Consumption and Rational Use of Antimicrobials in South-East Asia Region

World Health Organization
REGIONAL OFFICE FOR South-East Asia

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List of abbreviations

AMC	antimicrobial consumption
AMR	antimicrobial resistance
AMU	antimicrobial use
ATC	anatomical therapeutic chemical
AWARE	Access; Watch; Reserve; antimicrobial classes
DDD	defined daily dose
DID	DDD per 1000 inhabitants per day
FDC	fixed-dose combination
GAP	Global Action Plan on Antimicrobial Resistance
GLASS	Global Antimicrobial Resistance and Use Surveillance System
NAP	National Action Plan
NEML	National Essential Medicines List
SF	single formulation medicines
SU	standard unit
WHO	World Health Organization

Executive summary

The monitoring of antimicrobial consumption (AMC) is an indispensable component of national efforts aimed at mitigating the growing threat of antimicrobial resistance (AMR).

Simultaneously, the monitoring of AMC is pivotal in supporting access to medicines by ensuring the availability and appropriate use of antimicrobial agents. Within the WHO South-East Asia Region, most countries are currently in the initial stages of establishing their national AMC surveillance monitoring systems.

This publication insights into the dynamic landscape of antimicrobial consumption within the region. It encompasses a comprehensive analysis of antimicrobial consumption data, categorized by therapeutic groups, adherence to national essential medicines lists, standard treatment guidelines, and the promotion of rational antimicrobial use.

The publication presents clear evidence and key messages to guide policymakers, health-care providers, and stakeholders of the South-East Asia Region in their decision-making processes. These are purposed to address the multifaceted challenges and opportunities inherent in antimicrobial consumption and aim to improve the rational use of medicines and the containment of antimicrobial resistance for better public health outcomes.

Introduction

Antimicrobial Resistance (AMR) presents a significant threat to global health and human development by compromising countries efforts and investments to effectively combat a wide range of infectious diseases. The primary driver of AMR is overuse and misuse of antimicrobial agents. Countries face a contrasting situation whereby the limited access to antimicrobials results in many bacterial infections going untreated, thereby increasing morbidity and mortality.

Additionally, suboptimal dosing and substandard antimicrobials contribute to the development and propagation of AMR. To comprehensively understand and identify areas requiring intervention, data and evidence obtained from surveillance of AMR and antimicrobial consumption (AMC) are crucial. These data must be readily comparable and exchangeable and should inform local, national, and global strategies.

AMC monitoring is a pivotal component of national stewardship initiatives aimed at mitigating the escalating threat of AMR. The Member States in the South-East Asia Region underscored their commitment to collective action against AMR through various resolutions, most notably the regional resolution on "Prevention and Containment of Antimicrobial Resistance SEA/RC63/R4."[1] In 2011, Ministers of Health in the region adopted the Jaipur Declaration[2], affirming their determination to address the mounting issue of antimicrobial resistance.

In 2014, the WHO officially recognized antimicrobial resistance as a Regional Flagship Priority Programme within the South-East Asia Region, emphasizing its critical significance in the regional health landscape.

The majority of the countries in the South-East Asia Region are currently in the initial phases of establishing their national AMC monitoring systems. To facilitate these efforts, WHO has provided standardized methodologies[3] for the systematic and periodic monitoring of antimicrobial consumption (AMC) in human populations.

1 World Health Organization. Regional Office for South-East Asia. (2010). SEA/RC63/R4 - Prevention and containment of antimicrobial resistance. WHO Regional Office for South-East Asia. https://iris.who.int/handle/10665/128408

2 World Health Organization. Regional Office for South-East Asia. Jaipur declaration on antimicrobial resistance. WHO Regional Office for South-East Asia. https://iris.who.int/handle/10665/205397

3 GLASS methodology for surveillance of national antimicrobial consumption. Geneva: World Health Organization; 2020. Licence: CC BY-NC-SA 3.0 IGO.

Regional progress in AMC surveillance

WHO has developed a methodology integral to the Global Antimicrobial Resistance and Use Surveillance System (GLASS) to AMR worldwide. In 2020, this methodology was extended to encompass the GLASS-AMC initiative, which serves as a foundational framework for the establishment of national AMC surveillance systems. These systems are instrumental in generating reliable and comparable data, both at the national and global levels.

Within the South-East Asia Region, several countries namely, Bangladesh, Bhutan, Indonesia, Maldives, Nepal and Timor-Leste, have actively participated in WHO's GLASS-AMC initiative.

Table 1. The status of WHO GLASS-AMC enrolment among the countries in the WHO South-East Asia Region (2023)

Country	WHO GLASS-AMC enrolment	Year of joining WHO GLASS-AMC	Most Recent GLASS-AMC Data submission
Bangladesh	Yes	2022	2022
Bhutan	Yes	2020	2022
DPR Korea	No		
India	No		
Indonesia	Yes	2020	
Maldives	Yes	2020	2022
Myanmar	No		
Nepal	Yes	2020	2022
Sri Lanka	No		
Thailand	No		
Timor-Leste	Yes	2020	2022

Purpose of this Publication

The publication encompasses an analysis of antimicrobial consumption data across the region. This includes the descriptive analysis of consumption patterns categorized by therapeutic groups, reviewing adherence to national essential medicines lists and standard treatment guidelines, and the rational use of antimicrobials. Furthermore, the publication provides key findings to support effective strategies for addressing the challenge of antimicrobial consumption responsibly, thereby promoting rational use of medicines and spreading and implementing the best practices.

Methodology

Data source

The data used in the analysis was obtained from: (a) the IQVIA commercial database, and, (b) the GLASS-AMC 2022 data submission. Part 1 of this report presents results based on the analysis of the data obtained from (a) and part 2 that of (b), respectively.

a) **The IQVIA platform:** provides the sales and medical data from over 90 countries in a standardized and comparable way to facilitate a variety of analysis in the pharmaceutical sector. The commercial annual sale datasets were utilized for six countries in the Region, Bangladesh, India, Indonesia, Nepal, Sri Lanka and Thailand, spanning the period from 2015 to 2021. The analysis relied on specific variables within the dataset, namely "pack details" and "pack volume," to ascertain the total consumption in standard units (SU). The "pack details" variable was employed to determine the pack size, denoting the quantity of tablets, capsules, bottles, vials, cartridges, or ampules within a strip, box, packet, or container. To calculate the total number of standard units for each product, the pack size was then multiplied by the "pack volume" variable for each year, which represented the total number of strips, packets, boxes, or containers. One Standard Unit (SU) was subsequently defined based on the specific dosage form, encompassing one tablet or capsule for solids, one bottle for syrups, one vial or cartridge for insulin, and one ampule, infusion bottle, or vial for injectable medications.

b) **GLASS-AMC 2022 data submission:** During the 2022 data call, Bangladesh, Bhutan, Maldives, Nepal and Timor-Leste managed to share their national AMC data on the global database. The analysis also included data shared to this platform. GLASS-AMC also collects information on the implementation status of the national AMC surveillance system to monitor the progress of AMC surveillance. To measure the consumption of antimicrobials, the methodology uses the number of defined daily doses (DDDs). To adjust for population size, the consumption was presented as number of DDDs per 1000 inhabitants per day. This indicator can be roughly interpreted as the number of individuals per 1000 inhabitants on antibiotic treatment per day.

   The five countries managed to report to GLASS-AMC for five antimicrobials classes (ATCs):

   - antibacterials (ATC J01, A07AA, P01AB)
   - antimycotics and antifungals for systemic use (J02, D01B)
   - antivirals for systemic use (ATC J05)
   - drugs for the treatment of tuberculosis (ATC J04A), and
   - antimalarials (ATC P01B).

Limitations

There are a few limitations of the analysis done to estimate consumption of antimicrobial. These are:

- The IQVIA yearly is extrapolated from a sample, and it is difficult to ascertain the representativeness of the sample.
- IQVIA applies various algorithms to generate national estimates of consumption based on the sampling used. Thus, all estimates presented are extrapolated estimates.
- The GLASS-AMC data analysis relies on the ATC/DDD classification methodology and the IQVIA data analysis used consumption in Standard Units. These two methods may not be directly comparable.
- Depending on the source(s) selected, data coverage and/or population coverage may be incomplete in some countries, thus not showing the full picture of antibiotic consumption.

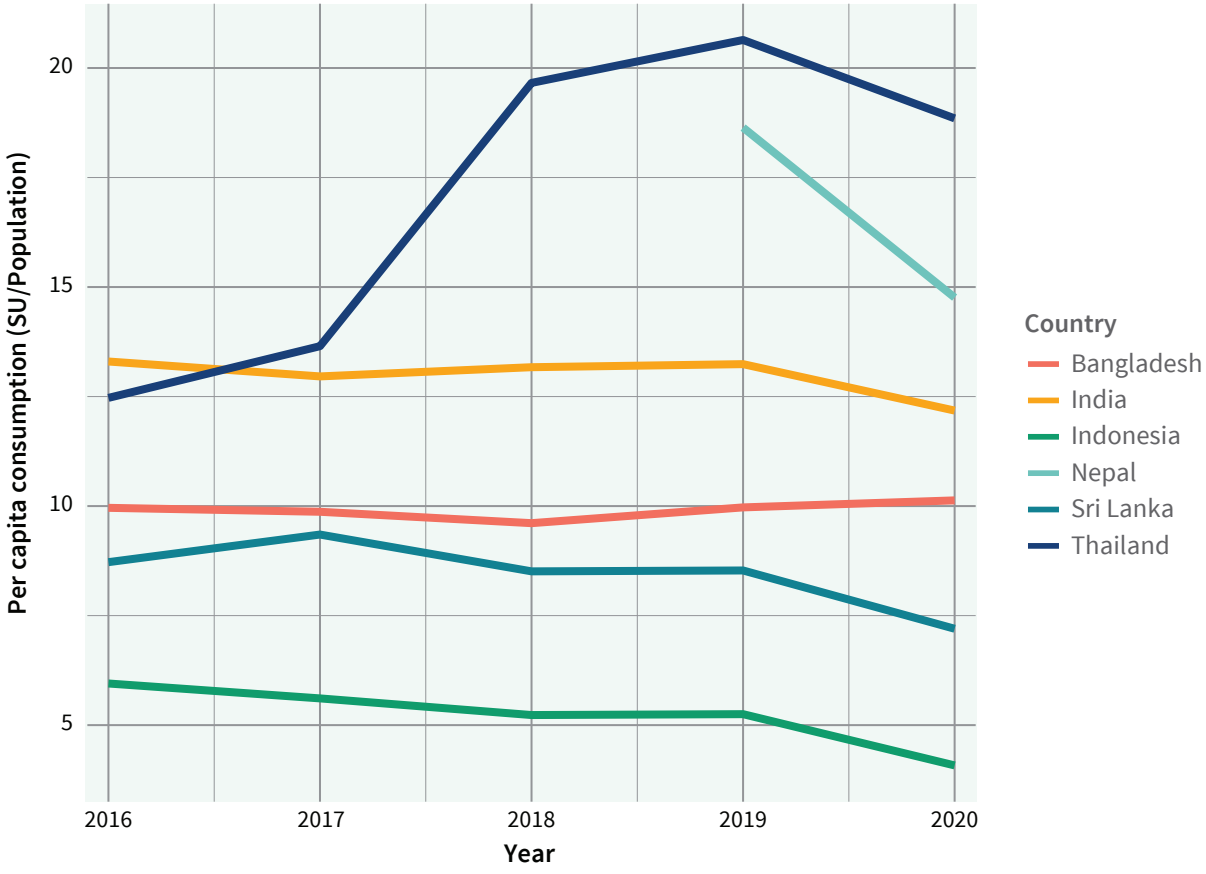
PART 1

IQVIA Data – consumption analysis and rational use

Antimicrobial consumption trends (2016–2020)

An analysis of the AMC data reveals notable variations among the countries of the South-East Asia Region (Fig. 1). Specifically, Indonesia and Sri Lanka show the lowest per-capita consumption of antimicrobials within the region. In 2020, Indonesia recorded a minimum of 4.4 standard units (SU), representing a relatively conservative utilization of antimicrobial agents (Fig. 1). Conversely, Sri Lanka's per capita consumption in 2017 reached a maximum of 8.2 SU, still considered at the lower end of the spectrum. However, it is important to note that there has been a declining trend in Sri Lanka and Indonesia since 2017.

Fig. 1. Total per capita consumption trend (2016–2020)



Data source: IQVIA data

A noteworthy trend is observed in Thailand, where the per capita consumption of antimicrobials has displayed an upward trajectory, peaking at a startling 23.6 SU in 2019. While subsequent data indicates a slight downward trend, the magnitude of consumption in Thailand warrants attention and underscores the need for targeted intervention and surveillance to mitigate the escalating use of antimicrobials in the country. These disparities in per capita consumption underscore the importance of comprehensive AMC data analysis to tailor interventions according to specific national contexts and trends.

Consumption of ATC overtime

Across the board, systemic antibacterials constitute the predominant category of the antimicrobial agents consumed (Fig. 2). However, there are notable variations in the distribution of other antimicrobial categories. Thailand stands out by exhibiting a higher share of systemic antivirals relative to the other countries. This may reflect specific public health challenges such as viral infections that may necessitate a greater use of antiviral agents.

On the other hand, Bangladesh demonstrates a slightly higher share of antimycotics in its overall AMC profile. This deviation may signify a particular prevalence of fungal infections or the use of antimycotics for specific therapeutic purposes within the country.

In contrast, India and Indonesia notably exhibit a significantly higher share of antimycobacterial agents being consumed. This observation may be indicative of a higher burden of mycobacterial infections, necessitating more extensive use of antimycobacterials.

These distinctions in the composition of antimicrobial consumption emphasize the necessity of tailoring antimicrobial stewardship efforts to address specific regional health challenges and patterns of disease prevalence. Such insights are invaluable for formulating targeted strategies aimed at optimizing the use of antimicrobial agents while mitigating the risk of antimicrobial resistance.

Fig. 2. ATC 2 level consumption across the countries (2016–2020)

Data source: IQVIA data

Consumption at ATC 3 antibacterial group level

The analysis of AMC within the six countries of the South-East Asia region reveals distinct patterns in the utilization of antimicrobial groups at the ATC 3 level (Fig. 3). The nine ATC3 groups included were: Tetracyclines (J01A), Amphenicols (J01B), Beta-lactam antibacterials (J01C), Other beta-lactam antibacterials (J01D), Sulphonamides (J01E), Macrolides (J01F), Aminoglycosides (J01G), Quinolones (J01M) and other antibacterials (J01M).

In Bangladesh, the predominant antimicrobial groups are beta-lactam antibacterials and penicillin which collectively account for over 50% of the total consumption. Following closely behind is the category of Quinolones. Notably, the share of Quinolones demonstrates a declining trend over the years, with a corresponding increase in the utilization of macrolide antibacterials.

In India, beta-lactam antibacterials and quinolones emerge as the dominant groups, and their share of total utilization has been steadily increasing over time. Additionally, the share of aminoglycoside antibacterials has been on the rise, whereas combinations of antibacterials have witnessed a decline in their share since 2018.

Indonesia predominantly consumes beta-lactams and penicillin at the ATC 3 level, followed by quinolones, mirroring the trends observed in other countries within the region. A noteworthy observation is the substantial increase in the share of beta-lactams over the years, accompanied by a corresponding reduction in the use of tetracyclines.

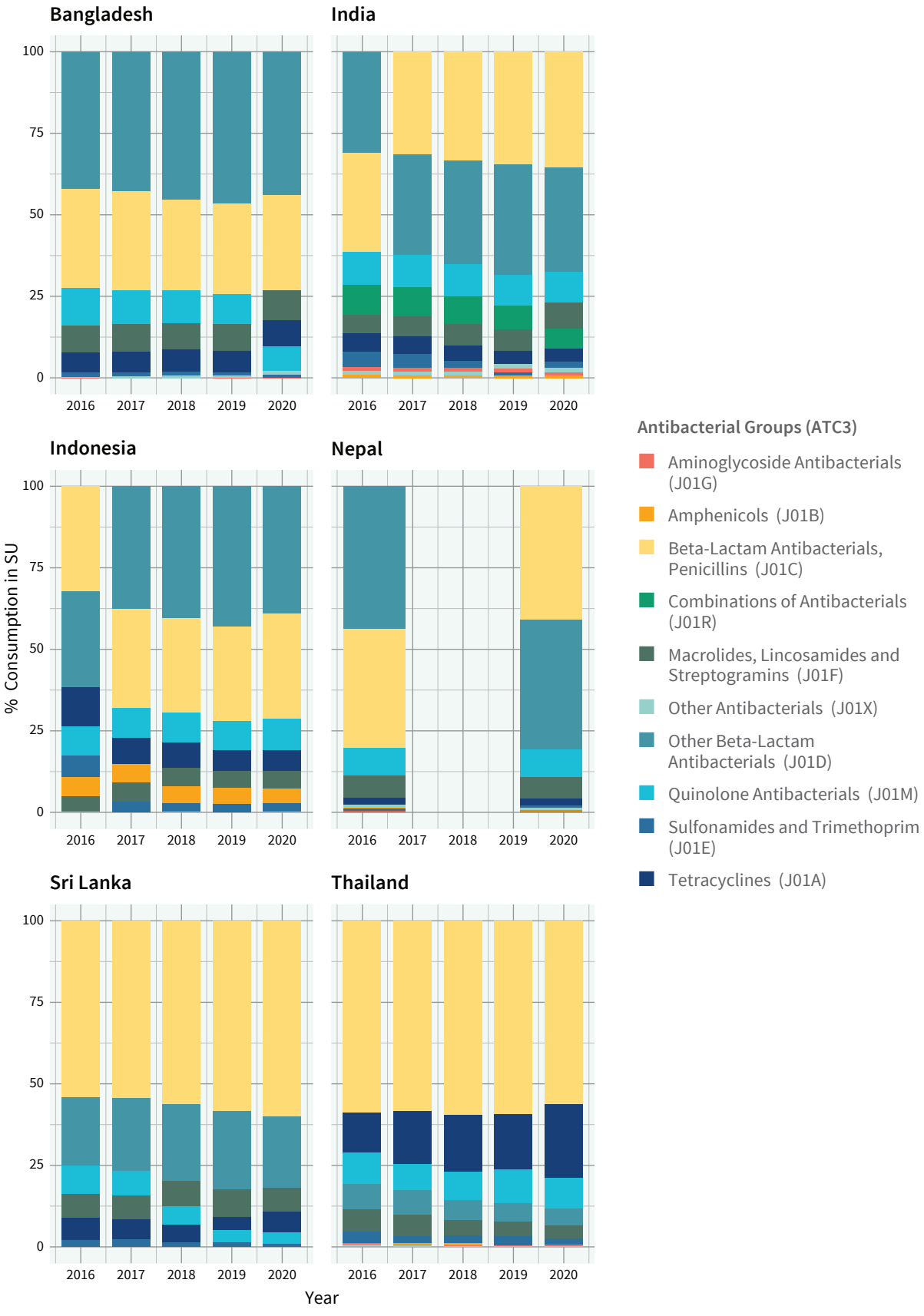
In Nepal, data availability spans the years 2019 and 2020, during which beta-lactam antibacterials and quinolones emerge as the most consumed antibiotic groups, mirroring trends in other South-East Asian countries.

Sri Lanka primarily utilizes beta-lactams and penicillin at the ATC 3 level, constituting over 50% of the total consumption, followed by other beta-lactam antibacterials at approximately 20%, and macrolides. The share of beta-lactam antibacterials has notably increased over the years, accompanied by a reduction in the use of quinolones and sulfonamide groups.

In Thailand, quinolone antibacterials, followed by beta-lactam antibacterials, dominate AMC patterns between 2016 and 2020. A distinctive observation is the increasing share of predominantly ACCESS group antibacterials such as penicillin and beta-lactam antibacterials, along with tetracyclines. Conversely, there is a reduction in the share of quinolones and macrolides, which are predominantly categorized under Watch and Reserve groups. These patterns deviate from those observed in other South-East Asia Region countries.

These findings underscore the need for tailored strategies to rationalize antimicrobial use and address specific regional challenges effectively.

Fig. 3. ATC 3 antimicrobial consumption (2016–2020)



Data source: IQVIA data

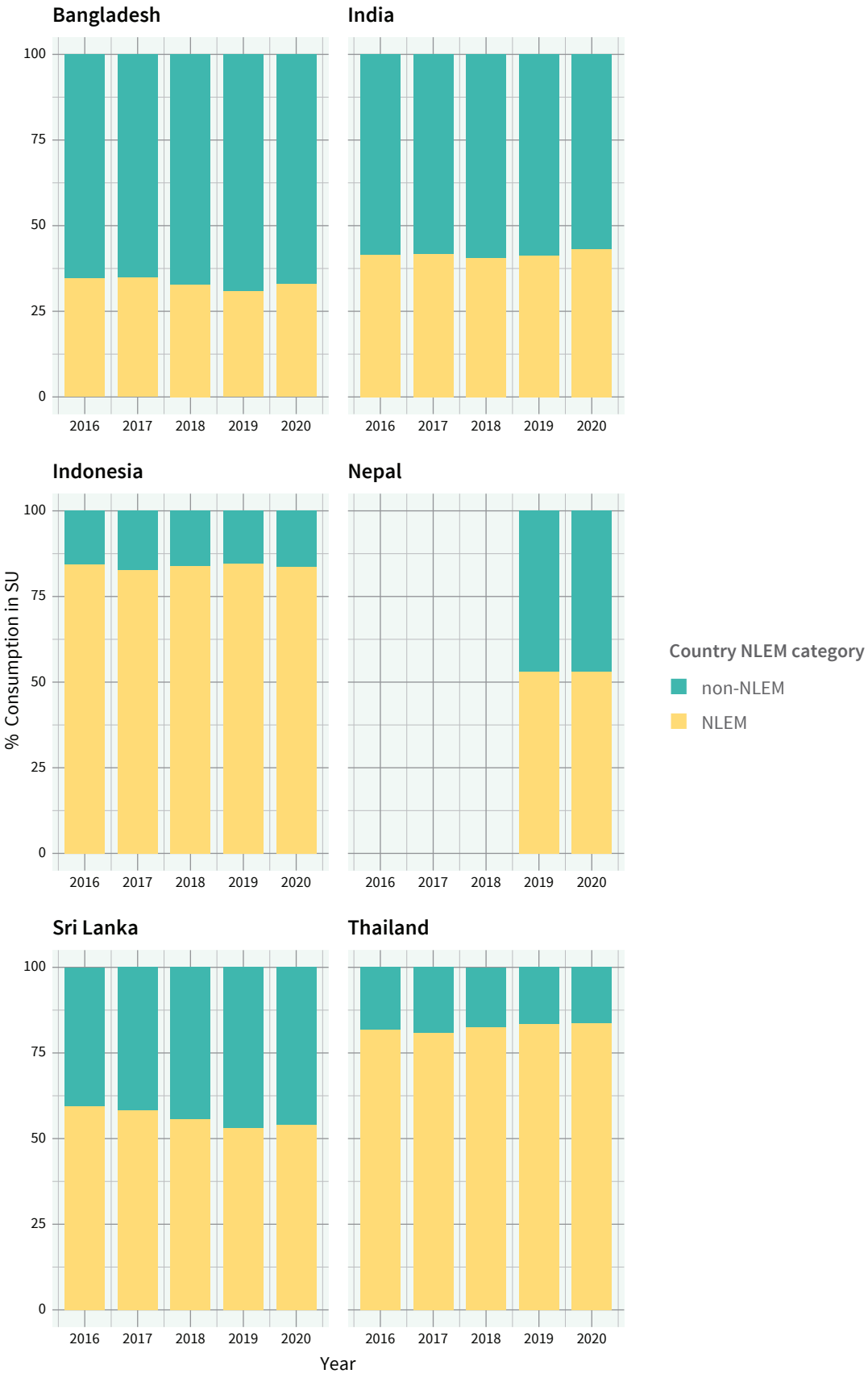
Rationale the use of antimicrobials

The rational use of medicine is a critical necessity in healthcare systems across the globe. A significant facet of this rational use is ensuring that antimicrobials, a vital class of medicines, are employed judiciously and in accordance with established guidelines. The analysis relied on the national essential medicines lists (NEMLs) of Bangladesh (2016), India (2022), Indonesia (2021), Nepal (2021), Sri Lanka (2014) and Thailand (2022). It is noteworthy that in most of the countries under consideration, over 50% of antibacterials consist of drugs listed in the National Essential Medicines List (NEML), signifying a reliance on recognized and essential antimicrobials for therapeutic purposes. An exception to this trend is observed in Bangladesh (NLEM 2016) and India (NLEM 2022) where more than 50% of the antimicrobials are not part of the NLEM.

In Thailand more than 80% of antibacterials consumed are listed as products in the NEML, a pattern that remained close to constant between 2016–2020 and given their updated NLEM (2022). This robust adherence to nationally recognized essential medicines exemplifies a commitment to the rational use of antibiotics and underscores the importance of aligning antimicrobial consumption with approved therapeutic guidelines to mitigate the risks of antimicrobial resistance and enhance patient care outcomes.

The elevated consumption of antibacterials (J01) that are not listed in the NEML may also be indicative of the prominent role played by the share of the private sector in health-care service provision. In many countries in the Region, private healthcare facilities alongside public institutions, offer a wide range of pharmaceuticals. These private health-care providers may consume medicines beyond the scope of the NEML based on the preference, thereby contributing to higher consumption of non-listed medications. The interaction between the private sector's pharmaceutical practices and the utilization of medicines can be complex, and understanding this dynamic is critical.

Fig. 4. Consumption of antibacterials (J01) listed in NLEM across countries (2016–2020)



Data source: IQVIA data

Bangladesh

Bangladesh's experience in monitoring AMC revealed an increase in the national antimicrobial consumption, with some concerning instances of irrational use. Notably, the use of "Watch" category antibiotics surpassed that of the "Access" category. Recognizing the urgency of addressing these challenges a comprehensive baseline survey to gauge awareness levels about antimicrobials, antimicrobial resistance, and their consequences, particularly in the context of self-medication.

The findings led to a resolution that mandated the introduction of a "RED identification mark for antibiotics" for both human and veterinary purposes, beginning in December 2022. Pharmaceutical companies are now obliged to adhere to this resolution, incorporating red labels featuring the text "antibiotic" and the message "Do not use without a prescription of a registered physician" in every packaging of antibiotics.

During the World Antimicrobial Awareness Week in 2022, DGDA and WHO Bangladesh jointly launched a campaign to promote the red labelling of antibiotics to combat misuse and self-medication. In tandem with this red-coloured labelling initiative, DGDA has made it a mandatory requirement for pharmaceutical companies to convey to the public that antibiotics should only be dispensed upon a prescription from a registered physician or veterinarian.

Source: https://www.who.int/bangladesh/news

Consumption of AWaRe groups (J01) in SUs across countries 2016–2020

Thailand demonstrates a substantial prevalence of Access group antimicrobials consumption that has increased over the years (Fig. 5). In the case of Sri Lanka, the prevalence of Access group antimicrobial consumption remains above 60% but seems to have attenuated in 2020. In contrast, results indicate that for the remaining four countries the estimated consumption levels fall below the recommended threshold of 60% for Access group antimicrobials, with limited discernible changes in this trend over time.

Of particular concern is the pronounced consumption of Watch antimicrobials and in some cases “discouraged antimicrobials” across the six countries, signalling the need for intensified scrutiny and targeted interventions to promote judicious use and reduce the risk of antimicrobial resistance associated with these categories. Moreover, the substantial consumption of "discouraged antimicrobials” in the six countries underscore an imperative need to foster awareness among healthcare providers and the public regarding the potential risks associated with these groups of antimicrobials. It also highlights the necessity to strengthen the regulatory environment to effectively reduce the consumption of "discouraged antimicrobials.”

Consumption of single formulation (SF) versus fixed-dose combinations (FDCs)

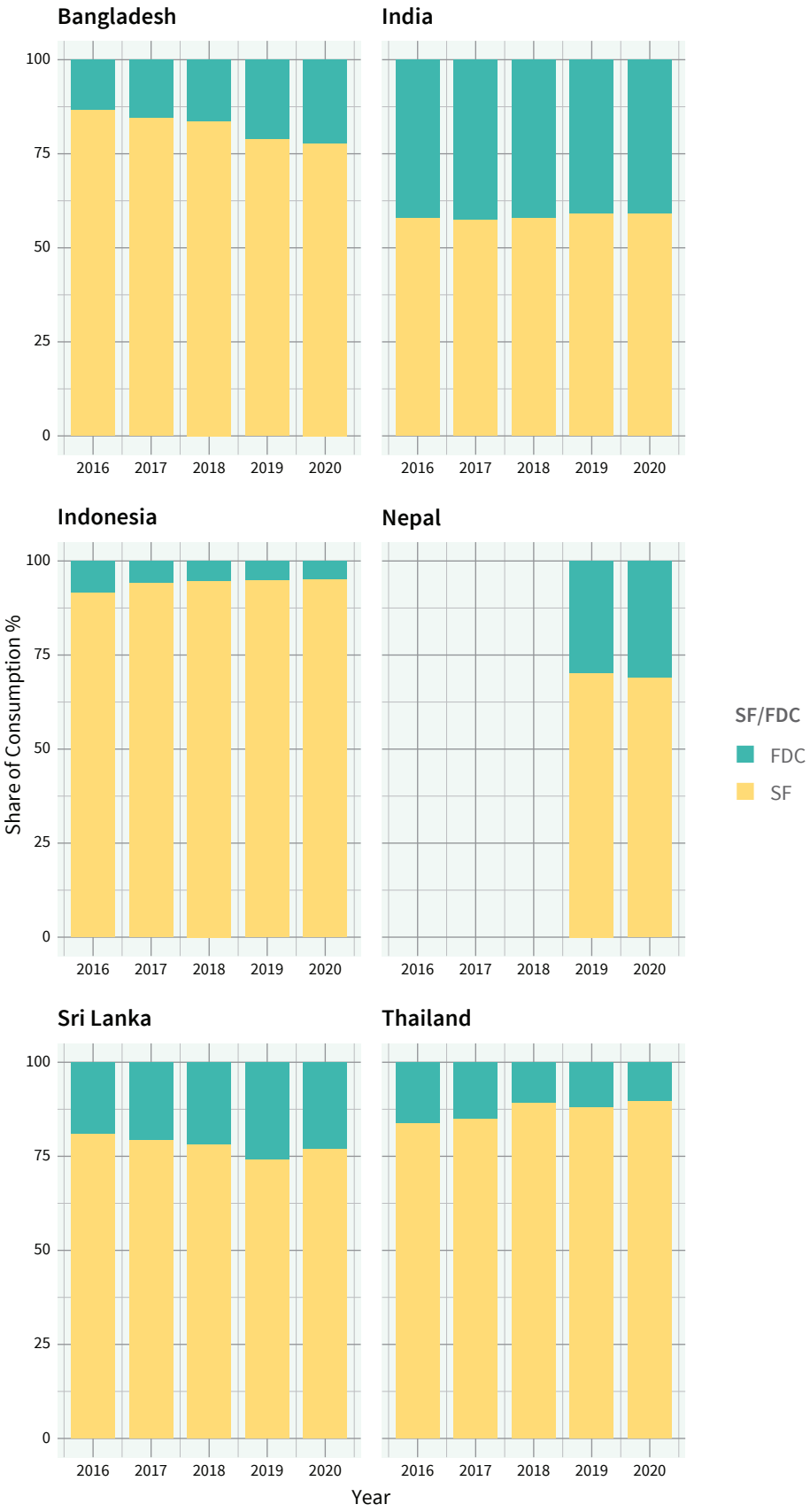
The prevalence of Fixed-Dose Combinations (FDCs) within the context of antimicrobial consumption reveals distinct patterns among the six countries considered (Fig. 6). Notably, close to a quarter of all products in India and Nepal are FDCs, representing the highest proportion within the cohort. In contrast, Indonesia and Thailand display the lowest share of FDCs among their antimicrobial products. It is essential to emphasize that the use of antimicrobial FDCs is strongly discouraged due to its potential to exacerbate antimicrobial resistance except in special disease conditions such as HIV, Malaria and TB.

This phenomenon arises from several factors, including the suboptimal dosing of individual agents, masking of resistance patterns, and limited treatment options in cases of resistance emergence. As such, the prevalence of FDCs consumption in India and Nepal underscores the importance of interventions aimed at promoting the rational use of antimicrobials and discouraging the utilization of FDCs, aligning with global efforts to combat the growing threat of antimicrobial resistance.

Fig. 5. Consumption of AWaRe groups (J01) across countries (2016–2020)

Data source: IQVIA data

Fig. 6. Consumption of SF versus FDC (2016–2020)



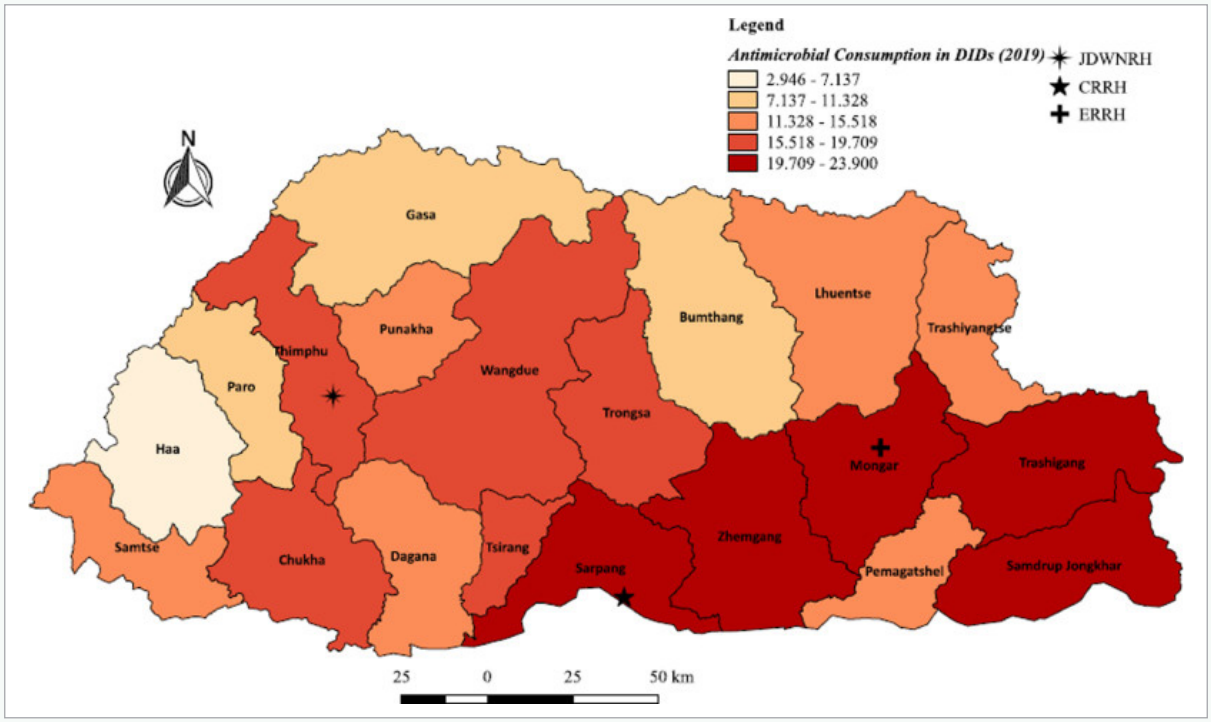
Data source: IQVIA data

Bhutan

Bhutan's experience with antimicrobial consumption revealed an interesting and nuanced picture. While the overall consumption of antimicrobials in the country based on the GLASS-AMC data, does not currently stand out as high in comparison to the EU/EEA average and other regional nations. However, it's important to note that consumption levels exhibited a steady increase over the course of the three-year study period.

A considerable variation in antimicrobial consumption between different dzongkhags (districts), highlighted potential disparities in prescribing practices across the country. This trend highlighted the importance of implementing targeted stewardship interventions to ensure the responsible and rational use of these antimicrobials.

Bhutan is now taking proactive steps to address these concerns. The country has initiated the rollout of a national antimicrobial stewardship programme, reflecting a commitment to enhancing the rational use of medicines and strengthening the overall management of antimicrobials. This initiative holds the promise of fostering judicious antimicrobial practices, furthering Bhutan's efforts in preserving the efficacy of these essential medications.



Source: Thupten Tshering, Sonam Wangda, Kirsty Buising, *Trends in antimicrobial consumption in Bhutan*, IJID Regions, Volume 1, 2021, Pages 65–71, ISSN 2772–7076,

Consumption at antibacterial molecule level (Top 5)

At the molecular level, the antibacterial molecule using landscape in the six countries, exhibit distinct trends (Fig. 7).

In Bangladesh, flucloxacillin, amoxicillin, and cefixime are the most utilized molecules, with Azithromycin making an appearance in 2020, likely influenced by the COVID-19 pandemic. Notably, there is a declining trend in the consumption of amoxicillin among the top five antibacterial molecules in Bangladesh, while the share of cephalosporins, such as cefixime and cefuroxime, has been steadily increasing.

In India, amoxicillin with clavulanic acid and cefixime dominate antimicrobial usage from 2016 to 2020, with azithromycin entering the top five, likely driven by COVID-19 guidelines. Over the years, there has been an increase in the share of amoxicillin, both with and without clavulanic Acid, and cefixime as a proportion of total consumption.

Indonesia sees amoxicillin as the most consumed antibacterial molecule from 2016 to 2020, accounting for nearly 20% of consumption, followed by cefadroxil and cefixime. While the share of amoxicillin has risen, there is also an uptick in the share of cephalosporins like cefixime and cefadroxil, marking a shift away from tetracycline.

In Nepal, third generation cephalosporins take the lead as the most consumed antibacterial subgroups in 2019 and 2020, followed by penicillins with beta-lactamase inhibitors.

Sri Lanka's antimicrobial landscape is characterized by amoxicillin and its combination with clavulanic acid, representing approximately 25% of consumption from 2016 to 2020, followed by cephalosporins like cefalexin and cefuroxime. Notably, azithromycin does not feature in the top five, setting it apart from other countries in 2020. There is an increasing share of amoxicillin and its combination with clavulanic acid, alongside a decrease in the share of molecules such as cefalexin and cloxacillin, indicating rigorous antimicrobial stewardship practices.

In Thailand, amoxicillin emerges as the most consumed antibacterial molecule, constituting 15–20% of consumption from 2016 to 2020, followed by dicloxacillin. There is an increasing share of the top five antibacterial molecules over the years, driven by amoxicillin and tetracycline, while there is a marked decline in the share of dicloxacillin between 2016–2020.

Fig. 7. Molecular antimicrobial consumption (2016–2020)

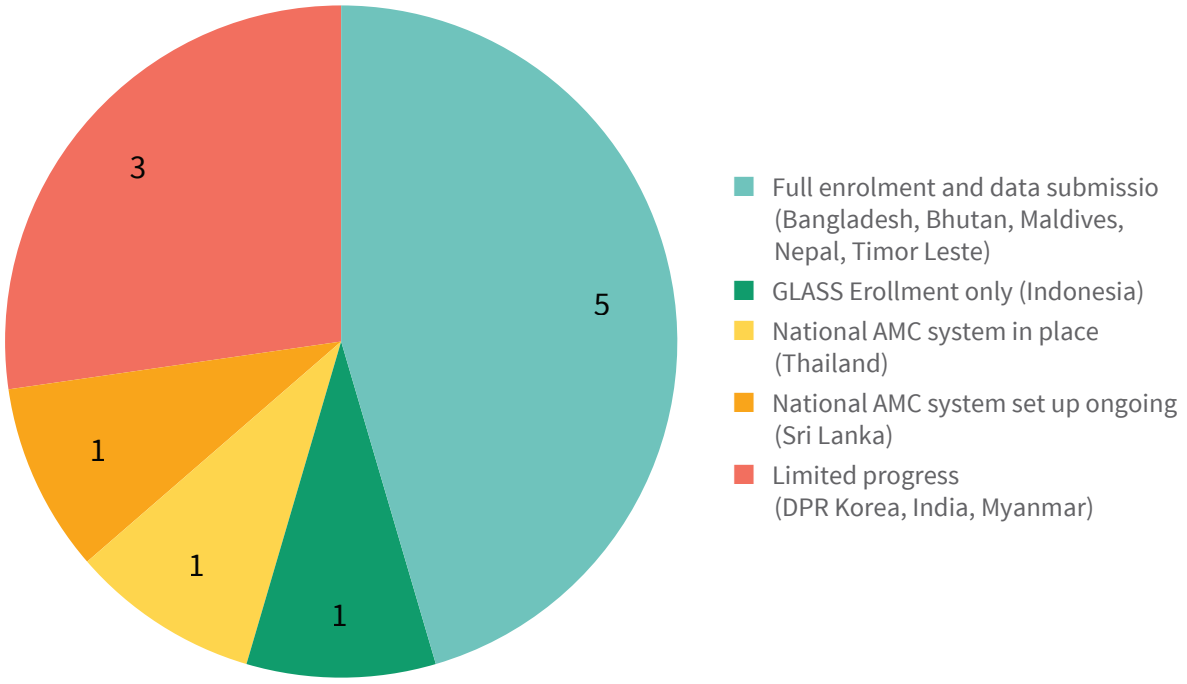
Data source: IQVIA data

PART 2

GLASS-AMC Data submission

As of the latest available information, Bangladesh, Bhutan, Maldives, Nepal and Timor-Leste have successfully enrolled in GLASS-AMC. These countries have made significant strides in sharing their respective AMC datasets demonstrating their commitment to contributing the comprehensive national AMC data.

Fig. 8. Coverage of the surveillance systems, data sources and levels of stratification

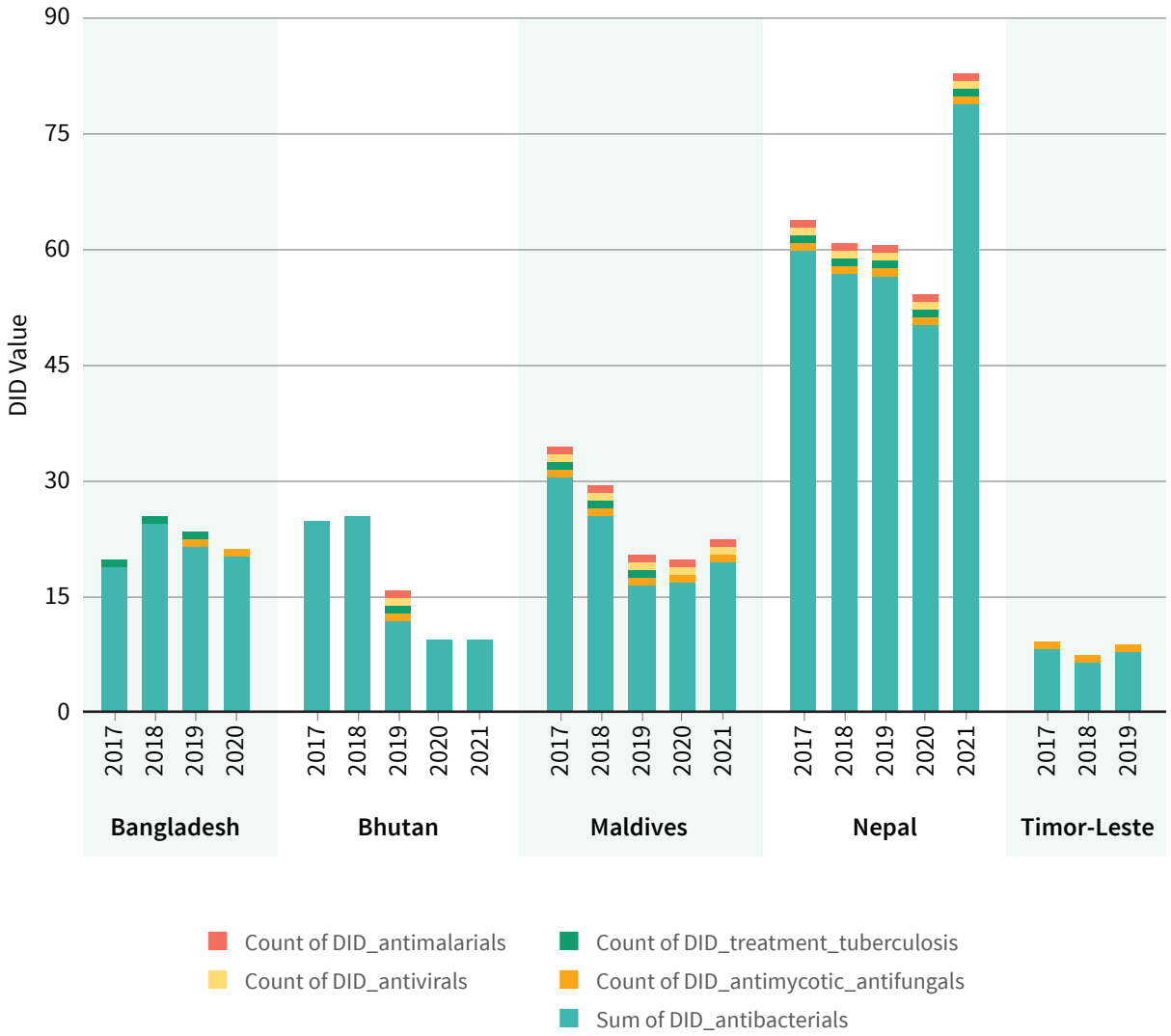


Indonesia, while joining the initiative in 2020, is yet to share its AMC data on the platform and discussions are currently underway to address the logistical and technical hurdles to facilitate meaningful participation. Similarly, Thailand has established a national AMC surveillance system but is yet to become a part of the GLASS-AMC platform. Finally, Sri Lanka is actively engaged in discussions aimed at establishing its own AMC surveillance system. These collective initiatives reflect the region's commitment to enhancing AMC data surveillance system to promote antimicrobial stewardship measures on a regional and global scale.

A comparison of antimicrobial consumption by classes/agents

In the five countries that successfully shared their national AMC data on the GLASS platform in 2022, a common trend emerges: antibacterials prominently feature as the most widely used antimicrobial agent (Fig. 9). This finding concurs with the findings from the IQVIA data analysis and underscores the significance of prioritizing antibacterial agents in antimicrobial stewardship efforts. Bangladesh consumes more antifungal medicines after antibacterials, and this also is consistent with the IQVIA data analysis. It accentuates the pressing need to channel resources and initiatives toward the prudent use of antibacterials, as they represent a pivotal area for intervention to mitigate the growing challenges of antimicrobial resistance and ensure the rational use of these vital medications.

Fig. 9. Antimicrobial consumption by classes (2017–2020)



Data source: GLASS-ACM platform

A comparison of antibacterial consumptions by pharmacological group

In the context of antimicrobial consumption, it becomes evident that Other Beta-lactam antimicrobials (J01D) and Beta-lactam antimicrobials (J01C) have consistently occupied the consumption forefront in the five countries (Fig. 10). These antimicrobial categories, on average, emerge as the most consumed agents within the region. Following closely behind are the categories of macrolides (J01F) and quinolones (J01M), with Nepal displaying notably higher consumption levels in these categories.

Remarkably, this observed trend corresponds with the findings of the IQVIA data analysis. This alignment underscores the significance of these antimicrobial categories in the context of consumption trends, thereby emphasizing their importance in antimicrobial stewardship endeavours and strategies aimed at optimizing antimicrobial use.

Fig. 10. Antibacterial consumptions by pharmacological group (2017–2020)

Data source: GLASS-ACM platform

Sri Lanka

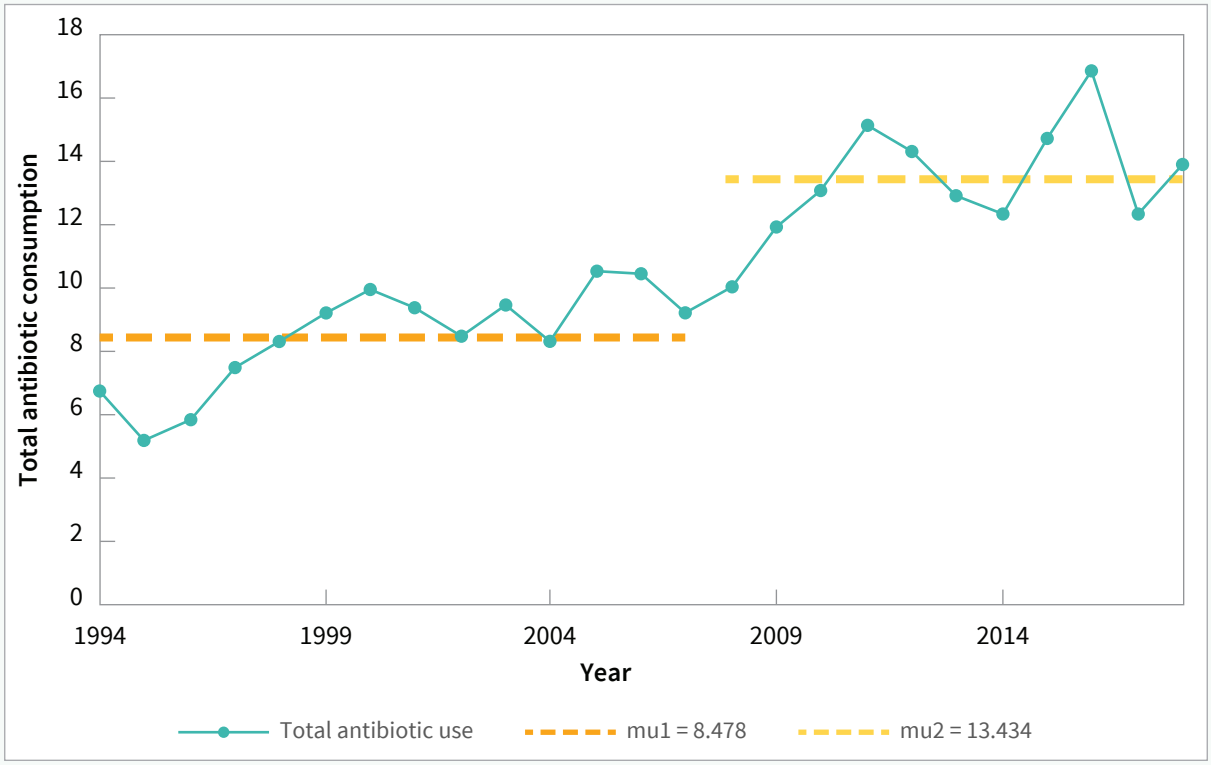
Sri Lanka's journey in addressing antimicrobial consumption has been marked by significant milestones. A pivotal study was conducted to evaluate the feasibility of implementing the AMC surveillance.

This study leveraged aggregated distribution data spanning from 1994 to 2018. The findings from this investigation provided a compelling illustration of the evolving landscape of antibiotic consumption in Sri Lanka. Notably, antibiotic consumption more than doubled during the period under review, with the number of chemical substances in use increasing from 19 to 41.

A particularly noteworthy observation was the increased consumption of antimicrobials classified within the Reserve group, even though their use remains relatively low.

As a result of this study, Sri Lanka has been galvanized into action, recognizing the urgent need to monitor AMC as a critical foundation for informed policy decisions. The country is now actively engaged in the process of establishing robust AMC surveillance systems.

This study leveraged aggregated distribution data spanning from 1994 to 2018. The findings from this investigation provided a compelling illustration of the evolving landscape of antibiotic consumption in Sri Lanka. Notably, antibiotic consumption more than doubled during the period under review, with the number of chemical substances in use increasing from 19 to 41.



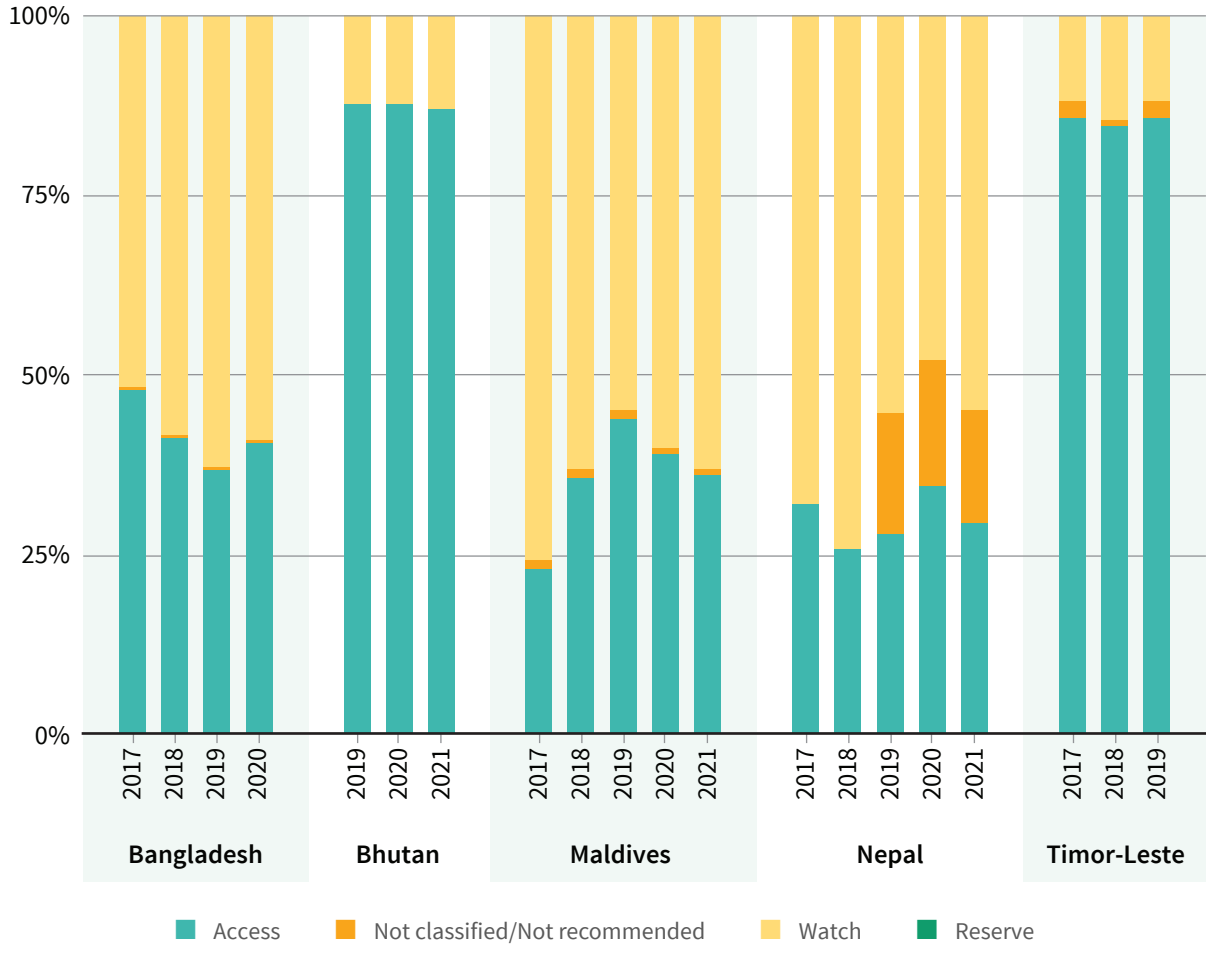
Source: The Pharmaceutical Journal of Sri Lanka 2020 10(1): Pages 54–63 DOI: http://doi.org/10.4038/pjsl.v10i1.57

Comparative consumption of antibacterials by AWARE Classification

Fig. 11 demonstrates that Bhutan and Timor-Leste exhibit a noteworthy trend characterized by a substantial utilization of Access antimicrobials, which account for over 85% of the total antibacterials consumption within the country. In contrast, the remaining three countries report a considerably lower proportion, with an average of less than 40% of their total consumption attributed to Access antimicrobials, as indicated in the GLASS report. Reversibly, these countries demonstrate a relatively higher consumption of Watch category antimicrobials.

Bangladesh and Nepal both exhibit elevated consumption of Watch category antibiotics, a trend that was corroborated by the IQVIA data analysis. Additionally, the IQVIA data exposes a noteworthy prevalence of the consumption of not classified or not recommended antimicrobials in Nepal. This divergence in consumption patterns warrants particular attention and underscores the imperative need for targeted interventions and heightened vigilance, as the utilization of Watch category antimicrobials may potentially pose challenges in terms of antimicrobial resistance and prudent antimicrobial stewardship practices within these countries. A similar trend has also been observed in the IQVIA data analysis.

Fig. 11. Antimicrobial consumption by AWARE Classification (2017–2020)



Data source: GLASS-ACM platform

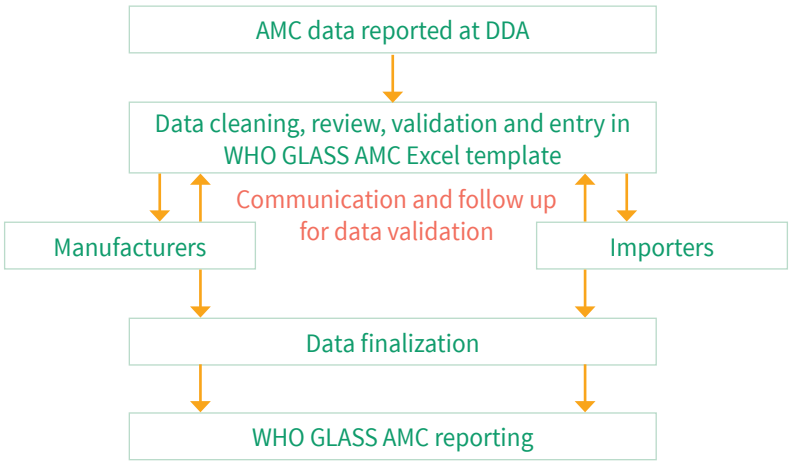
Nepal

In Nepal, the journey towards effective AMC surveillance has made significant strides. The initiation of AMC data collection commenced in 2016, with a commitment to regularly contribute to the GLASS-AMC.

AMC data in Nepal is sourced from a comprehensive range of stakeholders, including 46 domestic manufacturers and 49 importers, providing a comprehensive view of the country's antimicrobial landscape. During the data validation process, an approach is taken to ensure the elimination of duplication. The stringent data validation procedures guarantee the integrity of the collected information.

The data collection process in Nepal is founded on a well-structured framework, employing the 'Pooled Data' worksheet that adheres to the WHO template. This standardized approach ensures consistency and compatibility in the collection and reporting of AMC data, promoting both transparency and the effective monitoring of antimicrobial consumption.

AMC data collection and reporting strategy at DDA



Source: Presentation by Nepal DDA

PART 3

Potential applications of antimicrobial consumption data in the Region

The findings of the antimicrobial consumption analysis presented in this report can be used for several purposes. It can be used as unequivocal evidence to raise awareness about antimicrobial usage, steer policymaking and regulatory adjustments to maximize effectiveness, track the effects of interventions, and ameliorate the procurement and distribution of medications. These applications encompass and may not be limited to:

1. **Access to Medicines:** While excess use of antibiotics is a challenge in many high- and middle-income countries, poor access to affordable and quality-assured antibiotics is a problem in countries with limited resources, and particularly for some population groups. National consumption estimates can mask considerable inequalities in access to and consumption of antibiotics within a country. In some countries, Reserve group of antibiotics 62 were rarely observed which may suggest limited access.
2. **Pharmaceutical systems strengthening:** The establishment of AMC surveillance systems can be used to highlight the prevailing gaps and challenges within the regulation, procurement, and distribution of medicines. This can catalyze a broader strengthening of pharmaceutical systems, addressing regulatory and supply chain shortcomings and strengthening the supply of quality-assured antimicrobials.
3. **Antimicrobial Stewardship:** Monitoring antimicrobial consumption is pivotal for national and local antimicrobial stewardship initiatives. When combined with data on antimicrobial resistance, it not only reveals the quantity and trends in antimicrobial usage but also identifies areas for improvement. This information and evidence are instrumental in crafting specific stewardship interventions, enabling their monitoring and evaluation to gauge their effectiveness.

Lessons learned and key messages

The analysis from both the IQVIA data and GLASS-AMC surveillance reported data has yielded several valuable lessons, listed below:

1. **Gradual decline in consumption:** A general trend of declining overall antimicrobial consumption has been observed, signifying the positive influence of antimicrobial stewardship activities. For the down trend to be sustained, future actions should continue to consider:
    - Enhanced antimicrobial stewardship programmes: Strengthen and expand antimicrobial stewardship programmes in healthcare facilities to ensure the continued responsible use of antimicrobials.
    - Resilience planning: Develop contingency plans for health-care systems to mitigate disruptions caused by future pandemics or health crises, ensuring that stewardship activities can be maintained.
2. **Prevalence of antibacterials:** Antibacterials consistently emerge as the most frequently used antimicrobial category, with the consumption of antimycotics, antivirals, and other antimicrobials closely aligned with disease burden dynamics within each country. Focus should be on:
    - Disease surveillance: Implement robust disease surveillance systems to monitor disease burdens, enabling healthcare providers to align antimicrobial prescribing with specific regional needs.
    - Guideline adherence: Promote adherence to national treatment guidelines to ensure the appropriate use of antimicrobial agents.
3. **Non-listing in the national list of essential medicines:** Higher consumption of antimicrobials not listed in the Essential Medicines List and national formulary points to a need for aligning prescribing practices with recognized treatment guidelines. There is need for:
    - Essential medicines review: Periodically review and update national essential medicines lists and formularies to include antimicrobials that are most effective and essential for the region.
    - Educational campaigns: Launch awareness campaigns among healthcare providers regarding the importance of adhering to listed antimicrobials and discouraging the use of non-listed ones

4. **Fixed-dose combinations (FDCs):** India and Nepal display significantly higher consumption of Fixed-dose combinations (FDCs), while other countries also exhibit notable usage. This highlights the importance of regulating FDCs to ensure rational antimicrobial use. There is need for:
    - Regulation and rationalization: Strengthen regulatory oversight of FDCs and rationalize their use only when appropriate to minimize unnecessary combinations, e.g. in HIV, TB and malaria cases.
    - Prescriber education and sensitization: Educate healthcare providers on the implications of irrational use of FDCs and their potential risks, emphasizing the importance of individual component medications when applicable.
5. **Focus on watch category antimicrobials:** The analysis underscores a higher consumption of Watch category antimicrobials, emphasizing the need to improve the consumption of "Access" category antimicrobials to reach the recommended 60% of total consumption. Additionally, the observed increase in the consumption of third and fourth generation cephalosporins signals the importance of targeted stewardship efforts to mitigate the risk of antimicrobial resistance associated with these agents. There is need for tailored interventions aimed at optimizing antimicrobial use by:
    - Promoting Access category: Develop strategies to promote the use of "Access" category antimicrobials to reach the recommended 60% of total consumption. This can include incentives, guidelines, and education.
    - Availability of Access medicines: Medicine shortages can lead to irrational substitutions and an increased consumption of Watch category medicines.
    - Expanding antimicrobial stewardship: Implement robust antimicrobial stewardship programmes targeting Watch category and higher-resistance risk antimicrobials. Monitor and restrict their use when necessary.
6. **Expanding surveillance and reporting:** Strengthen surveillance and reporting systems to monitor trends in the consumption of third- and fourth generation cephalosporins. Implement measures to curtail their use when it poses a significant resistance risk.
    - Reporting and sharing data on antimicrobial consumption both nationally and internationally is an essential element of surveillance and provides important information in the global fight against antimicrobial resistance.
    - Enhancing the existing surveillance system in future by providing further granularity, specifically by disaggregating data into hospital, PHC, and community consumption. This detailed breakdown will enable a more comprehensive understanding of antimicrobial consumption across healthcare settings, facilitating targeted interventions and improved management of these critical resources.

Understandably, countries are in varying stages of establishing a national surveillance system for antimicrobial consumption, and hence the need to consider a proactive approach towards that end by adopting the WHO methodology on antimicrobial consumption monitoring ensuring alignment with the local context.

For countries that have recently launched national surveillance systems for antimicrobial consumption, the emphasis should be on strengthening and sustaining the capacities and resources for these efforts. This involves comprehensive data validation, expanding data coverage as needed, and establishing dedicated human and financial resources to ensure the continued operation and viability of the surveillance system.

In the case of countries with mature surveillance systems for antimicrobial consumption, there is need to explore the possibility of linking their data to other relevant surveillance programmes importantly the One Health antimicrobial resistance. Such a synergistic linkage would strengthen the interconnectedness of human and animal sectors.

Put together the findings and key messages from this report aim to guide policymakers, healthcare providers, and stakeholders in effectively addressing the challenges and opportunities associated with antimicrobial consumption, contributing to improved rational use of medicines, better public health outcomes and the containment of antimicrobial resistance.

Conclusion

The regional report on antimicrobial consumption patterns and rational use in the South-East Asia Region highlights several key findings and recommendations. Antibacterials remain the most consumed antimicrobials, emphasizing the importance of aligning prescribing practices with treatment guidelines. The consumption of non-listed antimicrobials calls for guideline adherence and periodic updates of the national list of essential medicines.

Fixed-dose combinations (FDCs) require regulation and information, education and communication, especially in countries with high FDC usage. The prevalent use of Watch category antimicrobials must be reversed by policy interventions that promote the use and consumption of “Access” category antimicrobials. Addressing the challenge of the high consumption of Discouraged antimicrobials is crucial. These findings underscore the importance of tailored interventions, antimicrobial stewardship programmes, and increased awareness to rationalize antimicrobial use and to combat antimicrobial resistance effectively in the South-East Asia Region.

COUNTRY PROFILES

Antimicrobial consumption country profile

BANGLADESH

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:** In the Proposed Drug and Cosmetic Act-2023

National medicine policy: National Drug Policy 2016

- ✓ National medicine policy includes a section on AMR

National action plan on AMR: revised National Action Plan on AMR for 2021–26 has been drafted

- ✓ National action plan on AMR includes AMC/AMU
- ✓ National guideline on AMC/AMU: National Guideline on Antimicrobial Consumption (AMC) Surveillance; formulation of National Guideline on Antimicrobial Consumption Surveillance (for veterinary medicine) ongoing

Selection

NEML: 2016

- ✗ AWaRe list incorporated into NEML: Partially reserve AB
- ✗ National antibiotic guideline

Number of antimicrobials available in the country: 119

Number of antimicrobials in the NEML: 56

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: Yes

Regulatory agency responsible: Directorate General of Drug Administration

- ✗ Dedicated budget for the surveillance system

  Number of staff dedicated for national AMC surveillance system: 5
- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined: In progress
- ✗ System for hospital antimicrobial consumption/use surveillance at the facility level
- ✓ Methodology for measuring AMC is defined: ATC/DDD
- ✗ System for monitoring sales/use of antimicrobials in animals: No national level but Dept. of Livestock performs it

Data sources

Data sources for national AMC surveillance is defined: Yes

IT system available at national level to monitor consumption: No

Indicate sources of data used for national AMC surveillance: Import, domestically produced antimicrobials, donations, public sector procurements

How often is AMC data collected: Annually

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✓ **The country has enrolled to WHO GLASS-AMC**

  Year joined: 2022

  Challenges in joining: To identify the pathway to join the GLASS-AMC platform.
- ✗ **Do you report to GLASS-AMC annually**

  Barrier/challenge: It requires Unique id for each and every product, and also faces some problems in validation.

Latest national data

Year 2020

Total quantity in DDD 1 562 232 088

DID 25.64

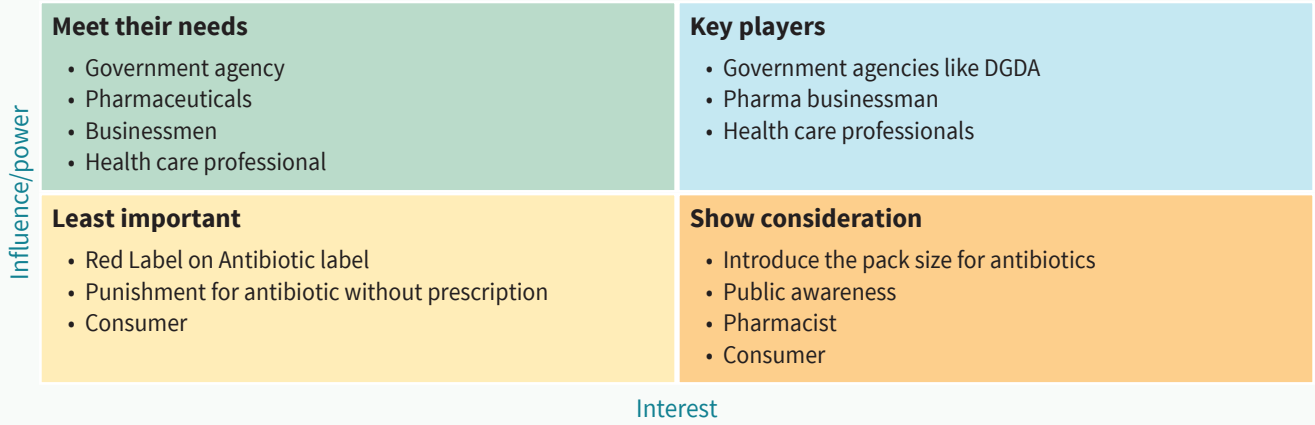
Population 166 462 933

Production

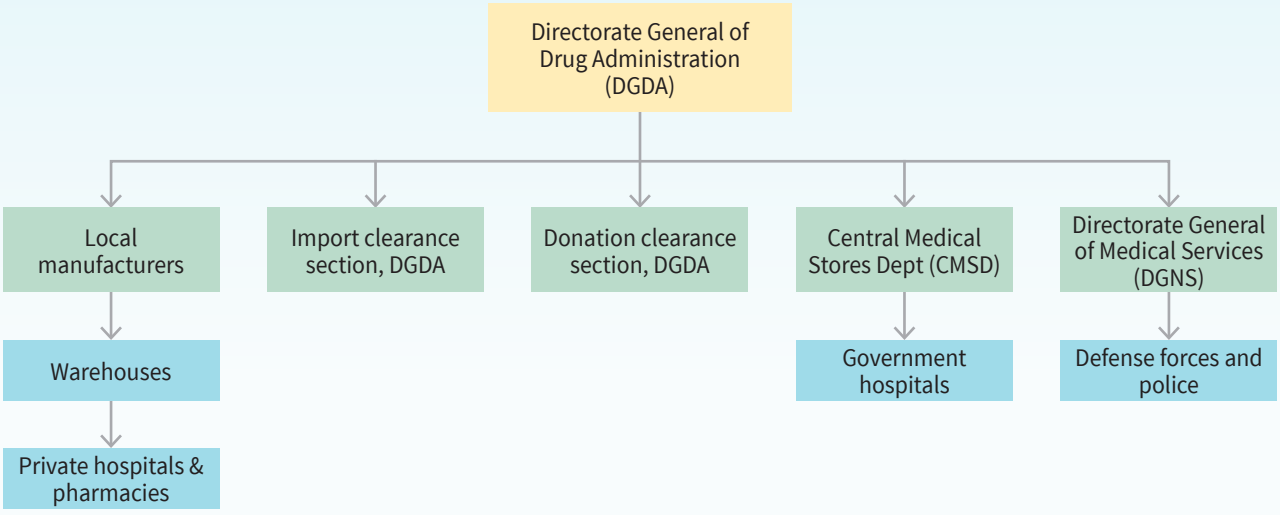
Local 100%

Imported 0%

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

BHUTAN

Production

Local production of:

- ✗ pharmaceuticals
- ✗ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:**

National medicine policy: 2007

- ✓ National medicine policy includes a section on AMR

National action plan on AMR: 2017

- ✗ National action plan on AMR includes AMC/AMU
- ✗ National guideline on AMC/AMU

Selection

NEML: 2021

- ✓ AWaRe list incorporated into NEML
- ✓ National antibiotic guideline

Number of antimicrobials available in the country: 680

Number of antimicrobials in the NEML: 60

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: In progress

Regulatory agency responsible:

- ✗ Dedicated budget for the surveillance system

Number of staff dedicated for national AMC surveillance system: None

- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✓ System for hospital antimicrobial consumption/use surveillance at the facility level
- ✓ Methodology for measuring AMC is defined: ATC/DDD/DID
- ✗ System for monitoring sales/use of antimicrobials in animals

Data sources

Data sources for national AMC surveillance is defined: Mapped but not defined

IT system available at national level to monitor consumption: No

Indicate sources of data used for national AMC surveillance: Public sector procurement

How often is AMC data collected: Regularly but not every year

Use of consumption data

- ✓ **Consumption monitoring data publicly available**
- ✓ **The country has enrolled to WHO GLASS-AMC**

Year joined: 2020

Challenges in joining: *No data*

- ✓ **Do you report to GLASS-AMC annually**

Barrier/challenge: *No data*

Latest national data

Year 2021

Total quantity in DDD 4 76 771.72

DID 8.461

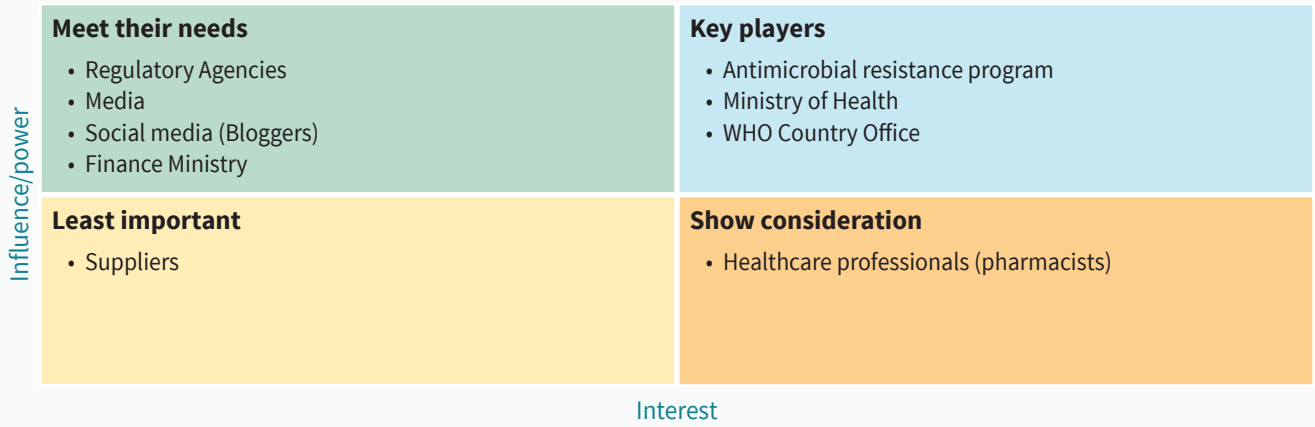
Population 775,008

Production

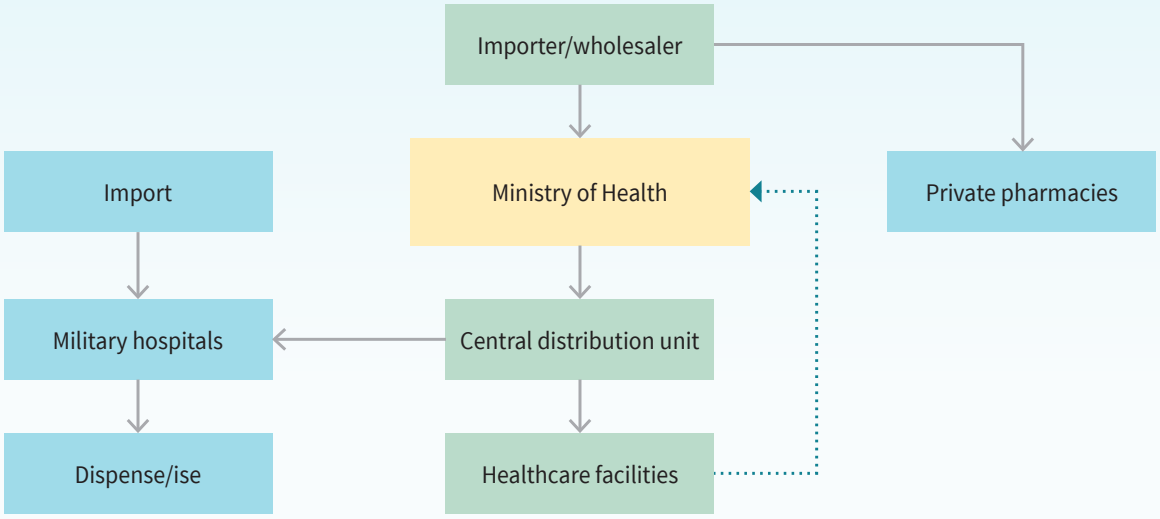
Local 0%

Imported 100%

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

INDIA

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place**

National medicine policy: 2002

- ✗ National medicine policy includes a section on AMR

National action plan on AMR: 2017

- ✓ National action plan on AMR includes AMC/AMU
- ✓ National guideline on AMC/AMU: National Treatment guidelines

Selection

NEML:
2022

- ✗ AWaRe list incorporated into NEML
- ✓ National antibiotic guideline: National Treatment guidelines

Number of antimicrobials available in the country: *No data*

Number of antimicrobials in the NEML: 94 (84:s, 10:c)

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: In progress (AMC network)

Regulatory agency responsible: CDSCO

- ✗ Dedicated budget for the surveillance system

Number of staff dedicated for national AMC surveillance system: *No data*

- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined: AWARE
- ✓ System for hospital antimicrobial consumption/use surveillance at the facility level: Limited – PPS/indoor data
- ✓ Methodology for measuring AMC is defined: *No data*
- ✗ System for monitoring sales/use of antimicrobials in animals

Data sources

Data sources for national AMC surveillance is defined: Mapped but not defined

IT system available at national level to monitor consumption: No

Indicate sources of data used for national AMC surveillance: Hospitals

How often is AMC data collected: Annually

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✗ **The country has enrolled to WHO GLASS-AMC**

Year joined: *No data*

Challenges in joining: *No data*

- ✗ **Do you report to GLASS-AMC annually**

Barrier/challenge: *No data*

Latest national data

Year *No data*

Total quantity in DDD *No data*

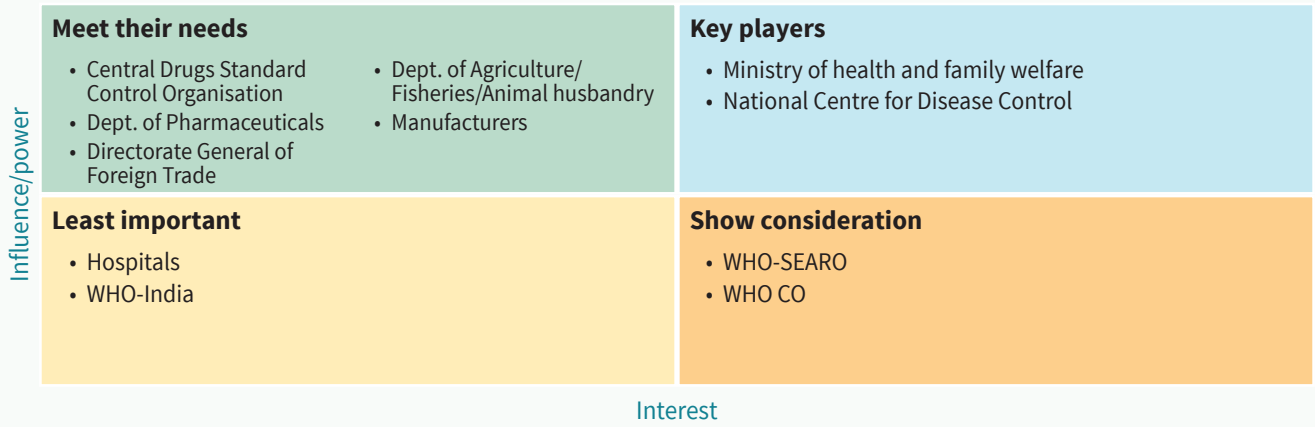
DID *No data*

Population *No data*

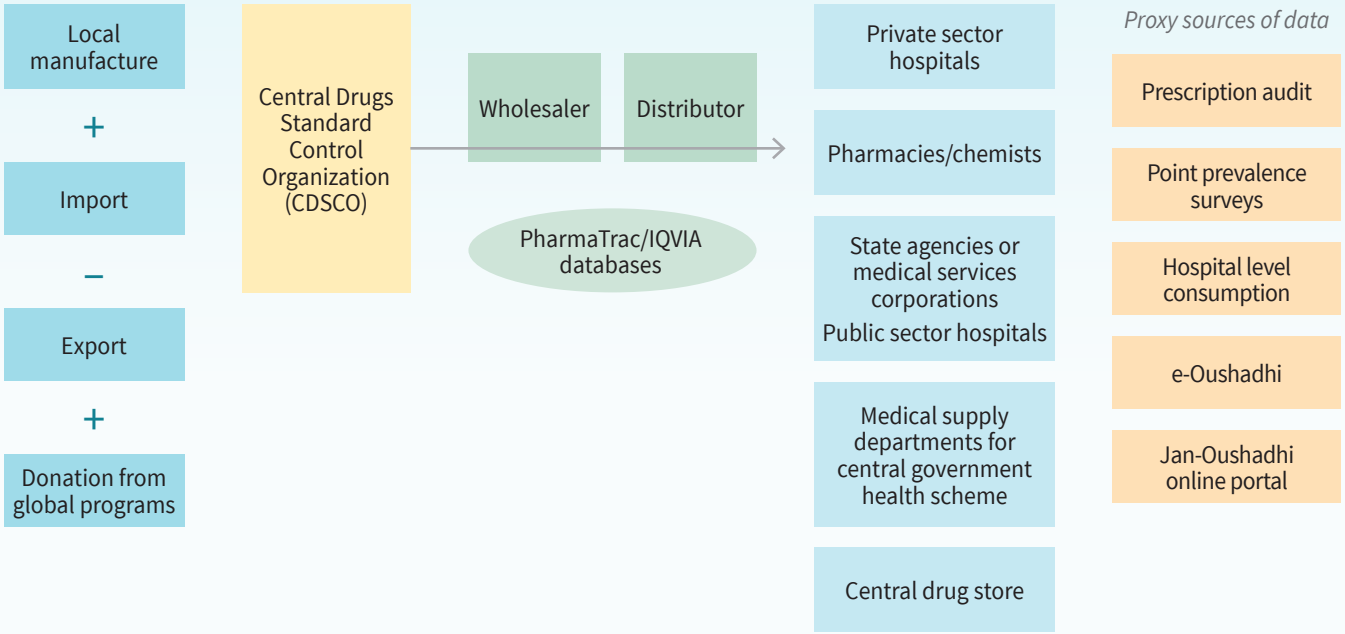
Production

Local | *No data* | Imported

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

INDONESIA

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place**

National medicine policy: 2006

- ✗ National medicine policy includes a section on AMR

National action plan on AMR: 2020 (NAP AMR 2020-2024)

- ✓ National action plan on AMR includes AMC/AMU
- ✓ National guideline on AMC/AMU: (ARCP in hospital 2015)

Selection

NEML:
2021

- ✓ AWaRe list incorporated into NEML: Partially reserve AB
- ✓ National antibiotic guideline

Number of antimicrobials available in the country: J01 > 4000 registered

Number of antimicrobials in the NEML: 160 (2019)

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: In progress

Regulatory agency responsible: Ministry of Health

- ✓ Dedicated budget for the surveillance system

Number of staff dedicated for national AMC surveillance system: In progress

- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined: In progress
- ✓ System for hospital antimicrobial consumption/use surveillance at the facility level
- ✓ Methodology for measuring AMC is defined: ATC/DDD
- ✗ System for monitoring sales/use of antimicrobials in animals

Data sources

Data sources for national AMC surveillance is defined: Mapped but not defined

IT system available at national level to monitor consumption: No

Indicate sources of data used for national AMC surveillance: Import, domestically produced antimicrobials, wholesaler/distributor, public sector procurements, hospitals

How often is AMC data collected: Annually, Ad hoc

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✓ **The country has enrolled to WHO GLASS-AMC**

Year joined: 2020

Challenges in joining: [Answer]

- ✗ **Do you report to GLASS-AMC annually**

Barrier/challenge: Data reporting system has not been standardised and integrated

Latest national data

Year 2021

Total quantity in DDD
Not yet published

DID
Not yet published

Population
PHC
47 010 882
Hospitals
1 859 265 348

Production
Local 100%
Imported 000%

Stakeholder analysis

Influence/power

Meet their needs
- Ministry of Agriculture (MoA)
- Ministry of Marine Affairs and Fisheries (MoMF)
- Media
- Health professionals organizations

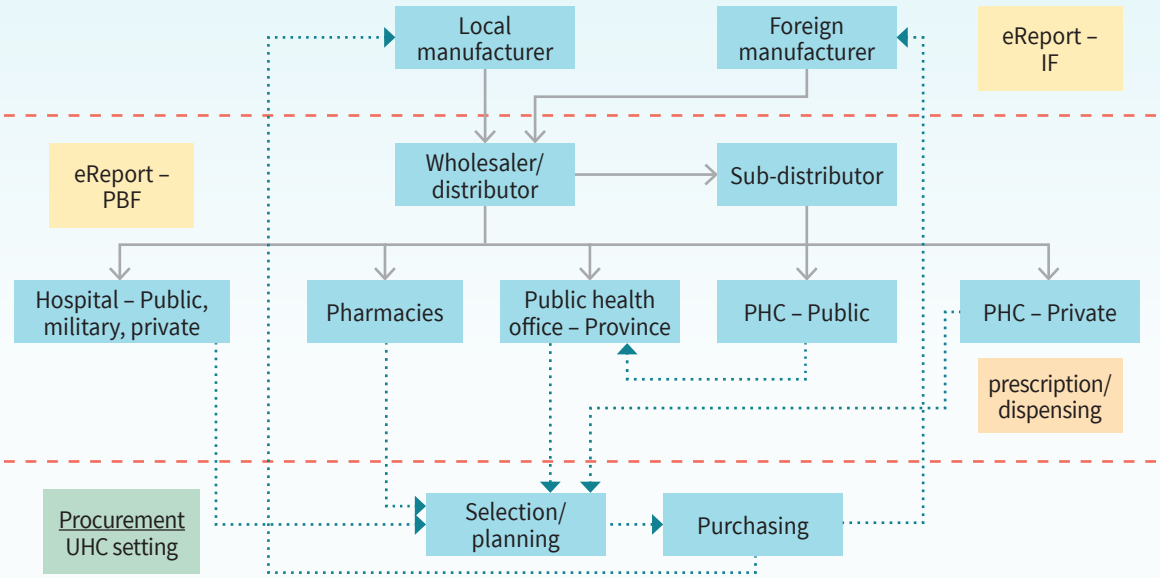
Key players
- Ministry of health
- National Agency of Drug and Food Control (NADFC)
- Distributors
- Manufacturers
- Health care facilities
- District Health Office

Least important
- MoE

Show consideration
- Private organizations
- Foundations
- NGO

Interest

Pharmaceuticals flow diagram



Antimicrobial consumption country profile

MALDIVES

Production

Local production of:

- ✗ pharmaceuticals
- ✗ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:** Medicine regulation R 46

National medicine policy: 2018–2023

- ✗ National medicine policy includes a section on AMR

National action plan on AMR: 2017–2022

- ✓ National action plan on AMR includes AMC/AMU
- ✗ National guideline on AMC/AMU

Selection

NEML:
2023

- ✓ AWaRe list incorporated into NEML
- ✗ National antibiotic guideline

Number of antimicrobials available in the country: 610

Number of antimicrobials in the NEML: 43

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: Yes

Regulatory agency responsible: Maldives Food and Drug Authority

- ✗ Dedicated budget for the surveillance system

  Number of staff dedicated for national AMC surveillance system: None
- ✗ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✗ System for hospital antimicrobial consumption/use surveillance at the facility level
- ✓ Methodology for measuring AMC is defined: WHO AMC tool
- ✗ System for monitoring sales/use of antimicrobials in animals

Data sources

Data sources for national AMC surveillance is defined: Yes

IT system available at national level to monitor consumption: Yes

Indicate sources of data used for national AMC surveillance: Import

How often is AMC data collected: Annually

Use of consumption data

- ✓ **Consumption monitoring data publicly available:** not specific to AMC
- ✓ **The country has enrolled to WHO GLASS-AMC**

  Year joined: 2020

  Challenges in joining: None
- ✓ **Do you report to GLASS-AMC annually:** Data entered till 2021

  Barrier/challenge: HR issues, data analysis issues

Latest national data

Year 2021

Total quantity in DDD 4 100 413

DID 20.43

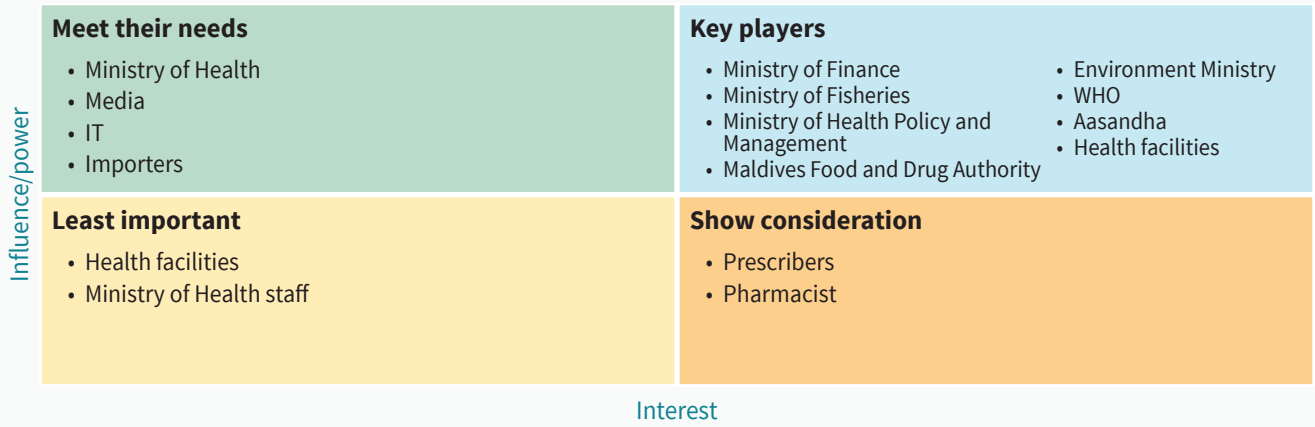
Population 517 986

Production

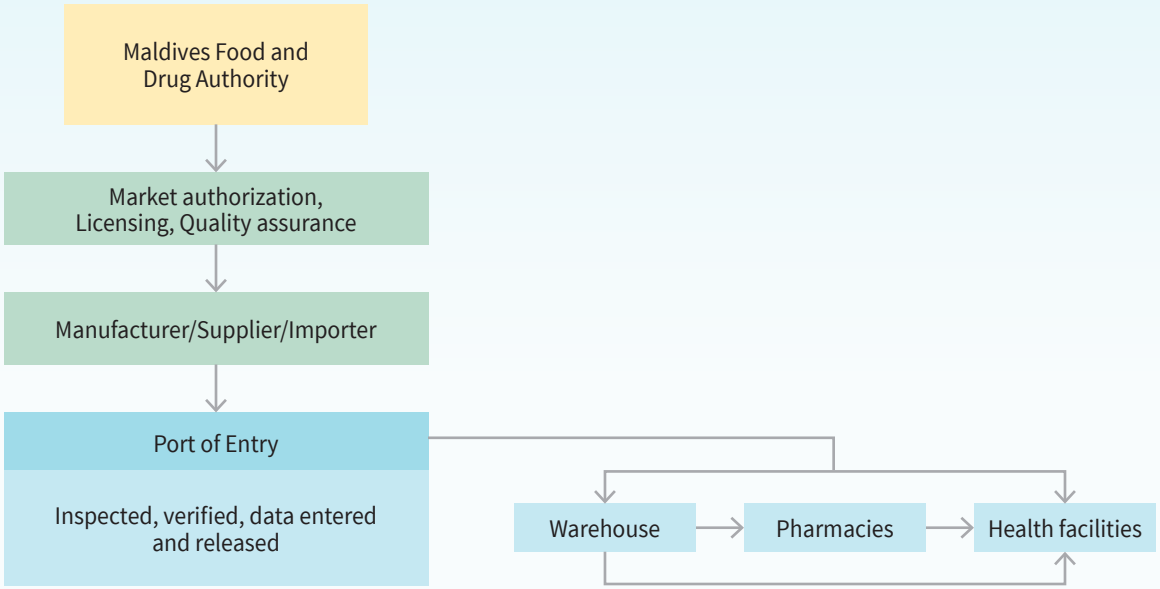
Local 0%

Imported 100%

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

MYANMAR

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:**

National medicine policy: 2018–2021

- ✓ National medicine policy includes a section on AMR

National action plan on AMR: 2017–2022

- ✓ National action plan on AMR includes AMC/AMU
- ✗ National guideline on AMC/AMU

Selection

NEML:
2016

- ✗ AWaRe list incorporated into NEML
- ✗ National antibiotic guideline

Number of antimicrobials available in the country: 36

Number of antimicrobials in the NEML: 107

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: No

Regulatory agency responsible: None

- ✗ Dedicated budget for the surveillance system

  Number of staff dedicated for national AMC surveillance system: None
- ✗ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✓ System for hospital antimicrobial consumption/use surveillance at the facility level: Project based PPS
- ✗ Methodology for measuring AMC is defined: WHO AMC tool
- ✓ System for monitoring sales/use of antimicrobials in animals

Data sources

Data sources for national AMC surveillance is defined:
No

IT system available at national level to monitor consumption:
No

Indicate sources of data used for national AMC surveillance: Import, Domestically produced antimicrobials, Donations

How often is AMC data collected: Not yet collected

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✗ **The country has enrolled to WHO GLASS-AMC**

  Year joined: None

  Challenges in joining: None
- ✗ **Do you report to GLASS-AMC annually**

  Barrier/challenge: None

Latest national data

Year *No data*

Total quantity in DDD *No data*

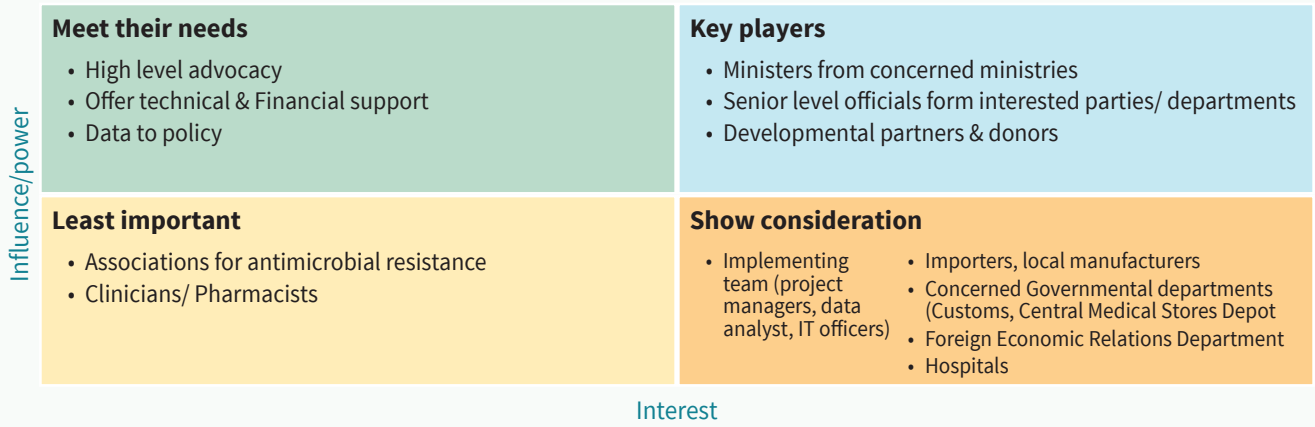
DID *No data*

Population *No data*

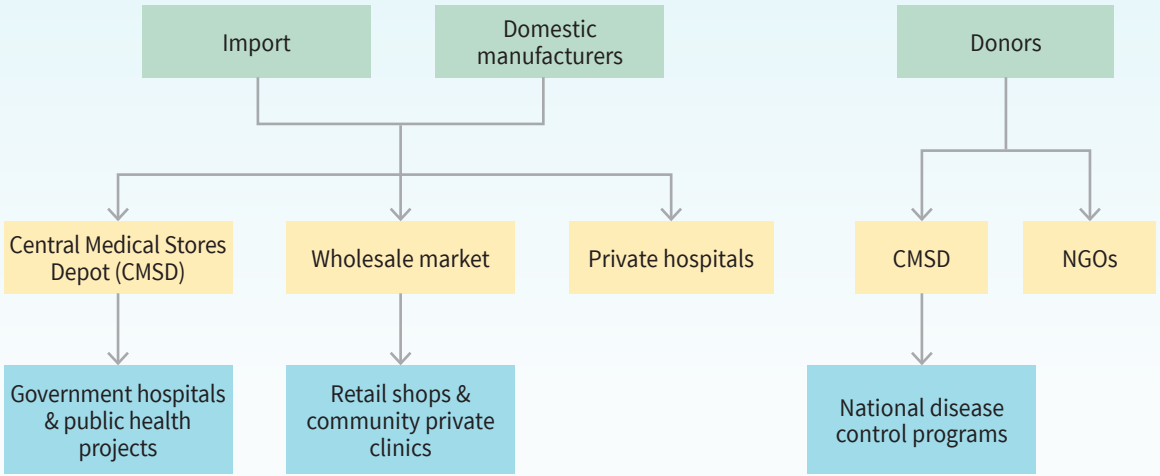
Production

Local | *No data* | Imported

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

NEPAL

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:** Drugs Act 2035 BS, Drug registration regulation
- **National medicine policy:** 1995
  - ✓ National medicine policy includes a section on AMR
- **National action plan on AMR:** Draft (approval in progress)
  - ✓ National action plan on AMR includes AMC/AMU
  - ✗ National guideline on AMC/AMU

Selection

NEML:
2021

- ✓ AWaRe list incorporated into NEML
- ✓ National antibiotic guideline

Number of antimicrobials available in the country: 1106 brands (129 molecules + 22 vol)

Number of antimicrobials in the NEML: 33

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: Yes

Regulatory agency responsible: DDA

- ✗ Dedicated budget for the surveillance system
  Number of staff dedicated for national AMC surveillance system: None
- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✗ System for hospital antimicrobial consumption/use surveillance at the facility level: PPS going on in some hospitals)
- ✓ Methodology for measuring AMC is defined: DDD
- ✓ System for monitoring sales/use of antimicrobials in animals: Yes, reported in world organisation of animal health

Data sources

Data sources for national AMC surveillance is defined: Yes

IT system available at national level to monitor consumption: In progress

Indicate sources of data used for national AMC surveillance: Import, Domestically produced antimicrobials, Donations, public sector procurement

How often is AMC data collected: Annually

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✓ **The country has enrolled to WHO GLASS-AMC**
  Year joined: 2020
  Challenges in joining: None
- ✓ **Do you report to GLASS-AMC annually**
  Barrier/challenge: None

Latest national data

Year 2021

Total quantity in DDD 891 911 859.47

DID 83.7

Population 29 192 480

Production

Local 76%

Imported 8%

Stakeholder analysis

Influence/power

Interest

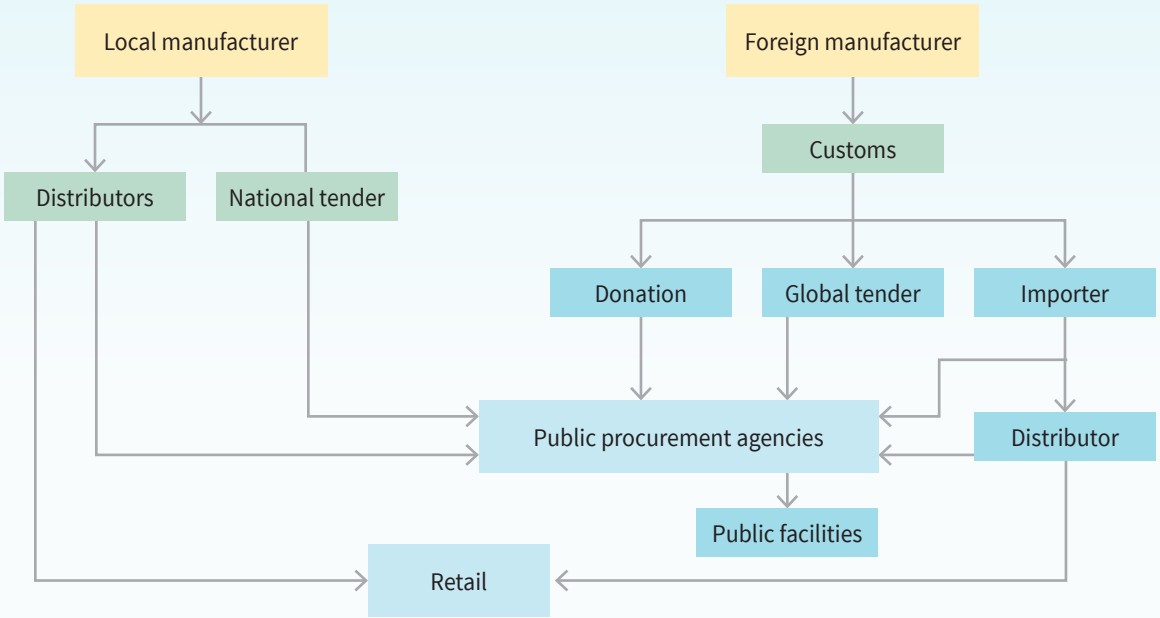
Meet their needs
- Patients
- Importer
- Prescriber
- Dispenser

Key players
- Domestic manufacturer, Importer
- Wholesale distributor
- MoHPNRA
- Health care institutions
- Government National Program —TB, Malaria
- Donors
- Media

Least important
- Consumer
- Public Procurement Agency
- Patients

Show consideration
- NRA
- Media

Pharmaceuticals flow diagram



Antimicrobial consumption country profile

SRI LANKA

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:** National Medicines Regulatory Authority act of 2015

National medicine policy: 2006

- ✗ National medicine policy includes a section on AMR

National action plan on AMR: 2017

- ✗ National action plan on AMR includes AMC/AMU
- ✗ National guideline on AMC/AMU

Selection

NEML:
2013/14

- ✗ AWaRe list incorporated into NEML: will include in 2022)
- ✓ National antibiotic guideline

Number of antimicrobials available in the country: To be obtained from NMRA

Number of antimicrobials in the NEML: 29 items (65 Dosage forms)

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: No

Regulatory agency responsible: Medical Supplies Division

- ✗ Dedicated budget for the surveillance system

Number of staff dedicated for national AMC surveillance system: None

- ✗ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✗ System for hospital antimicrobial consumption/use surveillance at the facility level: PPS going on in some hospitals)
- ✗ Methodology for measuring AMC is defined
- ✓ System for monitoring sales/use of antimicrobials in animals: Yes, Veterinary Drug Control Authority

Data sources

Data sources for national AMC surveillance is defined: No

IT system available at national level to monitor consumption: No

Indicate sources of data used for national AMC surveillance: *No data*

How often is AMC data collected: *No data*

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✗ **The country has enrolled to WHO GLASS-AMC**

Year joined: None

Challenges in joining: None

- ✗ **Do you report to GLASS-AMC annually**

Barrier/challenge: None

Latest national data

Year *No data*

Total quantity in DDD *No data*

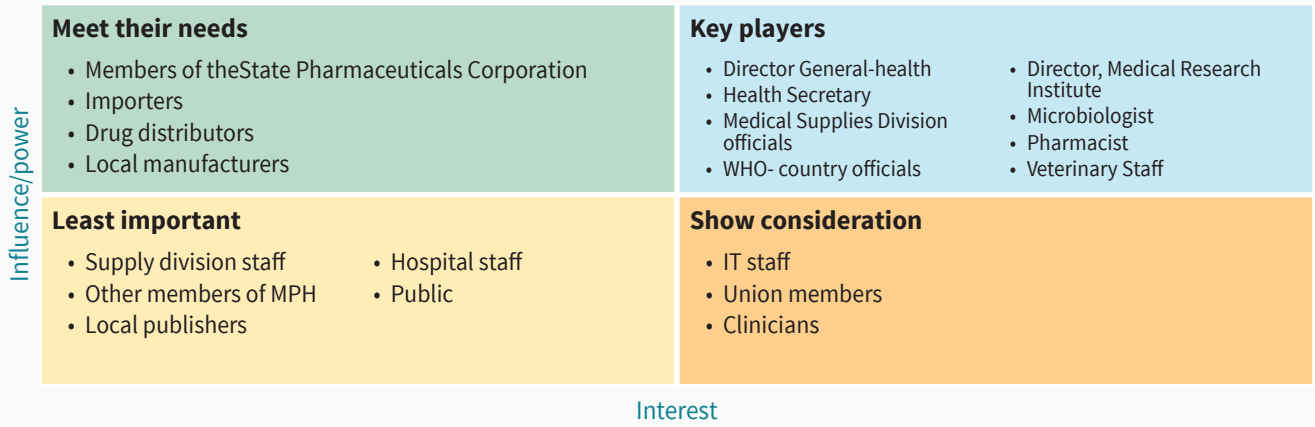
DID *No data*

Population *No data*

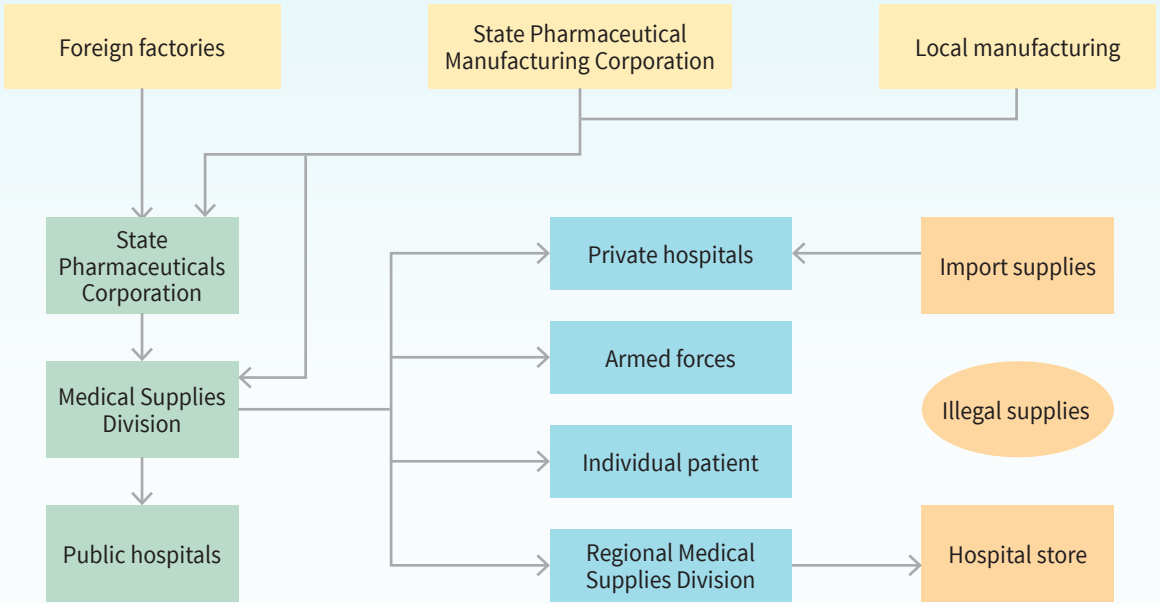
Production

Local | *No data* | Imported

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

THAILAND

Production

Local production of:

- ✓ pharmaceuticals
- ✓ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place**

National medicine policy: 2022

- ✓ National medicine policy includes a section on AMR

National action plan on AMR: 2017–2022

- ✓ National action plan on AMR includes AMC/AMU
- ✗ National guideline on AMC/AMU

Selection

NEML:
2022

- ✓ AWaRe list incorporated into NEML
- ✓ National antibiotic guideline

Number of antimicrobials available in the country: ~6600 (Human+ Veterinary)

Number of antimicrobials in the NEML: ~130 API

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: Yes

Regulatory agency responsible: *No data*

- ✓ Dedicated budget for the surveillance system: Routine work

  Number of staff dedicated for national AMC surveillance system: None
- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✗ System for hospital antimicrobial consumption/use surveillance at the facility level: In progress
- ✓ Methodology for measuring AMC is defined
- ✓ System for monitoring sales/use of antimicrobials in animals: Yes, AMC

Data sources

Data sources for national AMC surveillance is defined: Yes

IT system available at national level to monitor consumption: Yes

Indicate sources of data used for national AMC surveillance: Import, domestically produced antimicrobials

How often is AMC data collected: Annually

Use of consumption data

- ✓ **Consumption monitoring data publicly available**
- ✗ **The country has enrolled to WHO GLASS-AMC**

  Year joined: None

  Challenges in joining: Merging template between GLASS vs Thai FDA
- ✗ **Do you report to GLASS-AMC annually**

  Barrier/challenge: None

Latest national data

Year *No data*

Total quantity in DDD *No data*

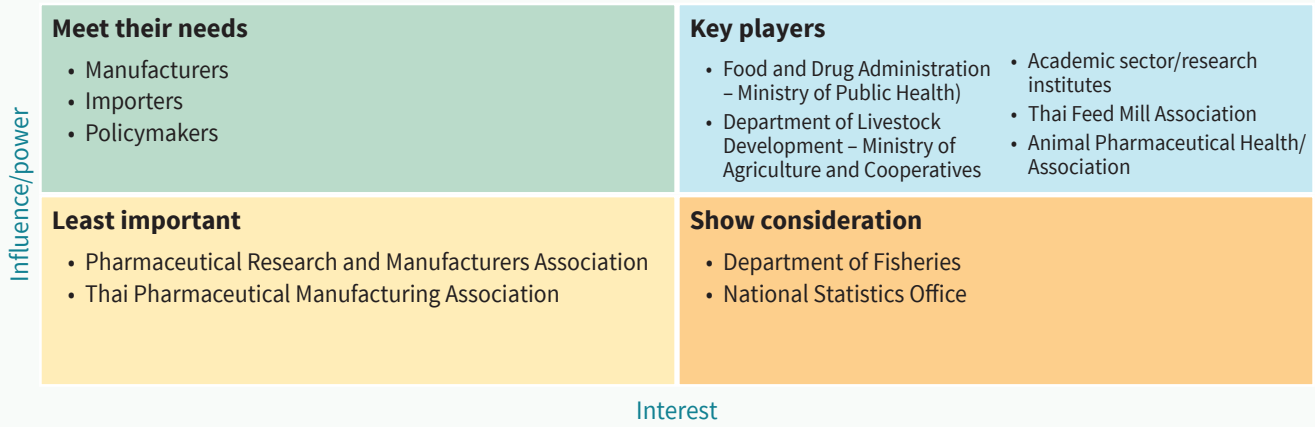
DID *No data*

Population *No data*

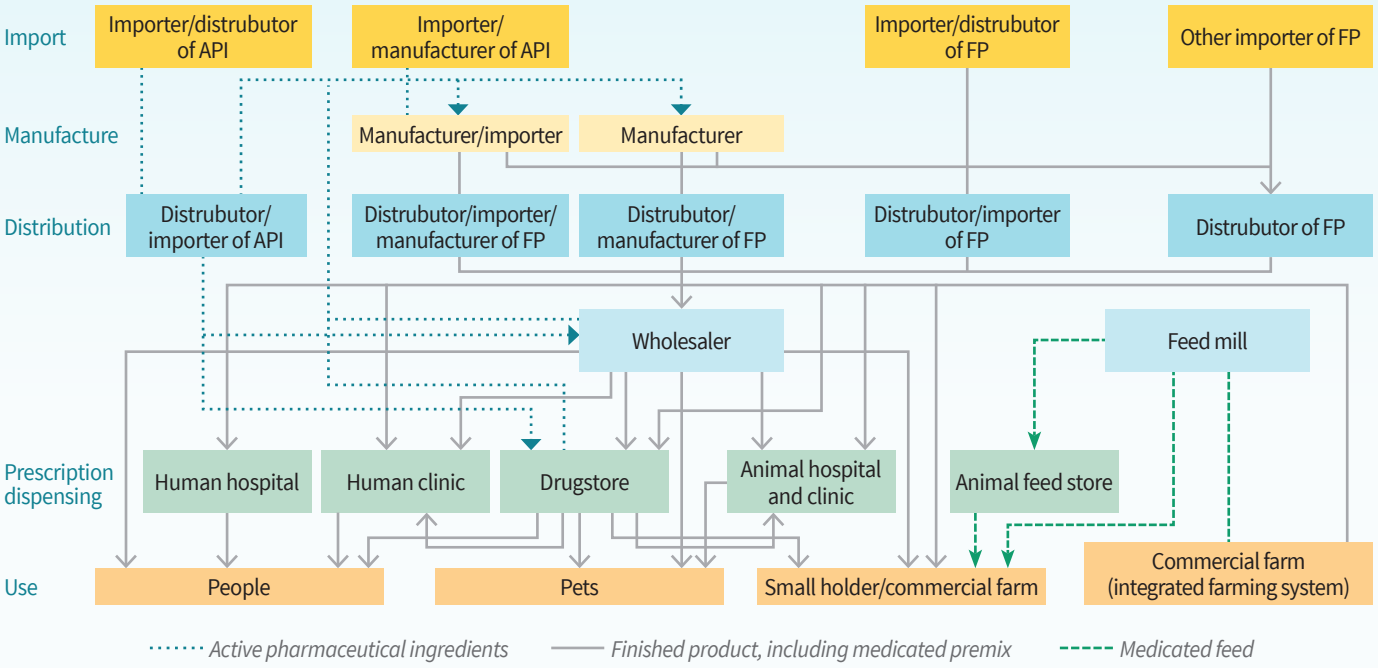
Production

Local *No data* Imported

Stakeholder analysis



Pharmaceuticals flow diagram



Antimicrobial consumption country profile

TIMOR-LESTE

Production

Local production of:

- ✗ pharmaceuticals
- ✗ antimicrobials

Regulation and policy

- ✓ **Regulation on antimicrobial sales is in place:** Decree Law No. 12/2003, Pharmaceutical Activities

National medicine policy: NMP 2018; 2022 (draft, not yet approved)

- ✓ National medicine policy includes a section on AMR

National action plan on AMR: 2022

- ✓ National action plan on AMR includes AMC/AMU
- ✗ National guideline on AMC/AMU

Selection

NEML:
2015 (approved);
2023 currently being revised

- ✓ AWaRe list incorporated into NEML: 2015 (no); revised version 2023 (yes)
- ✓ National antibiotic guideline

Number of antimicrobials available in the country: 340

Number of antimicrobials in the NEML: 46

Consumption monitoring structure and governance

National system for monitoring antimicrobial consumption: Yes

Regulatory agency responsible: Ministry of Health NDPH

- ✗ Dedicated budget for the surveillance system: Routine work

  Number of staff dedicated for national AMC surveillance system: 5
- ✓ Antimicrobials to be monitored by the national AMC surveillance are defined
- ✓ System for hospital antimicrobial consumption/use surveillance at the facility level
- ✗ Methodology for measuring AMC is defined
- ✓ System for monitoring sales/use of antimicrobials in animals: Ministry of Agriculture and Fischeries (MOAF)

Data sources

Data sources for national AMC surveillance is defined: Yes

IT system available at national level to monitor consumption: Yes

Indicate sources of data used for national AMC surveillance: Import, public sector procurement, hospitals, retail pharmacies

How often is AMC data collected: Annually

Use of consumption data

- ✗ **Consumption monitoring data publicly available**
- ✓ **The country has enrolled to WHO GLASS-AMC**

  Year joined: 2019

  Challenges in joining: None
- ✓ **Do you report to GLASS-AMC annually**

  Barrier/challenge: In process

Latest national data

Year 2019

Total quantity in DDD 2 923 650

DID 8.01

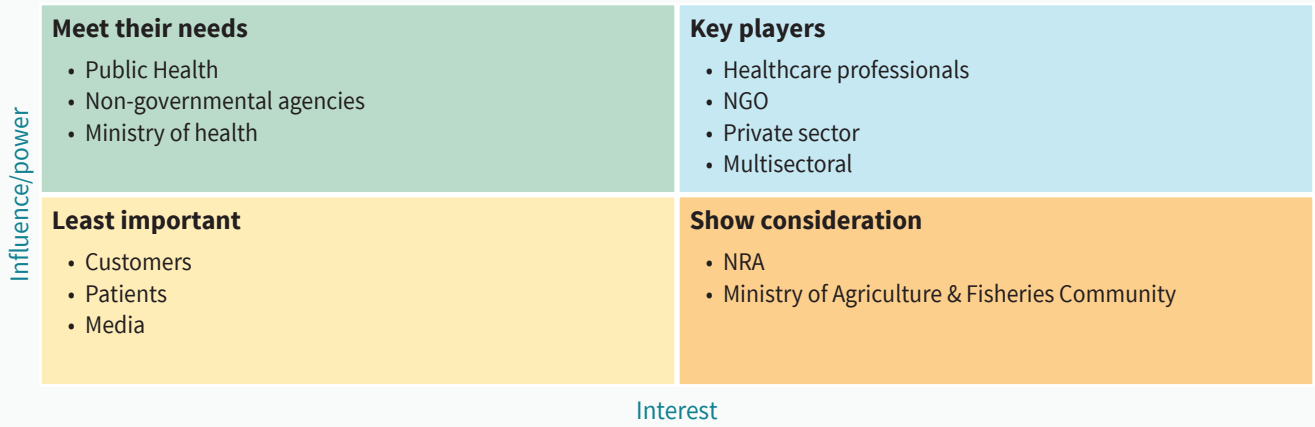
Population 1 271 121

Production

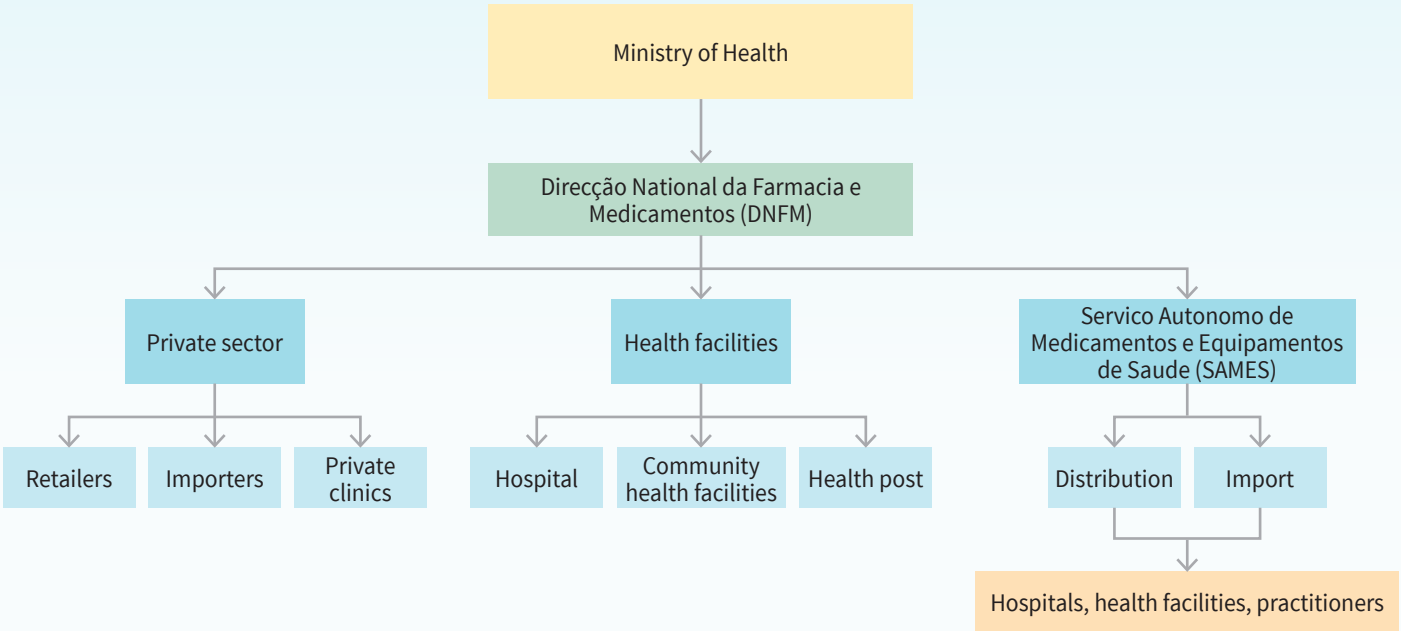
Local 0%

Imported 100%

Stakeholder analysis



Pharmaceuticals flow diagram



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