes for first-line (A) and second-line (B) antibiotics recommended by different guidelines.

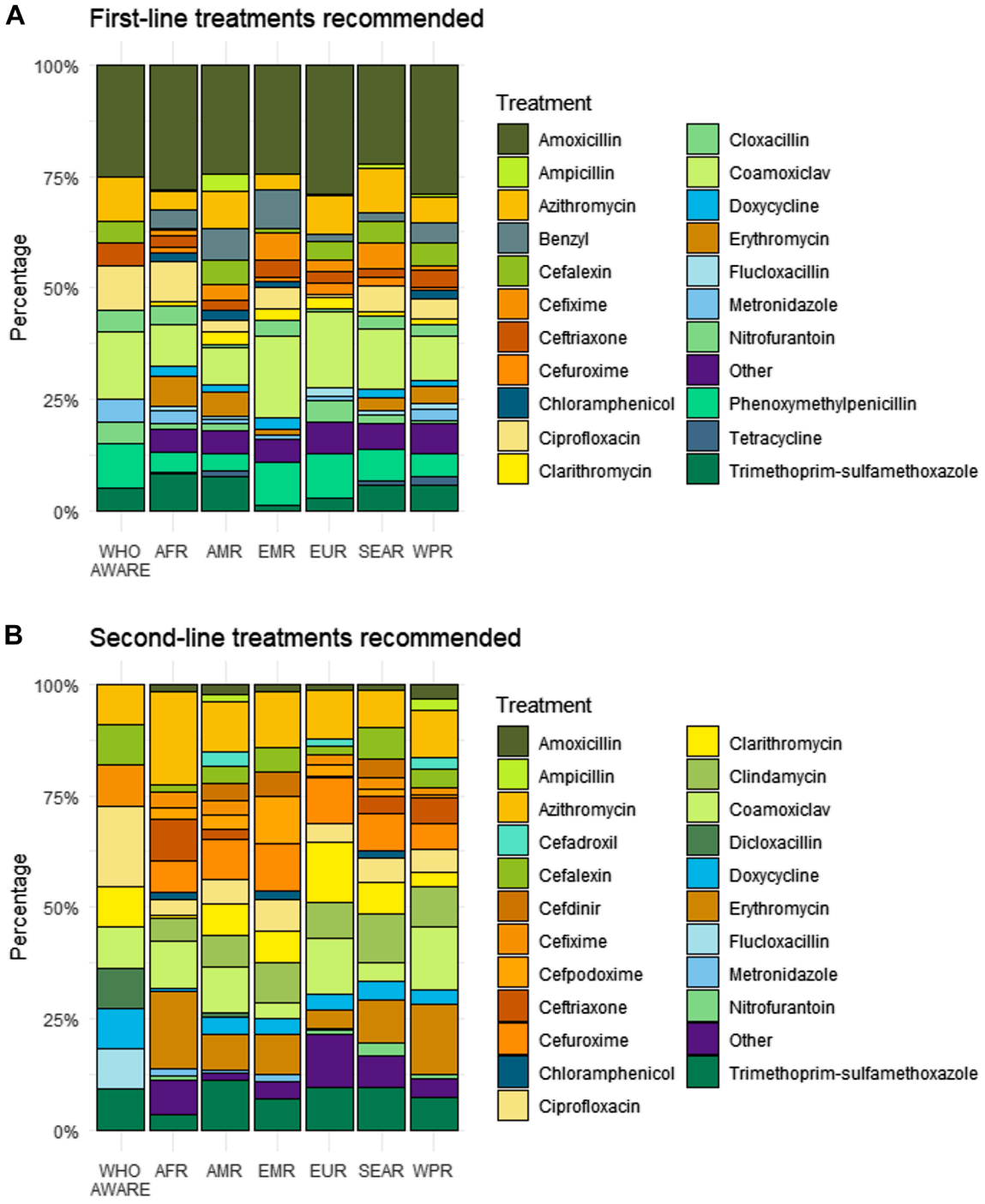

Fig. 3: Distribution of different types of antibiotics for first-line (A) and second-line (B) antibiotics recommended by national standard treatment guidelines grouped by WHO region.

Discussion

Considerable variation in national guideline availability was noted, with an average of eight per country and a higher number identified in LMICs compared to high-income countries (HICs).

National STGs covering multiple infections for both adult and pediatric populations and issued by National Ministries of Health were more commonly found in LMICs, whereas disease-specific guidelines issued by national scientific societies were more frequent in

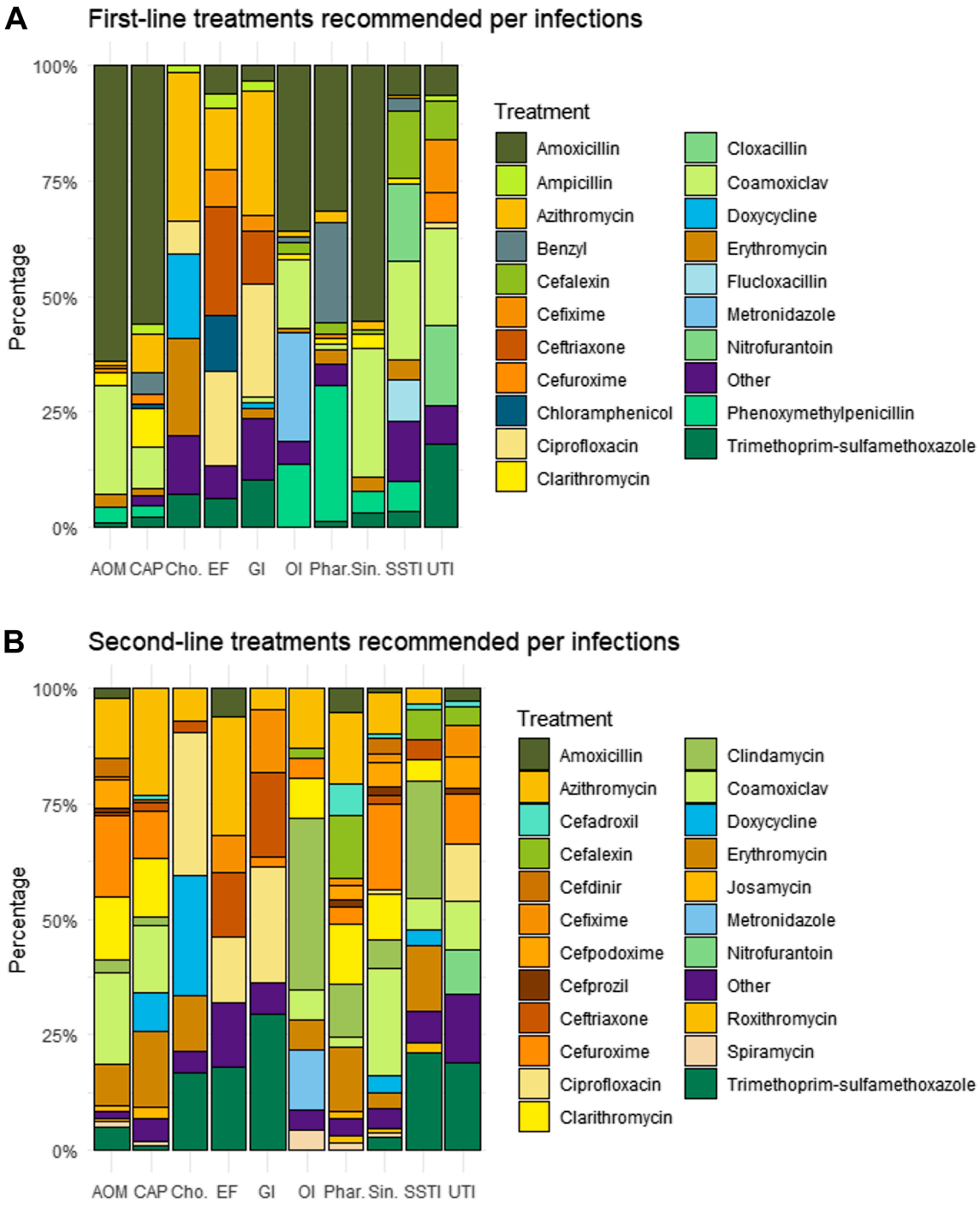

Fig. 4: Distribution of different types of antibiotics stratified by diagnosis for first-line (A) and second-line (B) antibiotics recommended by different guidelines.

HICs. While guidelines from scientific societies tend to have higher methodological quality, national STGs often lack detailed methodology, making their quality harder to assess.[13]

In this study, the AWaRe book was used as a reference standard to assess agreement with national STGs through a scoring system.[9] Agreement with WHO AWaRe book recommendations was generally

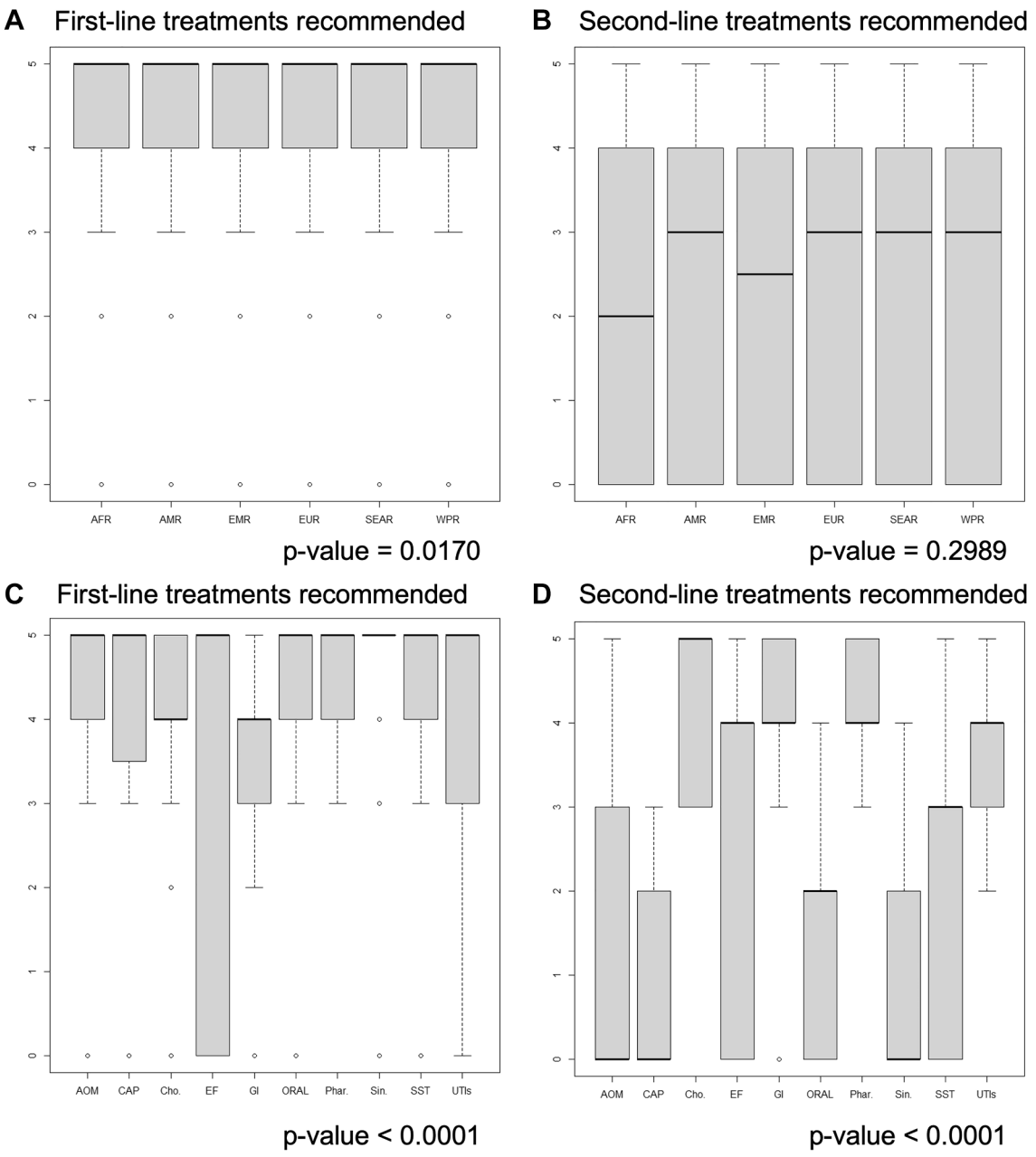

Fig. 5: Agreement scores between WHO AWaRe recommendation and first-line (A) or second-line (B) treatments stratified by regions, and first-line (C) or second-line (D) stratified by diagnosis.

high for first-line treatments, with the lowest concordance observed in guidelines for enteric fever and gastrointestinal infections, and the highest in those for AOM, pharyngitis, sinusitis, and SSTIs. In contrast, agreement was lower for second-line treatments. The varying levels of agreement observed across different infections are, at least in part, to be expected. Infections such as pharyngitis and acute otitis media are caused by a limited number of pathogens, typically associated with low global levels of antimicrobial resistance. As a result, antibiotic selection is often primarily influenced by national drug availability and, in some contexts, by local vaccination coverage. By contrast, infections such as gastrointestinal infections, cholera, and enteric fever involve a wider array of pathogens with diverse resistance patterns across countries. Furthermore, several of these pathogens can present with overlapping clinical features, complicating diagnosis and frequently

prompting national standard treatment guidelines to recommend broader-spectrum antibiotics to ensure adequate empiric coverage.

The analysis of national STGs using the AWaRe system revealed that Access antibiotics were commonly recommended as first-line treatments for most infections. However, for gastrointestinal infections, Watch antibiotics were more frequently endorsed. This trend may reflect the increasing antimicrobial resistance among enteric pathogens, such as *Salmonella* and *Shigella*, which have shown reduced susceptibility to Access antibiotics. The preference for broader-spectrum agents may also stem from the need for rapid, effective treatment, especially in pediatric and immunocompromised patients. Moreover, the recommendations included in the STGs, generally refer to both first- and second-line empiric treatment, aiming to cover the most likely pathogens and prevailing resistance patterns.

Overall, second- and third-generation cephalosporins along with macrolides were widely recommended as first- or second-line treatments in various national STGs, sometimes as alternatives for patients with penicillin allergies, though this indication was not consistently specified.

Nevertheless, it remains essential to promote a unified empiric approach that prioritizes the use of narrow-spectrum antibiotics whenever feasible, in order to minimize unnecessary exposure to broad-spectrum agents and mitigate the risk of further antimicrobial resistance. Once the causative pathogen has been identified and susceptibility data are available, treatment should be individualized, with targeted therapy selected—even if this entails using agents not listed among first- or second-line options—particularly in cases involving multidrug-resistant organisms.

Despite the absence of a correlation between broad socioeconomic indicators and the level of agreement between national STGs and the AWaRe Book, several other factors play a crucial role in the practical implementation and impact of these guidelines. Beyond general economic measures, elements such as antibiotic affordability and supply chain reliability significantly influence access to recommended treatments. In many settings, the cost of antibiotics remains a major barrier, limiting the use of first-line options even when they are guideline-recommended. Moreover, supply chain disruptions — including stockouts, procurement delays, and logistical obstacles — can lead to inconsistent availability of essential antibiotics. These challenges may lead clinicians to prescribe alternative agents, which may be broader-spectrum or less appropriate, thereby compromising guideline adherence and contributing to the development of antimicrobial resistance.[14]

Moreover, the inclusion of antibiotics in nEMLs is crucial for prioritizing procurement and distribution. While the WHO EMLc provides a global benchmark, the real impact depends on national adoption and local adaptation of these lists. Countries that do not incorporate recommended antibiotics into their nEMLs may face further barriers in ensuring reliable supply, complicating efforts to align treatment practices with evidence-based guidelines.[15]

When comparing antibiotics recommended in the different guidelines with those listed in the EMLc,[3] almost all first-line antibiotics in the EMR region are included, while in other regions, 5–10% of first-line antibiotics are missing. The discrepancy is even larger for second-line treatments, with many antibiotics missing from both nEMLs and the EMLc.

Among the 80 countries included in our study, 59 have a nEML available in the WHO platform. However, almost none exclusively recommend antibiotics listed in their nEML as first- or second-line treatment in their guidelines. The WHO strongly encourages the adoption of national EMLs, as the inclusion of antibiotics in these lists ensures their availability at reduced costs and facilitates access to treatment.[16]

To our knowledge, this is the first study to evaluate pediatric treatment recommendations for various infections in primary healthcare settings across 80 countries, representing all WHO regions, making it one of the most comprehensive analyses to date.

Previous research has primarily focused on narrower aspects of antimicrobial prescribing guidelines. For instance, some studies have analyzed treatment recommendations for specific diseases, such as the study on COVID-19 guidelines.[17] Others have concentrated on particular geographical areas, like the study by Craig et al., which examined STGs from 31 African countries.[18]

In contrast, other studies have focused on the alignment between national EMLs and the WHO EML, without specifically addressing pediatric populations. For example, Adekoya et al. assessed the concordance between antibiotics listed in national EMLs, the WHO EML, and the AWaRe classification system.[19] However, their analysis did not account for pediatric-specific recommendations, nor did it evaluate the antibiotics recommended within national guidelines. This highlights a critical gap in the literature, as pediatric STGs are essential for optimizing antibiotic use and ensuring consistent care across different healthcare settings.

In this context, the WHO AWaRe classification,[8] alongside the AWaRe Antibiotic Book,[9] plays a key role in shaping future antibiotic policies. During the 79th UNGA meeting in September 2024, a global target was set for 70% of antibiotics used in all humans to come from the Access group, highlighting the need to prioritize these antibiotics.[6] While over 70% of first-line antibiotics recommended in national STGs belong to the Access group, further efforts are needed, particularly for second-line treatments and considering

especially the empiric treatment. The WHO AWaRe Book provides continuously updated, evidence-based recommendations. At the national level, STGs should similarly be evidence-based, specifically tailored to pediatric needs, frequently updated and closely aligned with the AWaRe Book, while also being adapted to local epidemiology and resistance patterns that may vary significantly between countries. National STGs should start from the antibiotics recommended by WHO and modify or add other antibiotics only when local resistance data — obtained through continuous surveillance and updated reports — indicate that WHO-recommended options are no longer appropriate for empirical treatment in primary healthcare settings. In some countries, non-evidence-based guidelines issued by Ministries of Health or professional societies persist, lead to inconsistencies in treatment recommendations for the same infectious diseases.[13] Addressing these gaps requires coordinated global and regional initiatives. Notably, efforts are already underway, such as the development of continental STGs for Africa and the Americas, led by the African Union, the Africa CDC, and the Pan American Health Organization (PAHO).[20,21] These initiatives represent critical steps toward harmonizing treatment guidelines, improving antibiotic stewardship, and promoting equitable access to effective therapies worldwide.

However, while guidelines are essential, they alone may not be enough to improve the appropriateness of antibiotic prescribing.[22] An analysis of 2015 wholesale antibiotic sales of child-appropriate oral antibiotic consumption for young children across 70 countries, based on the WHO AWaRe classification, found that 75% of prescriptions fell within the Access category, with high variability between countries.[23] Educational initiatives, such as targeted training sessions for prescribers, are crucial, as discrepancies between guideline recommendations and real-world prescribing patterns persist.[24] However, the higher use of Watch antibiotics observed in some countries, especially in LMICs, may also reflect the greater availability of branded generics for these agents, compared to Access antibiotics, which may be less available or more expensive.[25] Addressing these gaps is essential for optimizing antibiotic use.

Although data on dosage, frequency of administration, and duration of therapy were collected, direct comparisons were not feasible; therefore, these results were not included. Many guidelines, particularly those from LMICs, reported dosages using weight-band dosing, while HICs guidelines used mg/kg/day, making comparisons challenging. Additionally, treatment duration was often inconsistently reported, with many guidelines suggesting a broad range of days, leaving the final decision to prescribers. Future guidelines should provide more precise and standardized recommendations on dosage (such as mg/kg/day or both weight band doses and mg/kg/day), frequency, and duration to ensure consistency in prescribing practices.

Despite our extensive search of both databases and grey literature, it is possible that some national guidelines may not have been retrieved. Nevertheless, we selected 80 countries for inclusion in the search strategy, as it was not feasible to include all countries worldwide. This could have introduced a bias, as it is possible that LMICs without specific national STGs may have been excluded, potentially overestimating the global availability of guidelines. However, to try to mitigate this bias, countries from all six WHO regions were included in the search. The absence of STGs for certain infections, such as gastrointestinal infections in some high-income countries, may have introduced a potential bias in our analysis. Given the considerable variability in antibiotic recommendations for these diseases, it is possible that agreement between national STGs and the AWaRe Book is actually higher in HICs compared to LMICs. However, it is important to emphasize that our study focused strictly on the analysis of existing national guidelines. We did not base our assessment on antibiotic prescription or consumption data, nor did we exclude or modify countries lacking specific STGs for certain infections. Therefore, our findings reflect the current state of available guidelines rather than inferred or imputed practices, acknowledging that countries without formal national STGs for particular diseases could not be included in that portion of the analysis. Further studies are needed to better inform national-level stewardship interventions for the treatment of community-based pediatric infections.

Our study found that first-line antibiotic recommendations in national STGs for pediatric populations largely align with the WHO AWaRe book, with a significant proportion of Access antibiotics recommended. In contrast, second-line treatments show lower alignment, with a greater reliance on Watch antibiotics. To meet the UNGA target of 70% Access antibiotic use, evidence-based STGs based on the WHO AWaRe book and providing clear guidance on dosage and duration should be established in all countries.

Contributors

Conceptualization: DD, SM, MS and SE; Data curation: DD, GB, GA, MA.

Methodology: DD, GB, AC, SM, MS, SE.

Formal analysis: DD, GB, AC.

Interpretation of the data: DD, GB, SM, MS, SE.

Original article draft: DD, GB, AC.

Revision of the article: MM, GA, SM, MS, SE.

DD, GB, AC had full access to and verified the data.

All authors had final responsibility for the decision to submit for publication.

Data sharing statement

The data included in this study are publicly available online through Medline, Embase, national government websites, or the official websites of national scientific organizations.

Declaration of interests
None of the authors have financial relationships relevant to this article to disclose.

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Appendix A. Supplementary data
Supplementary data related to this article can be found at https://doi.org/10.1016/j.eclinm.2025.103437.

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