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Evaluation of Drug Prescribing Practices Based on World Health Organization (WHO) Indicators at Tapian Dolok Community Health Center, Simalungun Regency, in 2025

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ABSTRACT

Rational drug use through prescription is crucial in healthcare services to ensure patient therapeutic outcomes. Prescribing indicators and complementary indicators from the World Health Organization (WHO) can be used to assess irrational drug use. This study aims to describe the pattern and profile of drug prescribing based on WHO prescribing indicators at the Tapian Dolok Community Health Center in Simalungun Regency. The purpose of this study was to describe drug prescribing during the period January-March 2025 at the Tapian Dolok Community Health Center, Simalungun Regency, based on WHO Prescribing Indicators. The method used in this study was a descriptive observational study with a cross-sectional design. The data used were retrospective data in the form of medical records and 150 patient prescriptions at the Tapian Dolok Community Health Center, Simalungun Regency, during the period January-March 2025. The results of the study showed that the total number of drugs used during the period January-March 2025 at Tapian Dolok Community Health Center, Simalungun Regency was 593 items with an average number of drug items per prescription sheet being 3.9%. The percentage of drug items prescribed with generic names was 100%. The percentage of drug prescriptions with antibiotics was 41.33%. The percentage of drug prescriptions with injection preparations was 0%. The percentage of drug items prescribed in accordance with the National Formulary was 100%..

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INTRODUCTION

Medicines are one of the most important components in healthcare services. However, the World Health Organization (WHO) estimates that approximately 50% of all medicines worldwide are used inappropriately in prescribing, dispensing, and distribution processes. In addition, about 50% of patients do not use medicines properly. Inappropriate use of medicines can have detrimental effects on the wider community, particularly among lower- and middle-income populations, which constitute the majority of the population, where nearly half of patients use medicines incorrectly. The use of medicines is considered irrational when the potential negative effects experienced by patients outweigh the expected benefits. The negative impacts of irrational drug use vary depending on the degree of irrationality and may include undesirable side effects, increased treatment costs, and the development of antimicrobial resistance. Irrational drug use is frequently encountered in daily clinical practice.

The World Health Organization estimates that more than half of all medicines worldwide are prescribed irrationally and are not properly prepared or distributed. Irrational drug use is a major global health problem. Irrational prescribing can be described as medically inappropriate and

economically inefficient in terms of healthcare financing (Agabna, 2014). According to WHO, drug use is considered rational when patients receive medications appropriate to their clinical needs, in doses that meet individual requirements, for an adequate duration, and at a cost affordable to patients and the community. Conversely, drug use is considered irrational when the potential negative outcomes outweigh the therapeutic benefits. Irrational prescribing also affects the quality and availability of medicines, which contradicts the government's objective of improving healthcare service quality by meeting patient needs in the most cost-effective manner possible.

Indonesia remains one of the countries facing significant challenges related to irrational drug use. Information provided on medicine packaging is often overlooked or poorly understood by the public, potentially leading to new health problems such as adverse drug reactions, drug interactions, or misuse. Based on data from the Association of Southeast Asian Nations (ASEAN) in 2022, prescribing practices in Indonesia are still categorized as irrational due to high levels of polypharmacy (an average of 3.51 medicines per patient), low adherence to the national formulary (78%), and excessive antibiotic use (48%). Common prescribing problems in Indonesia include polypharmacy, cost-inefficient drug use, overuse of antibiotics, and inappropriate prescribing indications.

The Indonesian Ministry of Health has stated that not all primary healthcare facilities have implemented rational drug use practices. Irrational drug use is often caused by polypharmacy, a high percentage of inappropriate antibiotic prescribing, excessive use of injectable medicines, and medication errors related to prescription writing. These issues contribute to suboptimal therapeutic outcomes, increased healthcare costs, and reduced patient adherence to medication regimens. Data indicate an improvement in the implementation of rational drug use in community health centers (Puskesmas). In 2020, 30.3% of districts/cities had implemented rational drug use practices in Puskesmas, increasing to 47.08% in 2022. Nevertheless, many Puskesmas have yet to implement rational drug use due to the lack of pharmaceutical personnel and the continued irrational use of antibiotics, which contributes to the emergence of antimicrobial resistance (AMR). Therefore, efforts to empower communities in promoting rational drug use must be further strengthened.

Puskesmas play a crucial role in providing healthcare services to the Indonesian population. As such, Puskesmas are required to implement rational drug use in accordance with established standards. A large proportion of the population, particularly lower- and middle-income groups, relies on Puskesmas as their primary healthcare facility. Consequently, inappropriate drug use at the Puskesmas level can have widespread adverse effects on the community. Sub-district Puskesmas generally serve the largest number of patients; therefore, irrational drug use in these facilities may result in greater harm compared to smaller urban health centers. At the Tapian Dolok Sub-district Health Center, cases of polypharmacy are still observed, potentially affecting drug stock availability and increasing the risk of medicine stockouts. Polypharmacy may cause losses for multiple stakeholders, particularly patients, and if left unaddressed, may lead to decreased public trust in Puskesmas. Given the close relationship between polypharmacy and the rationality of drug use, this study aims to evaluate drug prescribing practices based on World Health Organization indicators at the Tapian Dolok Community Health Center.

METHODS

Type of Study

This study employed a descriptive analytical design using a retrospective cross-sectional method. The samples were obtained from secondary data by reviewing prescriptions issued during the period of January–March 2025.

Population and Sample

Population

The study population comprised all patient prescriptions issued from January to March 2025 at the Tapian Dolok Community Health Center, Simalungun Regency, North Sumatra Province.

Sample

The sample consisted of a minimum of 150 selected prescriptions representing the study population. Sampling was conducted using a random sampling technique.

Data Collection (Sampling Method)

Prescription data were collected using a randomized sampling method. The researcher selected nine prescriptions randomly from each month. The prescription selection procedure was as follows:

a. The researcher randomly selected a group of prescriptions based on available dates.
b. From each group, one prescription was randomly chosen without prior review.
c. The selected prescription was screened to determine whether it met the inclusion criteria.
d. If the selected prescription did not meet the inclusion criteria, the sampling process was repeated until an eligible prescription was obtained.

Data Processing and Analysis

Data processing in this study was performed using Microsoft Excel. All collected prescription data were entered into Microsoft Excel worksheets. The recorded data included prescription date, patient name, age, gender, and drug name.

Data analysis was conducted using univariate analysis, in which each variable was analyzed independently. The results were presented in the form of tables and percentages, and the analysis focused on calculating prescribing indicator values.

Average Number of Drug Items per Prescription

Criteria for calculating the number of drugs per prescription:

- Each different drug listed in one prescription was counted as a separate drug.
- Drugs with the same name but different dosage forms were considered different drugs.
- Vitamins prescribed were included as drug items.
- Compounded medications were counted according to the number of active ingredients.

Formula:

$$\text{Average number of drug items per prescription} = \frac{\text{Total number of prescribed drug items}}{\text{Total number of prescriptions analyzed}}$$

Percentage of Drugs Prescribed by Generic Name

Criteria:

The number of drugs written using generic names in each prescription was counted.

Formula:

$$\frac{\text{Number of generic drug items prescribed}}{\text{Total number of drug items prescribed}} = 100\%$$

Percentage of Prescriptions Containing Antibiotics

Criteria:

- The presence of antibiotics in each prescription was assessed using absolute values (1 = present, 0 = absent).
- Combination anti-tuberculosis drugs were not categorized as antibiotics.

Formula:

$$\frac{\text{Number of prescriptions containing antibiotics}}{\text{Total number of prescriptions analyzed}} = 100\%$$

Percentage of Prescriptions Containing Injectable Drugs

Criteria:

The presence of injectable dosage forms in each prescription was assessed using absolute values (1 = present, 0 = absent).
Formula:

$$\frac{\text{Number of prescriptions containing injectable drugs}}{\text{Total number of prescriptions analyzed}} = 100\%$$

Percentage of Drugs Prescribed According to the National Formulary
Criteria:
Drugs prescribed using brand names were evaluated based on their generic equivalents. Combination drugs were assessed based on their active ingredient composition. If a formulation contained an active ingredient not listed in the Puskesmas formulary, it was classified as non-formulary.
Formula:

$$\frac{\text{Number of drug items prescribed according to the formulary}}{\text{Total number of drug items prescribed}}.$$

RESULTS AND DISCUSSION

This study was a descriptive observational study using a retrospective cross-sectional design without intervention. The purpose of this study was to describe drug prescribing patterns based on World Health Organization (WHO) prescribing indicators at the Tapian Dolok Community Health Center, Simalungun Regency. The prescribing indicators assessed included the average number of drugs per prescription, percentage of drugs prescribed by generic name, percentage of prescriptions containing antibiotics, percentage of prescriptions containing injectable drugs, and percentage of drugs prescribed according to the National Formulary.

A total of 150 prescriptions issued during the period January–March 2025 were analyzed. The characteristics of the prescriptions included prescription date, patient name, age, gender, diagnosis, and drug name.

The results and discussion can display data in the form of tables and images. Results must be supported by related references or can be compared with previous research.

Patient Characteristics

The research samples consisted of patient prescriptions issued during January–March 2025 that met the inclusion criteria. Patient characteristics analyzed in this study included age and gender.

Table 1. Patient Characteristics

Characteristics Age	Number	Percentage (%)
≤12 years	13	8.66
13–17 years	11	7.33
18–40 years	45	30.00
41–60 years	46	30.66
≥60 years	35	23.33
Gender		
Male	70	46.66
Female	80	53.33

Drug Prescribing Patterns

Medicines play a vital role in healthcare services. Rational drug use aims to ensure patients receive appropriate therapy with maximum effectiveness and efficiency. To assess rational drug use, WHO has established standardized prescribing indicators.

WHO prescribing indicators include the average number of drugs per prescription, percentage of drugs prescribed by generic name, percentage of prescriptions containing antibiotics, percentage of prescriptions containing injectable drugs, and percentage of drugs prescribed according to the National Formulary.

Table 2. Drug Prescribing Pattern

Parameter	Result (%)	WHO Standard
Average number of drugs per prescription	3.9	1.8–2.2
Percentage of drugs prescribed by generic name	100	≥82%
Percentage of prescriptions containing antibiotics	41.33	≤22.70%
Percentage of prescriptions containing injectable drugs	0	0%
Percentage of drugs prescribed according to National Formulary	100	100%

Average Number of Drugs per Prescription

The average number of drugs per prescription was 3.9, calculated from 593 drug items across 150 prescriptions, as shown below**.**

Table 3. Average Number of Drugs per Prescription

Description	Value
Total number of prescribed drug items	593
Total number of prescriptions analyzed	150
Average number of drugs per prescription	3.9

Formula:

$$= \frac{\text{Total number of drug items prescribed}}{\text{Total number of prescriptions analyzed}}$$

$$\frac{593}{150} = 3.9$$

The number of prescription samples collected during the period January–March 2025 using a random sampling method was 150 prescriptions, with a total of 593 drug items prescribed. The calculation showed that the average number of drugs per prescription was 3.9.

This finding indicates that the average number of drugs prescribed per prescription exceeds the WHO recommended standard of 1.8–2.2 drugs per prescription, suggesting the presence of polypharmacy in prescribing practices at the Tapian Dolok Community Health Center.

Percentage of Drugs Prescribed by Generic Name

This indicator measures the tendency of prescribers to prescribe medicines using generic names. According to the World Health Organization (WHO), a good standard for generic prescribing is at least 82%.

Formula:

$$\frac{\text{Number of drug items prescribed by generic name}}{\text{Total number of drug items prescribed}} \times 100\%$$

$$\frac{593}{593} \times 100\% = 100\%$$

Based on the results of this study, it was found that all drug items (593 items) were prescribed using generic names, resulting in a 100% generic prescribing rate.

This finding indicates excellent compliance with WHO standards and national drug use policies. Furthermore, the results demonstrate that generic drug prescribing at the Tapian Dolok Community Health Center meets and exceeds the WHO parameter, which requires a minimum of 82% generic prescribing.

Percentage of Prescriptions Containing Antibiotics

This indicator aims to measure the tendency of prescribers to prescribe antibiotics. Excessive antibiotic use can lead to antimicrobial resistance (AMR). Antimicrobial resistance is defined as the inability of bacteria to be inhibited or killed by antibiotics at normal systemic concentrations that should be effective or provide minimal inhibitory effects.

This parameter is calculated by dividing the number of prescriptions containing antibiotics by the total number of prescriptions analyzed, multiplied by 100. According to WHO standards, the acceptable range for antibiotic prescribing is ≤22.70%.

Formula:

$$\frac{\text{Number of prescriptions containing antibiotics}}{\text{Total number of prescriptions analyzed}} \times 100\%$$

$$\frac{62}{150} \times 100\% = 41.33\%$$

Out of 150 prescriptions, 62 prescriptions contained antibiotics, while 88 prescriptions did not include antibiotic therapy. The percentage of antibiotic prescribing was 41.33%, which exceeds the WHO recommended standard.

These findings indicate a high level of antibiotic prescribing, suggesting the need for improved antimicrobial stewardship to prevent the development of antimicrobial resistance.

Table 3. Types of Antibiotics Prescribed

No	Antibiotic	Number
1	Amoxicillin	26
2	Ciprofloxacin	14
3	Clindamycin	5
4	Cotrimoxazole	4
5	Erythromycin	2
6	Gentamicin ointment	2
7	Metronidazole	9
Total		**62**

From 150 prescriptions, 62 prescriptions (41.33%) contained antibiotics, while 88 prescriptions did not. This value exceeds the WHO standard (≤22.70%), indicating excessive antibiotic prescribing.

Percentage of Prescriptions Containing Injectable Drugs

This indicator evaluates the frequency of injectable drug use, which is generally associated with higher costs and increased risk.

Table 5. Percentage of Injectable Drug Prescribing

Description	Value
Prescriptions containing injectable drugs	0
Total prescriptions analyzed	150
Percentage	0%

No injectable drugs were prescribed during the study period, which complies with WHO recommendations.

Percentage of Drugs Prescribed According to the National Formulary

This indicator aims to measure the level of compliance of drug prescribing practices with the National Formulary (Formularium Nasional/Fornas). According to the World Health Organization (WHO), the percentage of drugs prescribed in accordance with the formulary should reach 100%.

Formula:

$$\frac{\text{Number of drug items prescribed according to the National Formulary}}{\text{Total number of drug items prescribed}} \times 100\%$$

$$\frac{593}{593} \times 100\% = 100\%$$

The value was obtained by dividing the total number of drug items listed in the National Formulary by the total number of prescriptions analyzed (World Health Organization, 1993). The results showed that all drug items prescribed during the study period were included in the National Formulary, resulting in a 100% compliance rate.

sOverall, none of the prescribed drug items fell outside the National Formulary; therefore, the percentage of drugs prescribed according to the National Formulary at the Tapian Dolok Community Health Center was 100%, which fully complies with WHO standards.

CONCLUSION

The evaluation of drug prescribing practices based on World Health Organization (WHO) indicators at the Tapian Dolok Community Health Center, Simalungun Regency, showed that the average number of drug items per prescription was 3.9, indicating a relatively high level of polypharmacy compared to WHO standards. The percentage of drugs prescribed by generic name reached 100%, demonstrating full compliance with rational drug use policies. However, the percentage of prescriptions containing antibiotics was 41.33%, which exceeds the WHO recommended threshold and suggests excessive antibiotic use. No injectable drugs were prescribed (0%), reflecting appropriate prescribing practices for primary healthcare settings. Furthermore, 100% of prescribed drug items complied with the National Formulary. Overall, while generic prescribing, injectable use, and formulary adherence met WHO standards, improvements are needed to reduce polypharmacy and optimize antibiotic prescribing practices.

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