The availability of essential medicines in primary health centres in Indonesia: achievements and challenges across the archipelago

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Summary

Background Indonesia is making significant strides toward achieving universal health coverage, which involves providing free access to essential medicines. This study examines the availability of essential medicine in primary health centres (PHCs) across Indonesia, the reasons why medicines are unavailable, and the extent to which communities have access to alternative dispensing points.

Methods Enumerators visited each of the 9831 PHCs in all 514 districts to assess the availability of 60 essential medicines and identify reasons for any absent medicines. We correlated the results with the national village census to assess the relationship between availability, poverty, and access to alternative dispensing points.

Findings Medicine availability varied greatly. The median availability for 17 priority medicines was 82%, while 58% of the broader selection of 60 essential medicines was present. The availability of maternal and childcare medicines was highest (73%) and lowest for mental health (42%). The main reasons for absence were that medicines were deemed unnecessary (46%) or not supplied (38%). The Java/Bali region had the highest medicines availability, and rural areas in Eastern Indonesia had the lowest. In these districts, the population is financially struggling, most dependent on free medicines from public providers, and had the least access to alternative dispensing points.

Interpretation The availability of priority medicines in PHCs is relatively high, while public-paid prices are low by international standards. To improve availability of all essential medicines, the government should prioritize areas with the highest need, increase funding for PHCs in remote areas, and implement transparent monitoring of medicines availability.

Funding Indonesian Government.

Keywords: Medicine availability; Pharmaceutical system; Access to medicine; Primary health centres

Introduction

The provision of essential medicines is an integral part of universal health coverage (UHC).[1,2] Access to free medicine plays a vital role in maintaining and improving the health of individuals, while also protecting the most vulnerable populations from catastrophic health expenditures due to high out-of-pocket costs.

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Research in context

Evidence before this study

We searched PubMed, Web of Science and Google Scholar for relevant articles without date or language restrictions. The search terms we used were either text word (tw) or Medical Subject Heading terms (MeSH). We included terms for medicines ("medicines" OR "medicines availability" OR "pharmaceuticals" OR "medical products" OR "obat") related terms that could lead to relevant empirical studies ("pharmaceutical system" OR "pharmaceutical supply chain" OR "pharmaceutical management") the name of the country, main islands and region ("Indonesia" OR "Java" OR "Papua" OR "Sumatra" OR "Kalimantan" OR "Sulawesi" OR "Southeast Asia") and facilities ("primary health facilities" OR "puskesmas" OR "hospitals" OR "drug stores" OR "pharmacies" OR "farmasi" OR "apotek" OR toko obat".

We found that very little has been published about medicine availability in public facilities in Indonesia. The five peer-reviewed publications that we identified offer information about only a small number of facilities (<1% of total) and with one exception, focus on public facilities on Java, the most developed island of the country. These studies reveal frequent shortages that hinder patient treatment. Three of these studies were conducted in large cities: in Jakarta a third of the primary health centres (PHC) lacked vital hypertension medicine for a year, in Yogyakarta, around 76% of 50 essential medicines were available in public facilities, and a study in Surabaya reported a quarter of essential medicines were missing in PHCs. A survey in facilities in central Java found that 23% of medicines needed for obstetric care were not available. One small study in six PHCs in Keerom district in Papua indicates that remote areas face worse shortages: 29% of 35 essential medicines was unavailable and 7% expired.

No large scale studies into the availability of essential medicines in public facilities across Indonesia have been published. There is a lack of surveys investigating the reasons behind medicine stock-outs, no exploration of disparities in medicines access between various regions within the country, and an absence of research into access to medicine outlets throughout the archipelago.

Added value of this study

Our study shows, for the first time, the availability of essential medicine throughout the entire network of primary health centres across Indonesia. The findings reveal significant variations in the availability of medicines. The median availability of 17 priority medicines was 82%, which is relatively high compared to other countries in the region. Out of the broader selection of 60 essential medicines, 58% were present. The primary reason for the absence of medicines was their perceived lack of necessity, accounting for 46% of the stock-outs. Additionally, 38% of the stock-outs were due to medicines not being supplied to the PHCs. The results highlight the variation in medicine availability based on the type of medicine and the location of the PHC. Availability was the lowest in eastern region of Indonesia, especially in the rural areas. These underserved districts are home to the most economically disadvantaged communities in the country and heavily rely on free medicines provided by PHCs. Our analysis reveals that these communities also have the most limited access to alternative medicine outlets.

Implications of all the available evidence

These findings show that the availability of many essential medicines in PHC is insufficient, highlighting the need for improvement to ensure adequate treatment and achieve universal health coverage in Indonesia. In addition to providing a crucial baseline, the results emphasize the necessity for targeted interventions to enhance the supply of medicines in rural and remote areas, particularly within the eastern part of the archipelago. The observation that certain medicines are occasionally perceived as unnecessary can be attributed, at least partially, to the remarkable diversity of Indonesia and the existence of diseases confined to specific parts of the country. This observation suggests that policymakers must strike a delicate balance between national pharmaceutical regulation and the support of local capacities, practices and structures necessary to ensure the adequate availability of essential medicines at the district and facility levels. This involves medicines prioritization, effective forecasting and inventory management, as well as transparent monitoring of availability and the reasons for shortages. Despite the challenges, these results from Indonesian offer valuable insights for other nations, as the prices for publicly procured medicines are remarkably low, and the availability of priority medicines is relatively high when compared to data from other middle-income countries.

Indonesia, the world's fourth most populous nation, is striving to achieve UHC.[3] In 2014, the government introduced a national health insurance scheme, Jaminan Kesehatan Nasional (JKN).[4] At the start of 2023, the JKN scheme has registered over 253 million participants, representing 93% of the population. The government pays the premiums for economically disadvantaged people, and state employees, currently some 70 percent of registered participants.[5]

Nevertheless, the limited availability of healthcare services, especially in the parts with more people financially struggling, means that registration of participants may not translate into effective 'coverage'.[6]

Providing access to quality health services poses a formidable challenge in this vast island nation. Indonesia is exceptionally diverse. Some 150 million people are squeezed into the island of Java, just 6% of the land mass. The other 120 million Indonesians are

scattered across some 7000 other inhabited islands, spread out over a distance of more than 5000 km. Population density ranges from 1400/km^2 in West Java to 10/km^2 in North Kalimantan and Papua provinces. Income, health needs, and access to services are similarly diverse. While in central Java, 4% of the population lives below the local poverty line, poverty rates in Papua province are nearly 10 times higher. In the Java and Bali region, 94% of the villages have easy access to a hospital, in contrast with only 27% in Malukus, Nusa Tenggara, and Papua.[7] The most pressing challenge in improving health coverage lies in the eastern part of the country, where poverty rates and healthcare demands are highest, and accessibility to health facilities is most limited.[6,8]

The national health insurance scheme provides comprehensive coverage to all participants, including free access to the entire list of over 300 essential medicines.[9] Primary Health Centres (PHCs) play a crucial role in delivering health services and medicines. There are over 9900 PHCs that are strategically located throughout the archipelago, including rural and remote areas.[10] These PHCs offer a wide range of primary healthcare services, including maternal and child health services, family planning, immunizations, basic diagnostics, treatment of common illnesses, and management of chronic diseases. Since the majority of the population relies on PHCs as their first and primary source of free healthcare, it is crucial to ensure that essential medicines are available at these centres.[11]

Previous studies into the availability of medicines in public facilities offer a mixed picture. In 2020, the Indonesian Ministry of Health reported that a selection of 17 most needed essential medicines was available in 93.6% of PHC, as indicated by a self-reported survey completed by staff from 85% of the PHC.[12] Smaller studies, whereby researchers visited facilities and looked for specific medicines paint a more worrying picture. Three recent studies in public facilities in large cities on Java, the island where most medicines producers and distributors are based, found that even in the most developed parts of the country, medicine is frequently out of stock, leading to reduced treatment for patients. A study in 2019 in the capital Jakarta found that one in three PHCs were without essential hypertension medicine for over a year.[13] In Yogyakarta, the availability of 50 essential medicine in public facilities was around 76,6%[14] and a study in Surabaya found that one in four essential medicine were not sufficiently available in PHC.[15]

There are signs that the problems with the availability of medicines may be even greater in the more remote regions. In 2017, a study of 6 PHC in Keerom district in Papua showed that, of the 35 most essential medicine, 29% was not available, and 7% of the available medicine were expired.[16]

Little is known about the reason why some medicines are not available. Studies from other countries indicate that shortages in the public sector often stem from underbudgeting, inefficient purchasing practices, and inadequate stock management. A recent qualitative study in Indonesia suggests that low prices may also contribute to medicine shortages.[17] To be able to afford UHC, the Indonesian government has tried to bring down the prices of publicly procurement medicine by introducing a single-winner auction system. For each province, bidders have to pitch their prices below a fixed ceiling level and promise to fulfil orders up to the demand forecast by the Ministry of Health. Local health authorities have to procure essential medicines through the public procurement system, known as the e-catalogue. If medicines are not being supplied, public facilities may source them directly from the market.[18] The implementation of the auction system has effectively fostered competition between manufacturers and pushed down medicine prices, often to levels below the international reference price.[19] Low prices have made medicines more affordable, but have also put pressure on the profit margins of manufacturers, leading some companies to withdraw from the market, and making them less inclined to fulfil orders to remote regions that incur higher supply costs.[17]

Patients end up paying the price, as medicine shortages in public facilities force them to purchase their own medications from private outlets or go without treatment. This is especially problematic economically disadvantaged patients who live in areas with restricted access to alternative medicine outlets, such as pharmacies or drug stores, where prices can be relatively high.[20]

While Indonesia has made significant progress in covering its population with health insurance, it remains unclear which essential medicines are actually available, why some medications are not available, and to what extent people have access to alternative dispensing points. Insight into the availability of essential medicines throughout the country is essential to formulate policies to improve access, reduce inequalities and allocate resources to the areas where they are needed most.

This study aims to assess the availability of essential medicines in all PHCs throughout Indonesia, the reasons why medicines are unavailable, and the extent to which communities have access to alternative dispensing points, such as pharmacies and drug stores. Enumerators visited each of the 9831 PHCs across Indonesia to document the availability of 60 essential medicines and determine reasons for any unavailable medicines. We analysed the availability of both these 60 essential medicines, and a more focused set of 17 medicines prioritized by the Indonesian government, and explored the relationship between district fiscal capacity, percentage of limited percentage of economically disadvantaged people, accessibility to alternative dispensing points, performing

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independent financial management system and the 60-medicine availability.

Methods

Study design and setting

In this article, we present the results of the *Riset Fasilitas Kesehatan (Rifaskes)* study, a national health facility survey for which data about the functioning of all primary health centres in Indonesia was collected, including the availability of essential medicine.[21] The Rifaskes study was funded by the Government of Indonesia and was led by the authors of the present study (HH and YY), working at the Indonesian National Institute of Health Research and Development (*Balitbangkes*) with technical advice and support from academic experts (LT and RBF).

Study population and inclusion criteria

Data were gathered on site from all Primary Health Centres (*Pusat Kesehatan Masyarakat*) and district health offices in all 514 districts in Indonesia. PHCs were included in the survey when they were listed as active PHC at the start of 2019 (n = 9909) and were functioning as PHC when reached by the enumerators. PHCs were excluded when they were not active when visited by the enumerators or the function of the facility had changed (e.g. transformed into a hospital). Of the total of 9909 PHCs that were listed, 9831 PHCs (99.2%) were included in the survey and dataset.

Data collection

Preparation for the study started with a pilot of the questionnaire and data collection procedures in Cirebon District, West Java. The structured questionnaire was developed by a team of Balitbangkes. The structure and most questions and themes were inspired by the Service Availability and Readiness Assessment (SARA, developed by WHO in collaboration with USAID). The SARA instrument was adjusted to the Indonesian context by the research team, in close consultation with experts from the Indonesian government and academia. The main adjustment was that more questions were added regarding the performance PHCs and the district health offices.[22] The instrument that was used in the study is available at https://dataverse.harvard.edu/dataverse/Medicines_Indonesia.

Data were collected in each of the 514 districts by four local data collectors and one field coordinator. The field coordinators were staff members of Balitbangkes. The 2056 data collectors were hired locally, had at least a bachelor degree related to health, and received a one-day training to ensure the quality of the data collection process.

Data collectors used a paper-based structured questionnaire. Data were collected on-site between April and July 2019. The data collectors visited the PHC and interviewed the responsible staff members, including the head of the PHC, the treasurer, and the pharmacists or other staff members responsible for managing the PHC medicines.

Data management

The data collectors handed the paper questionnaires to the field coordinators, who double checked their completeness and entered the data in the Redcap online platform. The electronic data was stored at the data management unit at the National Institute for Health Research and Development. Data were ready to be used in 2020. Data management and analysis were done using IBM SPSS Statistics version 27.0.

To analyse the relationship between medicine availability, access to health providers and alternative dispensing points, and health insurance coverage, we merged the data from the Rifaskes study with two other national surveys to the district level.

The first is a national census of villages or Survei Potensi Desa (PoDes) 2019, a census of all villages in Indonesia: 94,573 village records. The second dataset comes from Sismonev JKN, an online platform from the National Social Security Council (DJSN), which provides demographic data about health insurance coverage per district (Sismonev JKN 2019). The three datasets were merged at district level without weighting, as all three datasets contain information based upon a total sample.

Data analysis

Continuous variables were reported as averages, or as median values with interquartile ranges when the variable was skewed. Normality assumptions were checked by inspecting the distribution of the residuals of the continuous outcome variables. We performed univariable and multivariable linear regression analyses to assess the relationship between the availability of 60 selected medicines and district's characteristics (type of district, fiscal capacity, percentage of JKN subsided participants, access to other medicine dispensing points, medicine availability at the District Health Office, and population density) and independent financial management at the PHC.

Ethics approval

Ethical approval for this study was received from the Health Research Ethics Committee, National Institute of Health Research and Development (HREC—NIHRD) with reference number LB.02.01/2/KE.011/2019.

Variables and measures

Availability of essential medicines
Data collectors visited all PHCs and checked, together with the responsible officials at the PHC, the availability of 60 essential medicines. According to Ministerial Health Decree HK.01.07/Menkes/688/2019, these 60 medicines should be available in all PHCs. This decree

describes the Indonesian Essential Medicine List (EML) and states which medicines should be provided at which type of facility. These 60 medicines are listed by the WHOs' Service Availability and Readiness Instrument (WHO SARA) as indicator medicine for essential medicine availability.[22] In our analysis, we also assess the availability of a smaller sub-selection of 17 medicines that are prioritized by the Indonesian Ministry of Health as 'most essential' medicines (marked with (M17) in Fig. 1). The data collectors checked whether a medication was available and did not distinguish between different strengths or variations of that medication.

Reasons for unavailability of medicines
If a medicine was not available, the responsible official at the PHC was asked why it was absent. Possible
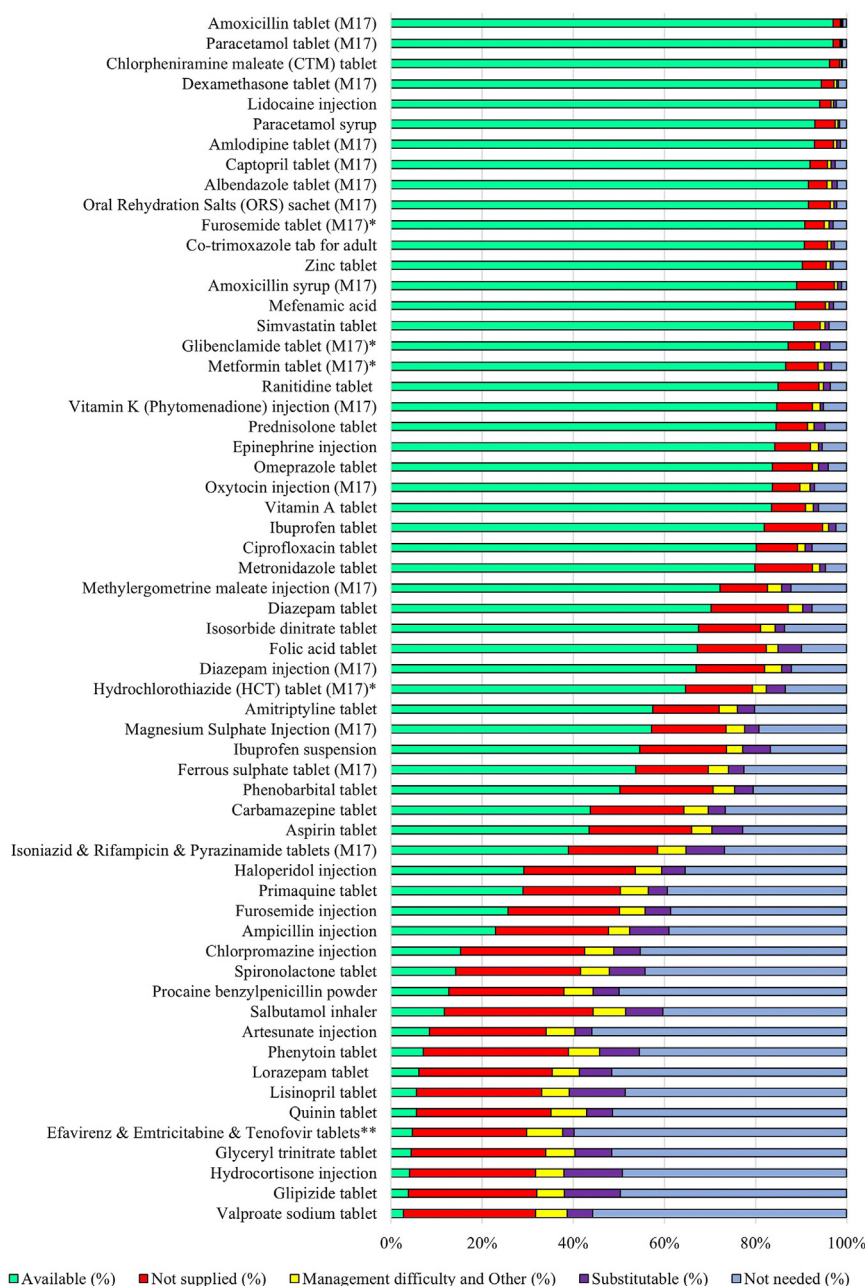

Fig. 1: The availability of 60 selected essential medicine in PHCs. M17 = Indonesian priority medicines. * = For the calculation of priority drugs (M17) the availability of glibenclamide tablet can be substituted for metformin tablet. and Furosemide tablet can be substituted for HCT tablet. ** = Tenofovir + Emtrisitabin + Efavirens tablets (HIV medicines) can be substituted by the combination of Tenofovir + lamivudin + Efavirens tablet.

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answers were: 1) not supplied to the PHC, 2) not needed at the PHC, 3) substitutable by another medicine, and 4) management difficulty and other. Additional data pertaining to the response category 'management difficulty and other' was not collected.

Districts and four regions

We followed the official division of districts in 'rural districts' (Kabupaten) and 'urban districts' (Kota) and five levels of district fiscal capacity (very low, low, middle, high and very high). In line with previous studies, we grouped Indonesia's 34 provinces into four regions that demonstrate similar economic characteristics, as shown in Table 1 and mapped in online supplementary material file.[1] From west to east, these four regions are 1) Sumatra and the western islands; 2) Java and Bali; 3) Borneo, West Nusa Tenggara (NTB), and Sulawesi, and 4) Eastern Indonesian (East Nusa Tenggara (NTT), Maluku and Papua). Supplementary Fig. S1 showed the four regions in Indonesia's map.

Population and insurance status

Using the data from Sismonev JKN 2019, we calculated insurer-reported coverage by dividing the number of registered participants (subsidised and non-subsidised) by district population. In our analysis, we focus on the participants with subsidised JKN health insurance. This is the most relevant segment for our analysis, as these Indonesians are considered economically disadvantaged by the Indonesian government. While health insurance coverage tends to be high in almost all districts in Indonesia, there are significant differences between districts in the percentage of participants with subsidised JKN health insurance.[6] This is both the most resource-limited segment of the population and the group that is most in need of free essential medicines from public facilities.

Access to health service providers and alternative medicine dispensing points

We constructed a proxy for physical access to health service providers and medicine dispensing points at the district level using data from 94,573 villages recorded. In PoDes 2019, village heads were asked whether various health services were present in the village, and if not, how easy it was to reach. We classified each health service as accessible if the service was present in the village, or 'easy' or 'moderately easy' to reach. We classified access as 'restricted' if the nearest facility was reported as 'hard' or 'very hard' to reach. The health services included are PHCs, hospitals, private clinics, general practitioners and midwives. In a similar way, we constructed a proxy for access to alternative medicines dispensing points at the district level, for which we included pharmacies, hospitals, and drug stores. Drug stores were included as a medicine dispensing point, as

studies show that they often sell a variety of 'prescription only' medicine.

Role of funding source

Funding sources played no role in research conceptualization, data collection, data analysis, data interpretation and writing the manuscript.

Results

Characteristics of the study population

Table 1 shows Indonesia's diversity in terms of population, availability of medicines, health service providers and medicine dispensing points, and insurance coverage across four different geographical regions.

The Java and Bali region is the richest, most populous and has the highest number of facilities offering health services and medicines, including pharmacies and drug stores. In contrast, Eastern Indonesia is the most resource limited and least populous region and has the lowest number of healthcare facilities and medicine providers.

While most facilities are concentrated in the Java and Bali regions, the sparsely populated Eastern Indonesia boasts approximately four times more PHCs per citizen. The eastern region has the lowest percentage of villages with access to healthcare while having the highest percentage of subsidised JKN participants. Eastern Indonesia has a much lower number of drug stores (147) compared to the other regions in the country, such as the Java Bali region (11,952).

The availability of 60 essential medicines

Fig. 1 shows the availability of each of the 60 essential medicine in all PHCs across Indonesia. Medicine availability varied greatly. Thirteen out of 60 essential medicines (22%) were available in more than 90% of the PHCs. The majority (33 out of 60) of the medicines were available in less than 80% of the PHC. Twenty out of 60 medicines were available in less than 30% of the PHC.

The reason that medicines were not available

When a particular medicine was not available, the responsible staff at the PHC were asked why it was out of stock. The most common response was that medicines were deemed 'not needed' (46%). The second most common reason, accounting for 38% of stockouts, was that medicines were not supplied to the PHC. Additionally, some medicines were unavailable due to being 'substitutable' (8%) or due to 'management difficulties' (8%). Surprisingly, half of the PHCs considered a quarter of the 60 essential medicines as 'not needed'. However, the other half reported that these fifteen medicines were neither substitutable nor supplied to them. Supplementary Fig. S2 shows the distribution of the average availability of the 60 essential medicine in PHCs. On average, 58% of the essential medicine were available.

	Region				Type of districts		National
	Sumatra	Java and Bali	Borneo, NTB and Sulawesi	Eastern Indonesia	Rural	Urban	
Population (in million people)	59.3	162.4	42.5	15.0	206.9	72.5	279.4
Population density	10,864	110,741	8242	3693	9495	293,389	15,038
Districts	154	128	147	85	416	98	514
District fiscal capacity [n]							
Very high	6	31	6	0	24	19	43
High	22	44	18	7	77	14	91
Middle	32	38	38	18	105	21	126
Low	42	14	43	29	104	24	128
Very low	52	1	42	31	106	20	126
Availability of Essential Medicine in PHC (out of 60) [mean sd]	34.4 (6.3)	36.3 (5.3)	35.0 (6.1)	32.3 (8.2)	35.0 (6.3)	35.0 (5.3)	35.0 (6.3)
Availability of Most Essential Medicine in PHC (out of 17) [median IQR]	14.0 (2.0)	14.9 (1.7)	14.3 (1.9)	13.2 (2.8)	14.3 (2.1)	14.6 (1.7)	14.3 (2.0)
Primary Health Centres	2547	3696	2373	1215	8131	1700	9831
Primary Health Centres with independent financial management	582	2138	345	174	2422	817	3239
Hospitals	711	1466	437	177	1583	1208	2.91
Private pharmacies	5611	14,647	5203	1227	17,283	9405	26,688
Drug stores	3933	10,952	1828	147	12,684	4176	16,860
Villages	25,621	25,988	18,996	13,332	78,691	5246	83,937
% of villages with easy to moderate access to any type of health facility[a] [M]	97%	100%	92%	66%	97%	100%	97%
% of villages with easy to moderate access to any other dispensing point[b] [M] (excluding PHC)	96%	100%	82%	37%	87%	100%	93%
Percentage of population with JKN coverage	73%	79%	86%	80%	76%	88%	79%
Percentage of JKN participants that are subsidised	47%	45%	55%	62%	51%	38%	48%

NTB: West Nusa Tenggara; JKN, *Jaminan Kesehatan Nasional*; PHC, Primary Health Centres; M, Median; IQR, Interquartile range. [a]Included facilities: primary health centres, pharmacies, private clinics, general practitioner practices and hospitals. [b]Included medicine providers are pharmacies, hospitals and drug stores.

Table 1: Study population characteristics by region and types of districts.

The availability of the 17 priority essential medicines

Given the frequency with which PHC staff identified multiple medicines as 'not needed' or 'substitutable', we also analysed the availability of the 17 medicines prioritized by the Ministry of Health as the 'most essential medicines' (marked with (M17) in Fig. 1). 82% of these 17 priority medicines were available (Supplementary Fig. S3 shows the distribution of the average availability). Six of the 17 most essential medicines were available in less than 80% of the PHCs. These six medicines were Methylergometrine maleate injection (72%), Diazepam injection (67%), Hydrochlorothiazide (HCT) tablet (65%), Magnesium sulphated injection (57%), Ferrous sulphate (54%), and Adult Anti-TB medicines (39%).

Since a previous study suggested that medicines were less likely to be supplied to more remote areas, we also assessed the average availability of medicines in PHCs per district. Fig. 2 shows the average availability of the 17 most essential medicines across all 514 districts in Indonesia. Availability ranged from 6.9 (41%) in the district with the lowest availability, to 17 (100%) in the best-performing district. Overall, there was a small difference in mean availability between rural (84%) and urban (85%) districts. However, when comparing urban and rural districts within each of the four regions individually, the differences were much larger.

Reasons for medicine absence per district

We assessed the main reasons for the absence of the 17 priority medicines in PHCs, comparing urban and rural districts within each region (Supplementary Fig. S4). In rural areas in Eastern Indonesia, as well as in the Borneo, NTB, and Sulawesi regions, the unavailability of priority medicines is predominantly attributed to supply problems, accounting for 46% and 48% respectively. In contrast, in urban districts of the Java and Bali regions, supply problems are less frequently cited as the cause for medicine unavailability (16%). Regardless of the region, the most common reason for the absence of the 17-priority essential medicine in rural districts is the failure to supply them, accounting for 44% of cases, compared to 32% in urban districts.

The availability of medicines based on treatment categories

The 60 essential medicines in our study are categorized in different treatment categories, which include: 1) Maternal, Neonatal, and Child Health (MNCH), 2) palliative care, 3) Diabetes, 4) Cardiovascular Diseases
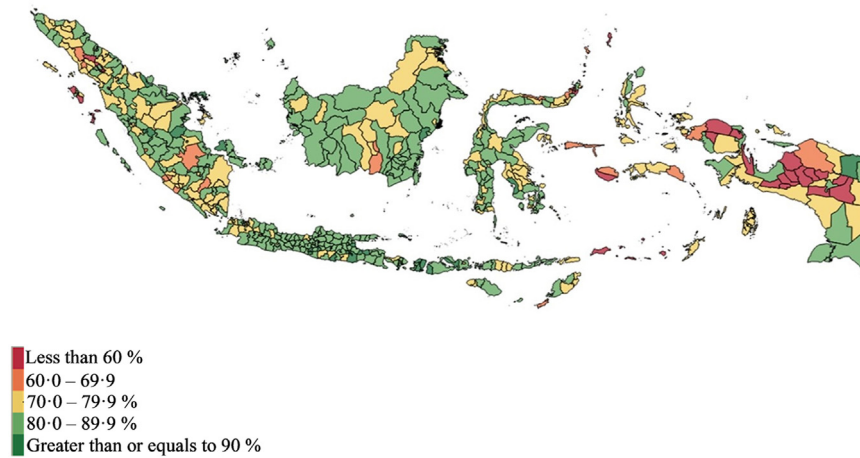
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Fig. 2: Average availability of 17 most needed essential medicines in PHCs at district level.

(CVD), 5) Chronic Respiratory Diseases (CRD), 6) Mental Health and Neurological Diseases, and 7) Infectious Diseases.

Fig. 3 shows the median (M) availability of medicines for each treatment category, per region and district type. There were large differences in availability between the categories. Medicines needed for maternal, neonatal, and child health services were most available (80%), while the availability of medicines for mental health was much lower (35%), with a notable scarcity in Eastern Indonesia (33%).

Access to health service providers and alternative dispensing points

We continue to identify access to the providers of health services and present the results in Supplementary Table S1. In urban districts throughout Indonesia and rural areas in the Java and Bali regions, 100% of the villages reported good access to a PHC (characterized as easy or moderately easy to reach). In rural areas in the other three regions, the percentage of villages with good access to a PHC was lower, with 92.3% in Sumatra, 89.3% in Borneo, and 63.2% in Eastern Indonesia.
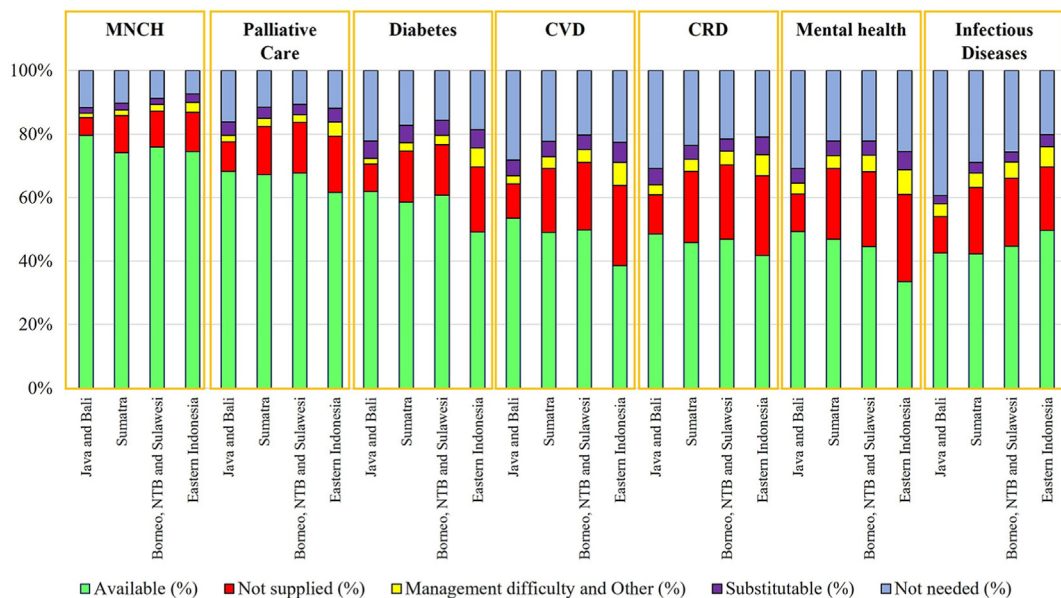

Fig. 3: The availability of 60 essential medicines, for each of the service categories, per region. MNCH: Maternal, Neonatal, and Child Health, CVD: Cardiovascular Diseases, CRD: Chronic Respiratory Diseases.

When medicines are not provided by a PHC, patients must obtain them from another provider. This is especially problematic when people are financially struggling and access to other medicine dispensing points is restricted. Table 2 shows that the percentage of the JKN subsidised participants is the highest in rural Eastern Indonesia (as indicated by the 81.7% who have subsidised health insurance). While people in these districts are most dependent on free medicines provided by the PHC, access to PHCs is most restricted (63.2%) and they have less access to other dispensing points (34.9%), including pharmacies (31.8%), hospitals (24.1%) and drug stores (6.4%), compared to other regions (Supplementary Fig. S5 shows the maps with access to community pharmacies, hospitals and alternative dispensing points per district).

Regression analysis

Table 2 displays our regression analyses. It shows that in districts with more resource-limited populations (higher percentage of people with subsidised JKN), the availability of essential medicines was lower. In districts with less access to alternative dispensing points, the availability of essential medicine was also lower. PHCs which managed their own finances had a higher availability of medicines, compared to PHCs for which finances were managed at the district level. These relations were strongest in Eastern Indonesia, compared to the other regions.

Discussion

Our study for the first time examines the availability of essential medicine in all primary health centres across Indonesia. The results show that medicines availability varies greatly. The median availability of the 17 medicines prioritized by the government as 'most essential' was 82%. On average, 58% of a broader selection of 60 essential medicines was present. The most frequent reason for the absence of medicine is that they were deemed not needed. 38% of the stock-outs were due to medicines not being supplied to the PHC. The availability of medicines varied depending on the type of medicine and the region in which the PHC was located. Medicines for maternal and child health services showed the highest availability, while medicines for infectious diseases and mental health (47%) were the least available. The eastern region of Indonesia, especially the rural areas, had the lowest availability of medicines, and the most districts in which even the 17 priority medicines were poorly available. While at the national level, medicine availability in PHCs seems relatively high, the poor supply of medicines in more remote parts of the country needs attention, as the population in these districts has the lowest income is most dependent on public health services, where they should receive medicines free of charge.

The results provide insight into both the strengths and weaknesses of medicine availability in Indonesia. Careful interpretation is required. The availability of the 17 most essential medicines at 82% appears notably high, compared to availability data from other large middle-income countries such as the Philippines (30,1%) Pakistan (35%), and India (41,3%),.[23–26] Availability was even higher (85%) in the three most densely populated regions of the country, where a large majority (>95%) of the population lives. The Indonesian government has succeeded in achieving this high availability while bringing down the prices of publicly procured medicines to levels that are low by international standards.[19] The combination of low prices in the public sector and widespread availability of priority medicines to the majority of the population presents an interesting example for other countries striving to attain universal health coverage.

At the same time, our analysis shows that focusing on the average availability of a narrow selection of medicines also has its downsides, as it offers only a partial view. When we examine the larger group of 60 medicines, it becomes evident that several essential medicines were frequently unavailable. Comparing the average availability of this larger selection of medicines with survey results from other countries poses challenges, as our study includes a relatively large number of medicines and draws upon data from all functioning PHCs. We observed large variations in availability among different medicines and between regions within Indonesia. A smaller selection of medicines and a more limited number of sampling locations, as is customary in studies in other countries, can lead to different outcomes. Our detailed analysis shows that, rather than just focusing on average availability, it may be more interesting and useful to look at why medicines are not available and compare different areas. Although medicine availability studies are conducted in many countries, they seldom survey why medicines are not available.

A remarkable finding is that, as reported by local PHC staff, the most common reason for the absence of medicines is that they are deemed unnecessary. This may be appropriate for some medications, given the vast geographical and disease diversity of Indonesia. Diseases such as malaria are confined to specific districts, thereby requiring medication availability in only select PHCs.[27] Another possibility is that some medications are labelled as unnecessary because the health problems for which they are needed, remain undiagnosed at PHCs, or appropriate care is not provided for other reasons. The frequent claim that medicines for mental health and palliative care are not needed, particularly in rural districts and Eastern Indonesia raises concerns about the adequacy of care in these areas. This issue deserves urgent attention, especially for populations with limited access to other public health facilities and medicine outlets.

Articles

	Unstandardized β Coefficients	95 CI	Standardized β Coefficients	P-value	Adjusted R2 (%)
Univariable					
Type of districts	0.03	−0.30: 0.35	0.00	0.878	0.00
District fiscal capacity					
Very low	−2.24	−2.58: −1.91	0.13	<0.001	0.02
Low	−0.80	−1.11: −0.46	0.05	<0.001	0.00
Moderate	1.24	0.95: 1.54	0.08	<0.001	0.00
High	0.89	0.60: 1.20	0.60	<0.001	0.00
Very high	0.33	0.05:0.66	0.02	0.036	0.00
Percentage of JKN subsided participants	−0.03	−0.03: −0.02	−0.08	<0.001	0.01
Access to any alternative dispensing points	0.06	0.05: 0.06	0.21	<0.001	0.04
Independent financial management	1.63	1.37: 1.90	0.12	<0.001	0.02
Population density	−0.00	0.00: 0.00	−0.01	0.381	0.00
Multivariable					
All regions					
Type of districts	−1.12	−1.55: −0.69	−0.07	<0.001	0.12
District fiscal capacity					
Very low	*Reference*				
Low	0.94	0.54: 1.34	0.06	<0.001	
Moderate	2.01	1.61: 2.41	0.14	<0.001	
High	1.29	0.88: 1.70	0.09	<0.001	
Very high	0.52	0.03: 1.01	0.03	0.036	
Percentage Of JKN subsided participants	−0.02	−0.03: −0.01	−0.05	<0.001	
Access to any alternative dispensing points	0.05	0.04: 0.06	0.19	<0.001	
Independent financial management	0.93	0.66: 1.21	0.07	<0.001	
Population density	0.00	0.00: 0.00	−0.02	0.032	
Java & Bali Region					
Type of districts	−0.86	−1.47: −0.26	−0.07	0.005	0.04
District fiscal capacity					
Very low	*Reference*				
Low	−1.25	−2.57: 4.75	0.01	0.510	
Moderate	0.92	−0.93: 0.6	−0.01	0.620	
High	−0.36	1.49: 2.52	0.15	0.850	
Very high	−1.09	0.28: 1.17	0.07	0.560	
Percentage of JKN subsided participants	0.01	−0.01: 0.02	0.02	0.340	
Access to any alternative dispensing points	−0.03	−0.08: 0.02	−0.02	0.250	
Independent financial management	0.80	0.46: 1.15	0.08	<0.001	
Population density	0.00	0.00: 0.00	−0.04	0.040	
Sumatra Region					
Type of districts	−1.77	−2.78: −0.76	−0.10	<0.001	0.04
District fiscal capacity					
Very low	*Reference*				
Low	0.32	−0.37: 1.00	0.02	0.366	
Moderate	0.21	−0.52: 0.94	0.01	0.571	
High	0.01	−0.73: 0.75	0.00	0.980	
Very high	0.18	−1.27: 1.63	0.01	0.809	
Percentage of JKN subsided participants	−0.04	−0.06: −0.02	−0.11	<0.001	
Access to any alternative dispensing points	0.03	0.01: 0.05	0.07	0.001	
Independent financial management	1.76	1.16: 2.35	0.12	<0.001	
Population density	0.00	0.00: 0.00	0.06	0.054	
Borneo. NTB and Sulawesi Region					
Type of districts	−0.92	−2.04: 0.21	−0.05	0.111	0.07
District fiscal capacity					
Very low	*Reference*				

(Table 2 continues on next page)

	Unstandardized β Coefficients	95 CI	Standardized β Coefficients	P-value	Adjusted R2 (%)
(Continued from previous page)					
Low	1.96	1.29: 2.64	0.14	<0.001	
Moderate	3.98	3.28: 4.68	0.29	<0.001	
High	3.12	2.27: 3.96	0.18	<0.001	
Very high	1.32	0.06: 2.57	0.05	0.040	
Percentage of JKN subsided participants	−0.02	−0.03: 0.00	−0.05	0.090	
Access to any alternative dispensing points	0.02	0.00: 0.03	0.06	0.010	
Independent financial management	0.10	−0.60: 0.80	0.01	0.786	
Population density	0.00	0.00: 0.00	−0.08	0.005	
Eastern Indonesia Regions					
Type of districts	0.75	−1.89: 3.39	0.02	0.578	0.11
District fiscal capacity					
Very low	*Reference*				
Low	1.20	0.08: 2.32	0.07	0.036	
Moderate	−0.79	−2.08: 0.50	−0.04	0.229	
High	0.45	−1.36: 2.26	0.02	0.626	
Percentage of JKN subsided participants	−0.16	−0.22: −0.1	−0.24	<0.001	
Access to any alternative dispensing points	0.06	0.04: 0.09	0.19	<0.001	
Independent financial management	−0.01	−1.28: 1.27	0.00	0.993	
Population density	0.00	0.00: 0.00	−0.10	0.024	

Table 2: The availability of 60 essential medicines, percentage of JKN subsidised participants, access alternative dispensing points, independent financial management and population density—linear regression model including district fiscal capacity and type of district.

The recurring assertion that certain essential medicines were considered unnecessary in PHCs raises questions about which medicines should be available where and the best way to monitor availability in such a diverse country. Currently, the supply and availability of medicines in the public sector is regulated at a national level. These national regulations state that everyone covered by national health insurance is entitled to free access to over 300 essential medicines from their local PHCs.[9]

The results show that there are significant regional disparities in medicine availability. These differences are not necessarily problematic and may even be a strength of the existing decentralized pharmaceutical system. Although East Indonesia exhibited the lowest average availability of medicines, the data shows that it has the highest availability of medicines against infectious diseases. This suggests that local health authorities are strategically allocating their limited budgets to procure the medicines they consider most essential for their local population.

A drawback of these local differences is the lack of clarity for patients regarding the medicines available at their respective PHC. To improve access in practice, it could be beneficial to provide clear information about the specific medicines available at each PHC. This could empower patients to make informed choices decisions about where to seek appropriate care and hold their PHC accountable, while also offering health workers a clear understanding of what they are expected to provide. Ensuring insight into the availability of medicines may also help to convince self-insured Indonesians to continue to pay for their public health insurance, as it shows the benefits of maintaining insurance coverage.[28]

The results of our study are also pertinent to the ongoing discussion about the best approach to monitoring medicine availability. In Indonesia, the current monitoring system relies on the self-reported availability of the 17 priority medicines in PHCs. Our findings are about 10% lower than those reported by the Ministry of Health, which may be due to more complete sample. Our findings also show that the selection of 17 indicator medicines is quite limited. To make medicine monitoring more useful, it may help to expand the number of medicines included in the monitoring framework. There is also merit in considering the monitoring of additional medicines at the sub-national level and the use of a track and trace system[29] Adopting a combination of national and locally specific indicators offers distinct advantages. It enables performance monitoring and learning from differences at multiple levels within the same framework. Engaging decision-makers at both national and local levels in the selection of their own indicator medicines may also help to enhance ownership, facilitate improvement efforts and promote accountability among national and local health authorities.[30]

Articles

The primary weakness of the Indonesian approach is that medicines are too often unavailable because they are not being supplied. The lack of supply accounts for 38% of the absence of essential medicines and is the main cause of regional disparities and lower availability in rural and more remote districts, especially in the east. To supply its public health facilities with medical products, Indonesia relies on its competitive and largely domestic pharmaceutical sector. Indonesia has successfully managed to mobilize market forces to push down medicine prices and supply most of its PHCs with priority medicines.[31] The weakness of this same approach is that when it is not profitable to supply a health facility, due to high transportation costs or low volumes, market forces determine that patients are not provided with the medicines they need. This disproportionally impacts to the low-income patients living in sparsely populated and remote districts that are thousands of kilometres away from the manufacturers of medicines. Poor availability of medicines in public facilities pushes patients to private pharmacies and drug shops, where medicines are often sold at relatively high prices, and patients may encounter products from unregulated supply chains, which are more likely to be expired and of poor quality.[17,32,33]

Until recently, the Indonesian government tried to improve availability in remote areas by offering a premium of up to 20% to incentivize delivery to the most far-flung parts of the archipelago. The lower availability in these remote areas indicates that this premium was not sufficient. Starting in 2023, a new approach was introduced. The consolidated tenders per province were dropped, and now each health facility is free to negotiate directly with manufacturers. While this may work well in the wealthier parts country, where there is sufficient competition between suppliers, it may not be as effective in the low fiscal capacity, least populated, and more remote districts. Fragmentation of demand in these areas could reduce negotiating power and potentially lead to higher prices. Implementing some form of local-level pooled procurement could aid in mitigating these risks.[34] Another concern is that prices paid will no longer be visible to the public, which contradicts WHO recommendations for transparent medicine pricing policies.[35,36]

The effects of these changes on the availability and price of medicines in the public health system in Indonesia are difficult to predict. Given the pivotal importance of access to medicines for people's health, it is essential to ensure careful monitoring and in-depth research to assess the impact of this new approach on changes in medicine accessibility and pricing within Indonesia's public health system. The latest government regulation aims to offer the public real-time insight into the availability of medicines in health facilities, contributing to effective monitoring.

A strength of this study is that it covers data from practically all PHCs in Indonesia, which allows for a unique and comprehensive assessment of medicines availability and regional disparities across one of the largest and most diverse countries in the world. A potential limitation is that the availability of medicines was assessed at only one moment in time. Recent studies in other countries show that medicine availability in public facilities tends to fluctuate over time. While it may be interesting to track availability in specific PHCs, our large sample makes it unlikely that longitudinal tracking would lead to very different outcomes. We also note that there may be more alternative dispensing points than those included in our study, such as physicians, midwives, or small private clinics who also sell medicines. Ideally, the analysis should have as the end goal not the availability of medicines, but patient outcomes.

Overall, this study shows that the availability of prioritized essential medicines in PHCs across Indonesia is relatively high, which is an important finding given the low prices for publicly procured medicines. The average availability of a more comprehensive selection of 60 essential medicines was lower (58%), with some medicines frequently being considered unnecessary by local staff. The availability of medicines was found to be lowest in rural districts, particularly in the Eastern part of Indonesia, where access to other medicine providers is also most limited. These findings unveil both the strengths and weaknesses of medicine availability in PHCs in Indonesia and can be used to guide efforts towards improving access to essential medicine and furthering the goals of achieving universal health coverage.

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