International Journal of Basic & Clinical Pharmacology
Laowo ERA et al. Int J Basic Clin Pharmacol. 2026 Nov;15(6):1135-1143
https://www.ijbcp.com
pISSN 2319-2003 | eISSN 2279-0780

DOI: https://dx.doi.org/10.18203/2319-2003.ijbcp20263287

Original Research Article

Essential drug availability and affordability in Gunungsitoli

Ervin Rosanti Anastasia Laowo[1], Khairunnisa Khairunnisa[2]*, Wiryanto Wiryanto[2]

[1]Pharmaceutical Sciences Program, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, Indonesia
[2]Departement of Pharmacology and Clinical/Community Pharmacy, Faculty of Pharmacy, Universitas Sumatera Utara, Medan, Indonesia

Received: 30 May 2026
Revised: 06 July 2026
Accepted: 15 September 2026

***Correspondence:**
Dr. Khairunnisa Khairunnisa,
Email: khairunnisa7@usu.ac.id

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: A key element of universal health care is equitable access to Essential medicines (EMs). Disparities in medicine availability, cost, and affordability, however, continue to be a global problem, especially in decentralized health systems like Indonesia. A standardized World Health Organization/health action international (WHO/HAI)-based evaluation of these indicators has never been carried out in Gunungsitoli City.
Methods: The study employed a descriptive sequential mixed-method approach. Using WHO/HAI sample guidelines, quantitative secondary data on the accessibility, cost, and affordability of 50 basic medications were retrieved retroactively from 2023 records from eight Puskesmas and two hospitals. To contextualize procurement difficulties, in-depth interviews with pharmaceutical staff were used to gather primary qualitative data. Descriptive analysis and benchmarking against WHO/HAI indicators were performed on the data.
Results: The majority of necessary medications in Puskesmas showed 100% availability. While program medications (Albendazole, DHP, and anti TB drugs) were unavailable at hospitals because of procurement laws connected to BPJS and centralized supply at the City Pharmacy Installation, stock-outs for ranitidine and retinol injections were noted at Puskesmas. At Puskesmas, all medications were reasonably priced, costing less than a day's minimum salary (Rp 93,633). According to a median price ratio (MPR) research, Puskesmas prices fell within the affordable range.
Conclusions: At the primary care level, access of EMs in Gunungsitoli is usually sufficient; nevertheless, stock-outs of certain injectables and program medications suggest systemic procurement limitations. Price fluctuations at the hospital level point to the necessity of better forecasting, more robust regulatory alignment, and more efficient procurement procedures to guarantee fair and long-term access to necessary medications.

Keywords: Essential medicines, Availability, Affordability, Median price ratio

INTRODUCTION

Every person has a fundamental right to health, and the key to guaranteeing that right is having access to health services. A primary goal of the Sustainable Development Goals, universal health coverage is to lower the cost of access to high-quality, need-based healthcare while increasing access to such services.[1] The term EMs refers to a group of medications that are necessary for health services, including diagnosis, prevention, treatment, and rehabilitation.[2] Depending on the purpose and degree of care provided by the facility, these medications should be offered at health centres.[3] EMs must be regularly supplied in proper amounts, suitable forms, high quality, sufficient numbers, accurate information, and at reasonable prices in order for health care systems to function as efficiently as possible. This ensures that services are delivered effectively.[4]

Drug price regulation, affordability, and guaranteeing fair access to healthcare services for all societal sectors are

major issues facing healthcare systems around the world.[5,6] The government finds it challenging to cover the rising cost of pharmaceuticals due to limited funding. In 1977, the WHO developed the idea of EMs, which are drugs that address the main requirements of public health services, in order to solve this issue. This idea was created to lower patient treatment costs and increase fair access to healthcare. WHO also offers advice to nations on how to choose and create their own lists of critical medications. The lack of accessibility to necessary medications persists and is a global challenge, even though the majority of countries-particularly developing ones-have such lists.[7]

Hospitals and community health centers are pharmaceutical service facilities that are essential to guaranteeing community's access to and responsible use of medications. As first-class healthcare facilities, Puskesmas offer pharmaceuticals together with other fundamental healthcare services like planning, acquiring, storing, distributing, and keeping an eye on medication use. Hospitals, on other hand, provide more complicated and advanced medical treatments as referral healthcare centers. In pharmaceutical industry, hospitals are in charge of drug management, drug therapy monitoring, and rational medication usage supervision through hospital formulary system (Mhlanga and Suleman, 2014). Indonesia has primary healthcare centers for local communities known as community health centers (PUSKESMAS). To ensure adequate drug availability within pharmacoeconomic service standards, government's program for all types of drug use and provision is regulated by Health Social Security Administration (BPJS).[8]

In least 80% of the necessary medications (50 indicator drug items) will be available in Community Health Centers (PUSKESMAS) by 2023. In order to support national health policies that encourage pharmaceutical independence, quality control, and efficient distribution under the National Health Insurance scheme, the Directorate General of Pharmaceuticals and Medical Devices measures the proportion of districts and cities with access to EMs. The evaluation of government policies in planning drug spending and provision has been delayed due to challenges in acquiring data on drug pricing, availability, and affordability. Individual health is greatly impacted, and life expectancy in the community may eventually be impacted as well. No survey on medicine costs, availability, and affordability had been carried out in Gunungsitoli City, according to a direct interview with the head of the city's health pharmacy unit. Thus, the purpose of this study is to evaluate the costs, availability, and affordability of necessary medications in Gunungsitoli City's hospitals and private healthcare facilities.[9]

METHODS

Study area, design and period

Study location, style, and time frame This study was carried out in Gunungsitoli City's hospitals and community health centers (Puskesmas). Sequential mixed method data collection, or data collected in stages or consecutively, is used in this descriptive study. Both primary and secondary data are included in the research materials. The availability, cost, and affordability of EMs at community health centers and hospitals in Gunungsitoli City are examples of secondary data, which is quantitative information gathered retrospectively through the review of documents from the prior year, specifically 2023. Primary data is qualitative information gathered through prospective data collecting following study, which involves interviewing research participants about the findings of secondary data collected at Gunungsitoli City's hospitals and community health centers.[10]

Population and sample

The population is all data available at the Community Health Centers and Hospitals in Gunungsitoli City, namely in 2023 as well as data observed and obtained during the research period, while the sample in this study is from the population, namely all documents in 2023 as well as data observed and obtained during the research period at the Community Health Centers and Hospitals in Gunungsitoli City.

Sample size determination

Sixty drug facilities or outlets were selected using the standard sampling method recommended by WHO/HAI. WHO/HAI also suggested that price-based research should include at least 14 global core drugs, and if possible, an additional 16 regional core drugs. Based on these guidelines, this study involves 30 drugs from the global and regional core lists, plus 20 additional essential drugs used in primary health centers and hospitals, resulting in a total of 50 essential drugs per location from various therapeutic classes. This approach allows for a comparative analysis of prices and availability across therapeutic drug groups with other EMs, providing significant meaning in interpreting results and formulating policy recommendations and strategies. Additionally, this research also contributes to the development of a global, publicly accessible database on drug prices and availability.[11]

Sampling

Based on WHO standard sampling techniques, this study was conducted at eight community health centers (Puskesmas) in Gunungsitoli City: Puskesmas A, Puskesmas B, Puskesmas C, Puskesmas D, Puskesmas E, Puskesmas F, Puskesmas G and Puskesmas H. Hospital X is located in North Sumatra Province and Hospital Y is a type D private hospital in Gunungsitoli City.

A summary of the generic names of EMs, strengths and units of measurement, original trademarks (OB) and their respective manufacturers is presented in Table 1.

Drug affordability

The number of days' income of the lowest-paid, unskilled government worker needed to buy prescribed pharmaceuticals at regular doses is used to determine how affordable treatment is for common ailments. For acute illnesses, treatment lasts for the entire course of therapy; for chronic illnesses, it lasts for 30 days. WHO/HAI states that a medication is deemed inexpensive if the cost of treatment is no more than one day's wages.[12]

MPR

The purpose of the MPR is to assess the international reference level and price level of medications in the survey area.[13,14] Use the following formula to determine the MPR:

$$= \frac{\text{Average Local Unit Price (IDR)}}{\text{International Reference Unit Price (IDR)}}$$

Data analysis

The availability, cost, and affordability of necessary medications in Gunungsitoli City's Community Health Centers and Hospitals in 2023 were described using a descriptive data analysis method. Interviews and document reviews pertaining to medication management were used to gather primary and secondary data. While document data were condensed to guarantee accuracy and consistency, interview data were categorized by theme and presented narratively. To get a complete picture and a foundation for formulating policy recommendations pertaining to access to vital drugs, each indicator was also computed and compared with WHO/HAI standards and pertinent literature

RESULTS

Availability of EMs

A key component of attaining universal health coverage is the steady supply of EMs, which is a critical determinant of how well a country's healthcare system is operating.[15] In order to clarify the current issues resulting from procurement structures and logistical bottlenecks, this section compares the reported inventory data with established policy mandates. This comparison is also important in the context of international studies on medicine access. This section looks at the availability status of EMs across primary and secondary facilities in Gunungsitoli City. The percentage of availability of essential drugs at the Gunungsitoli Community Health Center in 2023 can be seen in Table 1 and Figure 1.

Affordability of EMs

All necessary drug therapy packages are below the Gunungsitoli city minimum wage (UMK) for 2023, which is Rp. 93.633 per day, according to the result of the affordability calculation for drugs at the primary healthcare service level (puskesmas). These result show that controlling generic medication costs at the primary healthcare level has been a successful strategy. At the secondary or referral healthcare service level (hospital), however different circumstances were discovered. According to the quantitative data analysis presented in Table 2, there are notable price swings in this industry, with a number of critical prescription commodities falling into the pricey category because their MPRs are significantly higher than the established standard reference criterion.

Table 1: List of EMs availability in 2023.

Generic name	Dosage form and strength	Originator/ brand reference	Availability (%)
Albendazole/ Pyrantel Pam anti TB drugs	Tablet 400 mg/ 250 mg	Zentel® (GSK)/ Combantrin® (Pfizer)	0
Allopurinol	Tablet 100 mg, 300 mg	Zyloric® (Aspen Pharma/ GSK)	100
Amlodipine	Tablet 5 mg, 10 mg	Amlodipine Besilate	100
Captopril	Tablet 12.5 mg, 25 mg and 50 mg	Captopril	100
Amoxicillin 500 mg	Capsule 500 mg	Amoxicillin/ Kimia Farma	100
Amoxicillin syrup	Suspension 125 mg/5 mL/250 mg/5 mL	Amoxicillin/ Kimia Farma	100
Antacid chewable tablet	Tablet	Antasida Doen/ PT. First Medipharma	100
Antacid suspension	Suspension containing aluminum hydroxide 200 mg + magnesium hydroxide 200 mg + simethicone 25 mg	Antasida Doen/ PT. First Medipharma	100
Ascorbic acid (Vit C)	Tablet 500 mg, chewable tablet 500 mg	Vitacimin	100
Acyclovir	Tablet 200 mg, 400 mg, 800 mg	Zovirax® (GSK)	100
Betamethasone ointment	Ointment/Cream 0.05%	Celestone® (Merck)	100
Dexamethasone tablet	Tablet 0.5 mg	Dexamethasone/ Kimia Farma	100
Dexamethasone injection	Injection 4 mg/ml	Dexamethasone/ Kimia Farma	100
Diazepam injection	Injection 5 mg/ml	Valium® (Roche)	100

Continued.

Generic name	Dosage form and strength	Originator/ brand reference	Availability (%)
Diazepam tablet	Tablet 5 mg, 10 mg	Valium® (Roche)	100
Dihydroartemisinin + Piperaquine (DHP) + Primaquine	Tablet 40 mg + 320 mg + 15 mg	Duo-Cotecxin® (Holley Pharm)	0
Diphenhydramine injection	Injection 10 mg/ml	Benadryl® (Pfizer)	50
Epinephrine injection	Injection 0.1% (as HCl), 1 mg/ml	Adrenalin® (Parke-Davis/ Hospira)	100
Phytomenadione (Vit K1) injection	Injection 10 mg/ml	Konakion® (Roche)	100
Furosemide	Furosemide 40 mg	Furosemide 40 mg/ Kimia Farma	100
Hydrochlorothiazide (HCT)	Hydrochlorothiazide 25 mg	Hydrochlorothiazid/Kimia Farma	100
Oral rehydration salts (ORS)	Powder for solution	WHO-ORS standard formulation	100
Glibenclamide	Glibenclamide 5 mg	PT. First Medipharma	100
Metformin	Metformin 500 mg	Metformin 500 mg/ OGBdexa	
Hydrocortisone cream	1% Cream	Kalbe Farma	100
Hydrocortisone ointment	0.5% ointment	Kalbe Farma	100
Cotrimoxazole (trimethoprim + sulfamethoxazole) tablet	Tablet 80 mg + 400 mg;	Sanbe Farma	100
Cotrimoxazole (trimethoprim + sulfamethoxazole) suspension	Suspension 40 mg + 200 mg/5 ml	Sanbe Farma	100
Lidocaine injection	Injection 1%, 2% (10-20 mg/ml)	Xylocaine® (AstraZeneca)	100
Magnesium sulfate injection	Injection 500 mg/ml (50%)	$MgSO_4$ Injection	100
Methylergometrine maleate injection	Injection 0.2 mg/ml	Methergine® (Novartis)	100
Diclofenac sodium tablet	Tablet 50 mg	PT. First Medipharma	100
Diclofenac sodium injection	Injection 25 mg/ml	PT. First Medipharma	100
Fixed-dose combination anti-TB (Category 1)	Tablet containing isoniazid 75 mg + rifampicin 150 mg + pyrazinamide 400 mg + ethambutol 275 mg	Rimstar® (Sandoz / Novartis)	100
Oxytocin injection	Injection 10 IU/ml	Syntocinon® (Novartis)	100
Paracetamol syrup	Syrup 120 mg/5 ml or 250 mg/5 mL	Panadol® Suspension (GS	100
Paracetamol tablet	Tablet 500 mg	Panadol® (GSK)	100
Prednisone tablet	Tablet 5 mg	Deltacortril® (Pfizer)	100
Ranitidine tablet	Tablet 150 mg	Zantac® (GSK)	100
Retinol (Vit A) 100.000IU	Capsule 100.000 IU	Wellona Pharma	100
Retinol (Vit A) 200.000IU	Capsule 200.000 IU	Wellona Pharma	100
Salbutamol	Tablet 2 mg, 4 mg	Ventolin® (GSK)	100
Salbutamol inhaler	Inhaler 100 µg/dose	Ventolin® (GSK)	100
Antibiotic eye ointment/ eye drops	Ointment (Chloramphenicol 1% or Tetracycline 1%)	Chloromycetin® (Pfizer)/ Terramycin® (Pfizer)	100
Simvastatin	Tablet 10 mg, 20 mg	Zocor® (Merck Sharp and Dohme)	100
Ciprofloxacin	Tablet 250 mg, 500 mg	Cipro® (Bayer)	100
Ferrous sulfate + folic acid (iron supplement)	Tablet 60 mg Fe + 0.25 mg folic acid	San Marino Laboratories	100
Trihexyphenidyl	Tablet 2 mg, 5 mg	Artane® (Pfizer)	100
Vitamin B6 (Pyridoxine)	Tablet 10 mg, 25 mg, 50 mg	Becadexamin® (GSK)	100
Zinc sulfate	Tablet 20 mg (as Zinc)	Amherst Laboratories	100

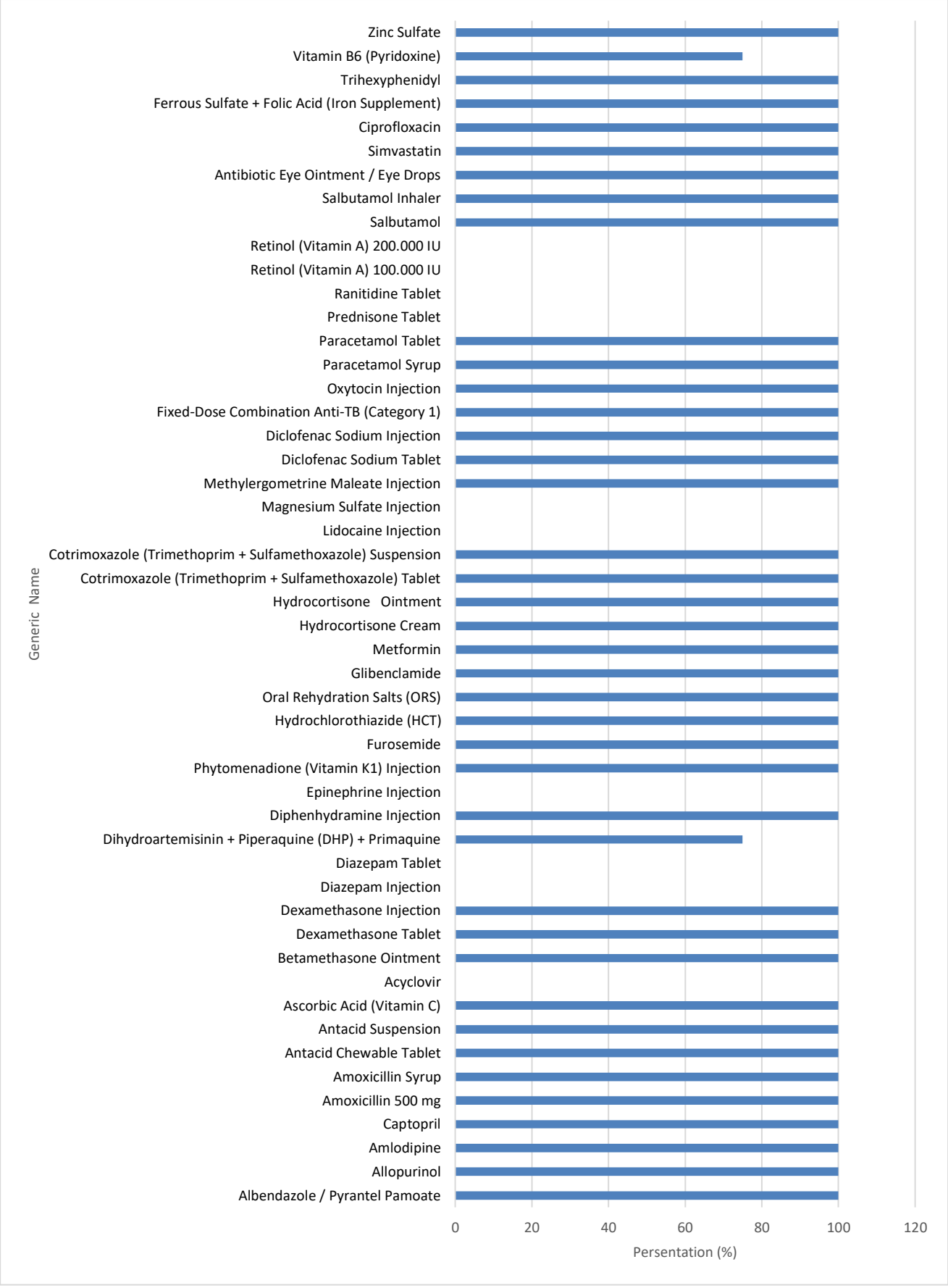


Figure 1: MPR EMs at community health centers.



Figure 2: The percentage of availability of essential drugs at the Gunungsitoli hospital in 2023.

Table 2: MPR of EMs at Gunungsitoli hospital in 2023.

No.	Medicine Name	Category
1	Amlodipine	11.320-5.940
2	Captopril	8.823
3	Ascorbate (Vitamin C)	27.906
4	Acyclovir	16.317
5	Betamethasone ointment	3.503
6	Dexamethasone tablet	5.797
7	Diazepam	8.771
8	Epinephrine (Adrenaline)	8.620
9	Furosemide 40 mg	9.708
10	Oral rehydration salts powder	7.142
11	Lidocaine injection	4.230
12	Diclofenac sodium	5.217
13	Oxytocin injection	17.761
14	Paracetamol syrup	4.310
15	Prednisone 5 mg	3.947
16	Ranitidine 150 mg	2.116
17	Simvastatin	1.587
18	Trihexyphenidyl	15.873
19	Vitamin B6	4.222

DISCUSSION

A key factor in determining the effectiveness of the healthcare system and a prerequisite for attaining universal health coverage (UHC) is guaranteeing a steady supply of EMs. This study reveals clear differences in EM accessibility between the primary and secondary levels of Gunungsitoli City's decentralised healthcare system. The assessed Community Health Centers (Puskesmas) performed exceptionally well at the primary care level, with the great majority of the 50 indicator items retaining a 100% availability rate. The effectiveness of the Indonesian government's generic medication distribution and selection policies within primary healthcare facilities is demonstrated by this high stock density. The availability of lowest-priced generics (LPGs) stagnated at about 55% in basic healthcare institutions, according to a longitudinal study conducted in Jiangsu, China. Similarly, multi-regional evaluations conducted throughout Sub-Saharan Africa often show primary care availability rates well below the WHO 80% normative target because of fragile supply chains.[4] Critical supply-side limitations were noted despite the overall success at the primary level. The quantitative audit found that the primary care institutions had absolute stock-outs (0% availability) of retinol (Vitamin A) capsules and ranitidine injections. These deficiencies are consistently associated with strict regulatory frameworks and institutional procurement procedures, according to qualitative information gleaned from structural interviews with the chemists in charge. The Health Social Security Administration (BPJS) regulations closely regulate local procurement at the Puskesmas level, and it is contingent upon the pre-existing inventory meeting the allocations at the City Pharmacy Installation. In this approach, demand elasticity is subordinated to precise volume forecasting and fiscal cost-effectiveness. As a result, drugs like retinol that need specific cold-chain distribution channels or that are considered less profitable under localised capitation budgets are sometimes left out or have protracted replenishment delays. This creates a systemic tension where strict cost-cutting measures unintentionally undermine the fundamental goal of complete drug security at the local level, even if they are essential for the national health insurance program's overall sustainability.[16-18]

On the other hand, at the secondary and referral levels (Hospital X and Hospital Y), an inverted supply paradigm was found. At the hospital level, the availability of major national public health program pharmaceuticals, namely albendazole, dihydroartemisinin-piperaquine (DHP), and fixed-dose combination anti-tuberculosis treatments, was zero percent. This absence reflects a rigid vertical division of program medicine management under present Indonesian health policy rather than a complete market scarcity. In order to reduce public health risks, avoid antibiotic resistance, and expedite epidemiological monitoring, vertically integrated public health commodities are deliberately centralised and managed only at the primary care level. Their official omission from referral hospital formularies can be explained by this. However, for referred patients who need ongoing treatment plans, this institutional division presents clinical hazards. Xiong et al have extensively documented parallel issues, arguing that severe stock-outs of essential injectables and therapeutic agents are often caused by inflexible institutional barriers between public health initiatives and hospital procurement frameworks. The overall universal healthcare paradigm is shattered by such fragmented access models, which also interfere with the

integrated continuum of treatment and may unintentionally force patients to purchase life-saving medications from unreliable out-of-pocket providers.[19]

The standardised WHO/HAI indicator of affordability was used to assess the socioeconomic impact of pharmaceutical access, and it was benchmarked against the daily income of Gunungsitoli City's lowest-paid, unskilled government employee (estimated at IDR 93,633 per day based on the 2023 city minimum wage/UMK). Since all recommended conventional therapy regimens cost much less than a single day's wage, there was no financial strain on patients at the primary healthcare level. The MPR analysis of the eight surveyed Puskesmas, which showed that all 50 indicator EMs fell comfortably within the cheap-to-reasonable categories and frequently had prices below the standardised national e-Catalog reference criteria, directly supports this total affordability. This demonstrates the structural effectiveness of the e-Catalog information management system, which protects vulnerable individuals from catastrophic health expenditures at point-of-care facilities by successfully coordinating public sector procurement with centralised pricing restrictions.

On the other hand, there were considerable fluctuations in the secondary referral financial climate. Due to disproportionately high local-to-international price ratios, many key agents were largely categorised as "expensive" in the hospital's quantitative MPR audit, which revealed significant pricing distortions. Baseline cardiovascular, anti-infective, and micronutrient treatments showed the most significant market distortions. For example, captopril showed a high MPR of 8.823, whereas amlodipine's MPR varied significantly between 5.940 and 11.320. Heavy retail inflation was also seen in primary mental stabilisers like trihexyphenidyl (MPR: 15.873) and critical anti-infectives like acyclovir (MPR: 16.317). Ascorbic acid (Vitamin C), which has the largest distortion with an MPR of 27.906, and essential obstetric injectables like oxytocin, which have an MPR of 17.761, show that even basic, highly commoditised substances exhibit considerable price magnification.

These high MPR values significantly surpass the optimum goal ratio of close to 1, indicating that secondary care facilities are buying or dispensing these necessary generic formulations at many times the international reference level. Decentralised purchasing outside of the national e-Catalog volume guarantees, fragmented institutional procurement, and secondary markups used by hospitals to make up for operational shortfalls are frequently the causes of this localised hyperinflation. Patients whose clinical needs surpass the basic coverage caps or those navigating partial out-of-pocket payment structures are immediately prevented from accessing essential therapy regimens when MPR values rise to these levels. Studies assessing pharmaceutical dynamics in rural Hubei Province, China, and public sector facilities in Ghana confirm that localised price inflation inevitably occurs when secondary health facilities fail to synchronise their procurement with national bulk-purchasing contracts.[20] Similar market distortions have been widely documented across low- and middle-income countries (LMICs). This contradicts the fairness objectives of decentralised universal health networks and places the financial burden back on the patient. Consequently, resolving these hospital-level price fluctuations in Gunungsitoli requires systemic interventions, including mandatory alignment with national e-Catalog pricing, more accurate epidemiological forecasting, and stricter regulatory oversight over public-sector hospital supply chains.[21,22]

According to the National Formulary (FORNAS) guidelines, the MPR is a crucial metric for evaluating the cost of medications. The price of medications sold on the market is compared to the price anticipated by international standards by the MPR. When the MPR is near 1, it indicates that the medication is easily accessible and reasonably priced. A greater MPR, on the other hand, suggests that the medication is too costly, which may prevent patients from getting the care they require. A medication's affordability is assessed using a formula that divides the average local unit price by the reference price. The price derived from the E-catalog serves as the reference price in this investigation. In essence, the E-catalog is an information management system that links the JKN drug procurement process's consumers (hospitals, community health centers), manufacturers (drug factories, distributors), and government (LKPP, Ministry of Health, BPOM). Based on the analysis of the MPR of 50 EMs at the Gunungsitoli City Health Center, all of these medicines have MPR values in the cheap to reasonable category, and none of the medicines are in the expensive category. Based on the analysis, the average price of EMs available at eight Gunungsitoli City Health Centers is in the range below the e-Catalog price, which means that all EMs at the Gunungsitoli City Health Centers have complied with the established regulations.[23]

CONCLUSION

At the primary care level, access of EMs in Gunungsitoli is usually sufficient; nevertheless, stock-outs of certain injectables and program medications suggest systemic procurement limitations. Price fluctuations at the hospital level point to the necessity of better forecasting, more robust regulatory alignment, and more efficient procurement procedures to guarantee fair and long-term access to necessary medications

ACKNOWLEDGEMENTS

The author would like to thank to Faculty of Pharmacy, Universitas Sumatera Utara; the Health Department of Gunungsitoli City; the Dr. M. Thomsen Nias Regional General Hospital; and the Bethesda Gunungsitoli Hospital for the permission, support, and data access provided during the research. Alos to enumerators and other parties who assisted in the data collection and interview process.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee no. 050/10526/Bappeda/2023

REFERENCES

1. Dong Z, Tao Q, Sun G. Survey and analysis of the availability and affordability of essential drugs in Hefei based on WHO/HAI standard survey methods. BMC Public Health. 2020;20:1405.
2. Kaiser AH, Hehman L, Forsberg BC, Simangolwa WM, Sundewall J. Availability, prices and affordability of essential medicines for treatment of diabetes and hypertension in private pharmacies in Zambia. PLoS One. 2019;14(12):e0226169.
3. Nasri N, Kaban VE, Syahputra HD, Ginting JG, Tania CG. Peningkatan Pengetahuan Pola Hidup Bersih dan Sehat serta Penggunaan Vitamin pada Anak di Panti Asuhan Claresta. ABDIKAN. 2023;2:145-53.
4. Yenet A, Nibret G, Tegegne BA. Challenges to the Availability and Affordability of Essential Medicines in African Countries: A Challenges to the Availability and Affordability of Essential Medicines in African Countries: A Scoping Review. Clinicoecon Outcomes Res. 2023;15:443-58.
5. Ntais C, Talias MA, Fanourgiakis J, Kontodimopoulos N. Managing Pharmaceutical Costs in Health Systems: A Review of Affordability, Accessibility and Sustainability Strategies. J Mark Access Health Policy. 2024;12(4):403-14.
6. Rani Z, Dalimunthe GI, Nasution HM, Yuniarti R, Lubis MS, Pulungan A, et al. Sosialisasi Penggunaan Obat dengan Cara Khusus di Kecamatan Percut Sei Tuan, Deli Serdang, Sumatera Utara. J Bakti Nusantara. 2025;3(1):39-46.
7. Adebisi YA, Ifechukwu BN, Aishat JA, Abubakar OB, Adeboye OB, Basirat OR, et al. Revisiting the issue of access to medicines in Africa: Challenges and recommendations. Public Health Chall. 2022;1(2):e9.
8. Deressa HD, Abuye H, Adinew A, Ali MK, Kebede T. Access to essential medicines for diabetes care: availability, price, and affordability in central Ethiopia. Global Health Res Policy. 2024;9(1):12.
9. Stolbrink M, Helen T, Ruth MH, Obianuju BO, Rebecca N, Shamanthi J, et al. Articles The availability, cost, and affordability of essential medicines for asthma and COPD in low-income and middle-income countries: a systematic review. Lancet Glob Health. 2022;10(10):e1423-42.
10. Adale A. Availability, affordability, and associated factors of essential medicines in primary health care facilities of the Wolaita zone, southern Ethiopia: implication for access, a cross-sectional study, 2022. Res Health Serv Reg. 2025;4(1):18.
11. Xiong X, Zhaohua H, Shuai Z, Ge B, Shiying H, Yinan Z, et al. Short- and long-term impacts of the National Essential Medicines Policy on drug availability, price, and usage in a deprived rural county in southwestern China: an interrupted time series analysis across 8 years. Front Public Health. 2024;12:1355239.
12. An MC, Agarwal A, Husain MJ, Datta B, Kishore SP. Access to Heart Failure Medicines in Low. Circ Heart Fail. 2022;15(4):e008971.
13. Hailemariam FH, Mekdes S, Chalelgn K. Availability, price, and affordability of antiseizure medicines in Addis Ababa, Ethiopia. Epilepsia Open. 2023;8(3):1123-32.
14. Chen J, Jidong J, Hui Z, Wenhong Z, Jin MY, Tawesak T, et al. Assessing pricing and affordability of HBV treatment in Asia-Pacific region : a barrier to elimination. Hepatol Int. 2025;19(2):349-57.
15. Ocran P, Id M, Biritwum RB, Babar ZU. A comprehensive survey of cancer medicines prices, availability and affordability in Ghana. PLoS One. 2023;18(5):1-19.
16. Shi Y, Zhe C, Kun Z, Miao Z, Zheng L, Dan L, et al. Global, regional and national availability of essential medicines for children, 2009-2020: a systematic review and meta-analysis. BMC Public Health. 2023;23(1):1-13.
17. Lalani HS, Tessema FA, Kesselheim AS, Rome BN. Availability and Cost of Expensive and Common Generic Prescription Drugs: A Cross-sectional Analysis of Direct-to-Consumer Pharmacies. J General Internal Med. J Gen Intern Med. 2023;39(12):2187-95.
18. Zhang M, Kun Z, Zheng L, Dan L, Xiuli W, Yuqing S, et al. Availability of essential medicines, progress and regional distribution in China: a systematic review and regional distribution in China: a systematic review and meta-analysis. Front Public Health. 2023;11:1149838.
19. Li C, Wang H, Yuan J, Shi L. Current status of older people with chronic diseases adopting digital health technologies: A scoping review. Digit Health. 2025;11:20552076251348578.
20. Nalebe RM. Towards a Digital Health Information Framework for Management of Essential Medicine Supply Chain in Public Healthcare Facilities in Kenya. (KeMU, 2024). 2024.
21. Id FK, Haefele-Abah C. The availability, prices and affordability of essential medicines in Malawi: A cross- sectional study. PLoS One. 2019;14(2):e0212125.
22. Nasution A, Dalimunthe A, Khairunnisa K. Pharmacists Intervention Reduced Drug-Related Problems in the Treatment of Patients with Type 2 Diabetes Mellitus. Open Access Maced J Med Sci. 2019;7(22):3856-60.
23. Yang H, Dib HH, Zhu M, Qi G, Zhang X. Prices, availability and affordability of essential medicines in rural areas of Hubei Province, China. Health Policy Plan. 2010;25(3):219-29.

Cite this article as: Laowo ERA, Khairunnisa K, Wiryanto W. Essential drug availability and affordability in Gunungsitoli. Int J Basic Clin Pharmacol 2026;15:1135-43.