ORIGINAL ARTICLE

# Availability and Affordability of Essential Antihypertensive Medicines in Public and Private Primary Care Drug Facilities in a 4th Class Municipality in the Philippines

Reyshell Marie M. Lat, Ron Joseph N. Samonte and Frances Lois U. Ngo, RPh, MHSS

*Department of Clinical, Social and Administrative Pharmacy, College of Pharmacy, University of the Philippines Manila*

## ABSTRACT

**Background.** The pharmaceutical subsystem is a complex interrelationship among different stakeholders that ensure access to safe, effective, and quality pharmaceutical products in the market. Understanding the availability and affordability as key areas for access to medicines is essential to appreciate the strategies needed to strengthen the pharmaceutical subsystem.

**Objectives.** This study aimed to determine the availability and affordability of essential antihypertensive medicines in public primary care facilities and private retail drugstores in a 4th class municipality. Further, the study determined the price comparisons of these essential antihypertensive medicines with international reference prices.

**Methods.** This is a quantitative, cross-sectional study design which employed a modified WHO/HAI methodology to quantify antihypertensive medicines' availability and affordability in public and private primary care drug facilities. Selection of medicines was based on a criteria applicable for the primary care setting. Availability was measured through visual inspection of the selected medicines in the facility, affordability was estimated through the selling price of medicines in the public and private facilities, respectively, and was divided by the local minimum wage of the municipality. Median price ratio was computed using the local median prices over the MSH 2015 international reference prices adjusted for inflation.

**Results.** Availability of essential antihypertensive medicines was found to be 12.96% in public facilities and 60.32% in private facilities (p = 0.0002). Only amlodipine is observed to be available in both public (83.33%) and private (85.71%) facilities, while only metoprolol 50 mg tab (33.33%) and amlodipine 5 mg tab (83.33%) were available in public facilities. All medicines are below 1 MPR, but carvedilol 6.25 mg (1 tab BID: 1.32; 2 tabs BID: 2.65), 25 mg (BID: 2.65), and enalapril 5 mg (BID: 1.14; TID: 1.70) treatment regimens are unaffordable compared to a worker's day wage.

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Corresponding author: Frances Lois U. Ngo, RPh, MHSS
Department of Clinical, Social and Administrative Pharmacy
College of Pharmacy
University of the Philippines Manila
Taft Avenue, Ermita, Manila 1000, Philippines
Email: fungo@up.edu.ph
ORCiD: https://orcid.org/0000-0002-5596-4398

**Conclusion.** Availability of essential antihypertensive medicines is diverse comparing public and private facilities. There is a need to increase the availability of antihypertensive medicines in public facilities as this is an important quality measure of primary care services. Public facilities can leverage on the availability of medicines in private pharmacies by forming Primary Care Provider Networks. While most medicines were deemed affordable in the private setting, there are still drugs such as carvedilol and enalapril, that need to be regulated. There is a need to strengthen the local pharmaceutical subsystem because it is essential to ensure safe, effective, and quality medicines in the local health system through adequate mobilization of resources.

*Keywords: pharmaceutical subsystem, access to medicines, availability, affordability*

## INTRODUCTION

The World Health Organization (WHO) underscores the importance of access to essential medical products, vaccines, and technologies as a means to define functional health systems.[1] To ensure access to these health technologies, methods to strengthen the pharmaceutical system should be properly planned, executed, and monitored. Various organizations have defined the pharmaceutical system and how it affects the health system, due to this complexity, a study was conducted to review available frameworks and their domains. Over all, Hafner et al. defined the pharmaceutical system to consist of "all structures, people, resources, processes, and their interactions within the broader health system that aim to ensure equitable and timely access to safe, effective, quality pharmaceutical products and related services that promote their appropriate and cost-effective use to improve health outcomes."[2]

National policies aimed to increase availability and affordability of medicines have been passed in the country such as the Generics Act of 1998, the Universally Accessible Cheaper and Quality Medicines Act of 2008, the TRAIN and CREATE Laws allowing VAT-exemption of selected medicines, and 20 percent discount and VAT-exemption for senior citizens and persons with disability. Further, the Philippine Medicines Policy (PMP) operationalizes the strategic thrust of the country towards universal access to medicines and health technologies. The PMP 2022-2030 covers six key pillars: (1) Assurance to Safety, Efficacy, and Quality; (2) Collaboration on Availability and Affordability; (3) Commitment to the Rational Use of Medicines; (4) Effective Networking, Partnerships, and Governance; (5) Sustainable Financing for Medicines; and (6) Strengthening Health Systems.[3]

The second pillar of the Philippine Medicines Policy highlights different strategies to drive the increase in availability and affordability of medicines as important domains of access to medicines in the country. This includes promotion of self-sufficiency through local production of health technologies, strengthening strategic procurement initiatives for medicines, implement the Philippine Supply Chain Roadmap, create equitable access schemes for medicines in geographically isolated and disadvantaged areas (GIDAs), ensure timely supply and delivery of essential medicines and its alternatives to Indigenous Cultural Communities (ICC) and Indigenous Peoples (IP), and ensure drug and vaccine security for health emergencies.[3]

However, there have been various problems that constantly challenge the pharmaceutical system of the country, specifically on medicines availability and affordability. A national study in urban cities found that medicines have limited availability in private outlets (74%) and public health facilities (69%). Affordability remains to be relatively low where treatment for moderate adult pneumonia costs 1.3 day's wage in the public sector, and 1.4 day's wage in the private sector. While treatment for hypertension costs 0.8 day's wage and 0.7 day's wage in the public and private sector, respectively.[4] Another study covering six regions of the country surveying 50 medicines found that 25% and 35.4% of lowest-priced generics of the surveyed drugs are available in the public and private facilities, respectively. Specifically, high availability was observed for amlodipine, losartan, and metformin both in the public and private sectors; while atorvastatin, captopril, and simvastatin were found to be highly available in the private sector only. Further, the study found that 20 of the medicines in their lowest-priced generics were affordable. It is worth noting that insulin glargine, is the most unaffordable needing 7.88 days' wage to pay for monthly treatment.[5]

Access to effective, safe, and quality medicines is an important component of health service delivery in providing appropriate pharmacologic interventions to achieve universal healthcare targets for high quality patient care. Out-of-pocket spending for medicines is a significant burden for patients where medicines are not covered by social health insurance in the inpatient and outpatient settings. It has been reported that medicines can account for about 67% of total health expenditures in low-middle income countries.[6] Therefore, increasing access to essential medicines by increasing financial risk protection ensures equitable access to these life-saving interventions. In the Philippines, UHC has expanded coverage to indigents and senior citizens who both have limited capacity to pay but are identified vulnerable groups to catastrophic spending.[7,8] Rural communities and geographically isolated and disadvantaged areas (GIDAs) are particularly exposed to the challenges faced by the local health systems, especially in primary health care, in the country due to geographic and financial inaccessibility, inadequate funding, inconsistent medication supply and equipment, personnel shortages, and unavailability of health services.[9,10] There is a lack of studies to describe the access to medicines in these communities which is vital in providing a strategic direction in enhancing service delivery.

The WHO/HAI methodology effectively appraises and quantifies domains of access to medicines by collecting evidence on medicine prices and availability.[11] This methodology requires the collection of price components and compare this with international reference prices to reference the current prices of the region to the external prices.[12]

This study aims to determine the availability and affordability of essential antihypertensive medicines in public primary care facilities and private retail drugstores in a 4th class municipality. The study determined the price comparisons of these essential antihypertensive medicines with international reference prices.

## METHODS

### Research Design

This study employs a quantitative, cross-sectional design to determine the availability and affordability of essential antihypertensive medicines in public and private primary care drug facilities in a 4th class municipality through face-to-face visual inspection of the facility's inventory, computation of treatment costs, and medicine price ratios.

### Study Site

The study was conducted in Magallanes, Cavite, a 4th class municipality in Region IV-A, Philippines with a population size of 23,851 in the 2020 Philippine Statistics Authority (PSA) census.[13] The municipality is a partner community of the University of the Philippines Community Health and Development Program. The muni-cipality has no government or private hospital but has 12 barangay health stations and one rural health unit that cater to the health needs of 16 barangays with one barangay classified as a geographically isolated and disadvantaged area, Brgy. Ramirez.[14] The municipality has limited private drug facilities. Table 1 shows the characteristics of government-owned health facilities in the municipality.

**Table 1.** Characteristics of Government-owned Health Facilities in Magallanes, Cavite

| Facility | Barangay Location | Services |
|---|---|---|
| ***Rural Health Unit (RHU)*** | Kabulusan | Medical consultation, laboratory testing, prenatal consultation, family planning, animal bite treatment, TB DOTS clinic |
| ***Botika ng Bayan (BNB)*** | Kabulusan* | Free medicines |
| ***Barangay Health Centers*** | 12 out of 16 barangays | Primary care services, house visits |

**Located inside the RHU*

### Sampling Plan

Due to the limited number of health facilities in the municipality, this study employed a total population sampling of all public and private ambulatory drug facilities. A total of 21 health facilities composed of public and private drug facilities are included in the study. Table 2 shows the total number of health facilities and their type of ownership.

**Table 2.** Health Facilities Included in the Study

| Health/Drug Facility | Type of Ownership | Number of Facilities |
|---|---|---|
| ***Rural Health Unit*** | Public | 1 |
| ***Barangay Health Center*** | Public | 12 |
| ***Retail Drugstore*** | Private | 8 |
| ***Total*** | | 21 |

Inclusion criteria for public facilities are: (1) a municipal- or barangay-level facility handling medicines and (2) should procure medicines in the capacity of the local government. While the exclusion criterion is: (1) carrying medicines that come from the national government or donated.

Private drug facilities were based on the Philippine Food and Drug Administration (FDA) verification portal containing the list of drug establishments with a valid License to Operate as a drug retail outlet. The inclusion criteria of private drug facilities are as follows: (1) a privately-owned, independent or chain, facility providing drug retail services to the residents of Magallanes, Cavite; (2) located within the municipality of Magallanes, Cavite; and, (3) with a valid License to Operate as a drug retail outlet from the Philippine Food and Drug Administration. The exclusion criteria for private drug facilities are: (1) those that provide hospital and nursing home services; (2) drug facilities run by charities or NGOs; (3) drug facilities that refuse to participate in the study; and, (4) drug facilities that are closed during the visit for data collection.

The informant of the included facilities may choose to withdraw from the study should they request to exclude themselves at any point during the data collection without imposing any consequences. In case of withdrawal from the study, all collected data pertaining to the facility shall be excluded from analysis.

### Selection of Medicines

The surveyed medicines were composed of six essential antihypertensive drugs, chosen using the following criteria: (1) must be part of the WHO Model List of Essential Medicines; (2) must be part of the Philippine National Formulary with prices listed in the DOH Drug Price Reference Index 2022; and (3) must be under the molecules covered by the Philippine Package of Essential Non-Communicable Diseases Interventions (PhilPEN) as stipulated in DOH AO 2012-0029. The list of the selected essential antihypertensive medicines is found in Table 3.

### Instrumentation

The questionnaire utilized a modified version of the WHO/HAI methodology for measuring availability, affordability, and price components of medicines. The interviewer-

**Table 3.** List of Selected Essential Antihypertensive Medicines

| Generic Name | Dosage Form | Dosage Strength |
|---|---|---|
| ***Enalapril*** | tablet | 5 mg<br>20 mg |
| ***Atenolol*** | tablet | 50 mg |
| ***Carvedilol*** | tablet | 6.25 mg<br>25 mg |
| ***Metoprolol*** | tablet | 50 mg<br>100 mg |
| ***Amlodipine*** | tablet | 5 mg |
| ***Hydrochlorothiazide (HCTZ) + Telmisartan*** | tablet | 12.5 mg + 40 mg |

guided questionnaire was divided into three parts: (1) sociodemographic characteristics of the informant, (2) availability, and (3) affordability. In the availability section, the informants were asked about the physical availability of each included essential antihypertensive medicine. While for the affordability section, informants were asked about the lowest unit price paid by the patient (private facility) or the lowest unit price paid by the facility (public facility). Answering the questionnaire was estimated to take 30 minutes.

## Data Collection Procedure

Each drug facility was asked to nominate two personnel who had the most knowledge on the availability and affordability of medicines in their workplace. The representatives were interviewed in a private area of the facility to ensure confidentiality of the discussion. An informed consent form was provided to the selected interviewees to explain the scope of the study and to ask for their approval to participate in the data collection process. A medicine was marked available if it was physically observed by the field data collector in the gondola or storage of the facility. Medicine prices were obtained by asking the respondents or by records inspection.

## Data Processing and Analysis

All data were cleaned, processed, and analyzed through MS Excel. Sociodemographic variables were described using frequency statistics. Availability of essential antihypertensive medicines were analyzed through descriptive statistics and was reported as the percentage (%) of facilities in which the selected essential antihypertensive medicines visually inspected during the time of data collection. It was classified using the WHO classification of medicines availability as listed in Table 4.

**Table 4.** Classification of Medicines Availability Used in Study

| Availability | Percentage (%) |
|---|---|
| ***Not available*** | 0 |
| ***Very low*** | <30 |
| ***Low*** | 30–49 |
| ***Fairly high*** | 50–80 |
| ***High*** | >80 |

Treatment affordability was assessed using per capita income or through the number of days' wages a lowest-paid government employee or worker could afford a monthly course of treatment depending on the different treatment regimens for hypertension. Minimum wage in Magallanes, Cavite was taken from the website of Cavite Province which set the minimum wage rate at PhP 317.00, this amount was set as the reference point for the affordability of the drug regimens.[15] To compute for the monthly course of treatment, the median unit price (MUP) for each selected medicine found in all facilities was multiplied by the total number of drugs to complete the treatment regimen, divided by the daily minimum wage of an agricultural or non-agricultural worker in Magallanes, Cavite (Figure 1). Less than a day's wage to purchase the whole course of treatment means good/high affordability, while more than a day's wage would mean poor/low affordability.

$$\text{Affordability} = \frac{\text{Drug regimen median unit price (MUP)}}{\text{PhP 317.00 (minimum wage rate)}}$$

**Figure 1.** Computation of Medicine Affordability.

To facilitate international price comparisons, local MUPs were expressed as ratios relative to a standard set of international reference prices listed in the Management Sciences of Health (MSH) International Medical Products Price Guide to get the Median Price Ratio. Prices listed in MSH were adjusted for inflation by computing for the inflation factor using Philippine consumer price indices (CPIs) of the survey year and the base year to derive real-time MPR values. The computed international reference prices are listed in Table 5.

**Table 5.** Unit International Reference Prices of Selected Essential Antihypertensive Medicines

| Generic Name | Dosage Strength | Unit International Reference Price (in USD) |
|---|---|---|
| ***Enalapril*** | 5 mg<br>20 mg | 0.0101<br>0.0114 |
| ***Atenolol*** | 50 mg | 0.0107 |
| ***Carvedilol*** | 6.25 mg<br>25 mg | 0.0552<br>0.0439 |
| ***Metoprolol*** | 50 mg<br>100 mg | Not available<br>0.0444 |
| ***Amlodipine*** | 5 mg | 0.0157 |
| ***Hydrochlorothiazide (HCTZ) + Telmisartan*** | 12.5 mg + 40 mg | Not available |

## Ethical Considerations

The study was submitted to the University of the Philippines Manila Research Ethics Board (UPMREB) and was classified as Expedited (UPMREB 2023-0148-

UND). Informed consent was administered and requested to informants before the actual data collection. The informants were requested to carefully read the informed consent form and were aware that privacy and confidentiality of their personal information were ensured in the reporting of results.

## RESULTS

### Demographic Characteristics of Informants

A total of 13 facilities were recruited for the study with six public and seven private facilities. Reasons for exclusion include: declined to participate (one private facility), did not carry medicines (six barangay health centers), and did not procure their own medicines (one barangay health center).

A total of 19 personnel, who served as informants, were interviewed. Majority of the informants were working as pharmacists (21.05%) and barangay health workers (21.05%), while barangay treasurers (15.79%) also provided administrative information on drug availability and affordability in the facility. Majority of which are college graduates (68.42%), wherein five (26.32%) studied BS Pharmacy, three (15.79%) studied BS Nursing, and two (10.53%) studied BS Business Administration. Most of the interviewed informants had 1-5 years of experience (57.89%). Demographic characteristics of the informants are summarized in Table 6.

**Table 6.** Demographic Characteristics of Study Informants

| Demographic characteristic (n=19) | Frequency (n) | Percent (%) |
|---|---|---|
| ***Position*** | | |
| Pharmacist | 4 | 21.05 |
| Barangay Health Worker | 4 | 21.05 |
| Barangay Treasurer | 3 | 15.79 |
| Pharmacy Owner | 2 | 10.53 |
| Nurse | 2 | 10.53 |
| Sales Manager | 2 | 10.53 |
| Pharmacy Assistant | 1 | 5.26 |
| Sanitation Officer | 1 | 5.26 |
| ***Degree*** | | |
| BS Pharmacy | 5 | 26.32 |
| BS Nursing | 3 | 15.79 |
| BA Business Administration | 2 | 10.53 |
| BA Economics | 1 | 5.26 |
| Bachelor of Elementary Education | 1 | 5.26 |
| Bachelor of Commerce | 1 | 5.26 |
| Did not graduate college | 6 | 31.58 |
| ***Years of Experience*** | | |
| Less than 1 | 1 | 5.26 |
| 1 to 5 | 11 | 57.89 |
| 6 to 10 | 2 | 10.53 |
| 11 to 15 | 3 | 15.79 |
| More Than 15 | 2 | 10.53 |

### Availability of Essential Antihypertensive Medicines

Table 7 describes the level of availability of selected antihypertensive medicines in the drug facilities surveyed. Majority of the medicines were unavailable in the public sector where only metoprolol 50 mg tab (33.33%) and amlodipine 5 mg tab (83.33%) were available in public facilities. Meanwhile, all medicines were found to be available in the private sector except for HCTZ + Telmisartan (0.00%). Metoprolol 50 mg tab (100.00%), metoprolol 100 mg tab (85.71%), and amlodipine 5 mg (85.71%) were highly available. Enalapril 5 mg tab (71.43%), atenolol 50 mg (71.43%), and carvedilol 25 mg (71.43%) showed fairly high availability. There was low availability of carvedilol 6.25 mg tab (42.86%) and an observed very low availability for enalapril 20 mg. No originator brands were available in public and private facilities in the municipality.

Overall, the mean percentage availability of all surveyed essential antihypertensive medicines in public facilities is 12.96% and the same medicines are 60.32% available in private facilities. An analysis of variance was conducted to confirm the difference between the availability of medicines in the public and private sectors ($p = 0.0002$).

**Table 7.** Frequency and Percent Availability of Selected Medicines in Public and Private Facilities

| Essential Antihypertensive Medicine | Lowest-priced Generic (LPG) | | Originator Brand (OB) | |
|---|---|---|---|---|
| | Public, n=6 | Private, n=7 | Public, n=6 | Private, n=7 |
| ***Enalapril 5 mg*** | 0 (0.00) | 5 (71.43) | 0 (0.00) | 0 (0.00) |
| ***Enalapril 20 mg*** | 0 (0.00) | 1 (14.29) | 0 (0.00) | 0 (0.00) |
| ***Atenolol 50 mg*** | 0 (0.00) | 5 (71.43) | 0 (0.00) | 0 (0.00) |
| ***Carvedilol 6.25 mg*** | 0 (0.00) | 3 (42.86) | 0 (0.00) | 0 (0.00) |
| ***Carvedilol 25 mg*** | 0 (0.00) | 5 (71.43) | 0 (0.00) | 0 (0.00) |
| ***Metoprolol 50 mg*** | 2 (33.33) | 7 (100.00) | 0 (0.00) | 0 (0.00) |
| ***Metoprolol 100 mg*** | 0 (0.00) | 6 (85.71) | 0 (0.00) | 0 (0.00) |
| ***Amlodipine 5 mg*** | 5 (83.33) | 6 (85.71) | 0 (0.00) | 0 (0.00) |
| ***HCTZ + Telmisartan 12.5 mg + 40 mg*** | 0 (0.00) | 0 (0.00) | 0 (0.00) | 0 (0.00) |

## Prices of Essential Antihypertensive Medicines

Different treatment combinations of hypertension and their corresponding monthly cost of treatment and equivalent days' wages are provided in Table 8. Treatments that are not considered affordable are those for enalapril 5 mg BID equivalent to 1.14 day's wage, enalapril 5 mg TID equivalent to 1.70 day's wage, carvedilol 6.25 mg 1 tab BID 1.32 day's wage, and carvedilol 25 mg BID 1.70 day's wage. While the treatment regimen carvedilol 6.25 mg 2 tabs BID is the most unaffordable which is equivalent to 2.65 days' wage.

## Median Unit Price Comparison with International Reference Prices

The medicine price ratios (MPR) of selected essential antihypertensive medicines were computed to compare the local medicine prices with international reference prices. The results of the study have shown that all medicines available in the 4th class municipality were below the international reference prices as observed from all MPRs found below 1.00. Metoprolol 100 mg has the lowest MPR of 0.05. While the price of enalapril 20 mg is a little more than half (MPR=0.53302) that of the international reference price. Table 9 shows the MPR of all selected essential anti-

**Table 8.** Treatment Affordability of Selected Medicines

| Treatment Combinations of Essential Antihypertensive Medicines | No. of Units per Monthly Treatment Regimen | Median Unit Price (in PhP) | Total Cost of Treatment (in PhP) | Days' Wages* |
|---|---|---|---|---|
| ***Enalapril 5 mg OD*** | 30 | 6.00 | 180.00 | 0.57 |
| ***Enalapril 5 mg BID*** | 60 | 6.00 | 360.00 | 1.14 |
| ***Enalapril 5 mg TID*** | 90 | 6.00 | 540.00 | 1.70 |
| ***Enalapril 20 mg OD*** | 30 | 7.50 | 225.00 | 0.71 |
| ***Atenolol 50 mg OD*** | 30 | 3.25 | 97.50 | 0.31 |
| ***Atenolol 50 mg BID*** | 60 | 3.25 | 195.00 | 0.62 |
| ***Carvedilol 6.25 mg ½ tab BID*** | 30 | 7.00 | 210.00 | 0.66 |
| ***Carvedilol 6.25 mg 1 tab BID*** | 60 | 7.00 | 420.00 | 1.32 |
| ***Carvedilol 6.25 mg 2 tabs BID*** | 120 | 7.00 | 840.00 | 2.65 |
| ***Carvedilol 25 mg BID*** | 60 | 9.00 | 540.00 | 1.70 |
| ***Metoprolol 50 mg ½ tab BID*** | 30 | 3.00 | 90.00 | 0.28 |
| ***Metoprolol 50 mg BID*** | 60 | 3.00 | 180.00 | 0.57 |
| ***Metoprolol 100 mg BID*** | 60 | 3.00 | 180.00 | 0.57 |
| ***Amlodipine 5 mg OD*** | 30 | 3.50 | 105.00 | 0.33 |
| ***Amlodipine 5 mg BID*** | 60 | 3.50 | 210.00 | 0.66 |
| ***Amlodipine 5 mg OD*** <br> ***+ Enalapril 5 mg BID*** | 30 <br> 60 | 3.50 <br> 6.50 | 105.00 <br> 390.00 | 0.99 |
| ***HCTZ 12.5 mg + Telmisartan 40 mg OD**** | 30 | N/A | N/A | N/A |

**Minimum wage of non-agricultural sector = PhP 317.00*
***Not available in all facilities*

**Table 9.** Medicine Price Ratios (MPR) of Selected Essential Antihypertensive Medicines

| Essential Antihypertensive Medicine | International Reference Price (in USD) | Adjusted Price for Inflation* (in USD) | Local Median Unit Price** (in USD) | Median Price Ratio |
|---|---|---|---|---|
| ***Enalapril 5 mg*** | 0.0101 | 0.22725 | 0.11 | 0.48130 |
| ***Enalapril 20 mg*** | 0.0114 | 0.25650 | 0.14 | 0.53302 |
| ***Atenolol 50 mg*** | 0.0107 | 0.24075 | 0.06 | 0.24609 |
| ***Carvedilol 6.25 mg*** | 0.0552 | 1.24200 | 0.13 | 0.10274 |
| ***Carvedilol 25 mg*** | 0.0439 | 0.98775 | 0.16 | 0.16610 |
| ***Metoprolol 50 mg*** | Not available | Not available | 0.05 | Not available |
| ***Metoprolol 100 mg*** | 0.0444 | 0.99900 | 0.05 | 0.05474 |
| ***Amlodipine 5 mg*** | 0.0157 | 0.35325 | 0.06 | 0.18062 |
| ***HCTZ 12.5 mg + Telmisartan 40 mg*** | Not available | Not available | Not available | Not available |

**CPI base-year 2015 = 100; CPI latest year 2023 = 122.5 (PSA, 2023)*
***Average BSP Q1 2023 Exchange Rate: 1 USD = PhP 54.8567 (https://www.bsp.gov.ph/statistics/external/Table%2012.pdf)*

hypertensive medicines, including data on international reference prices adjusted for inflation and local median prices.

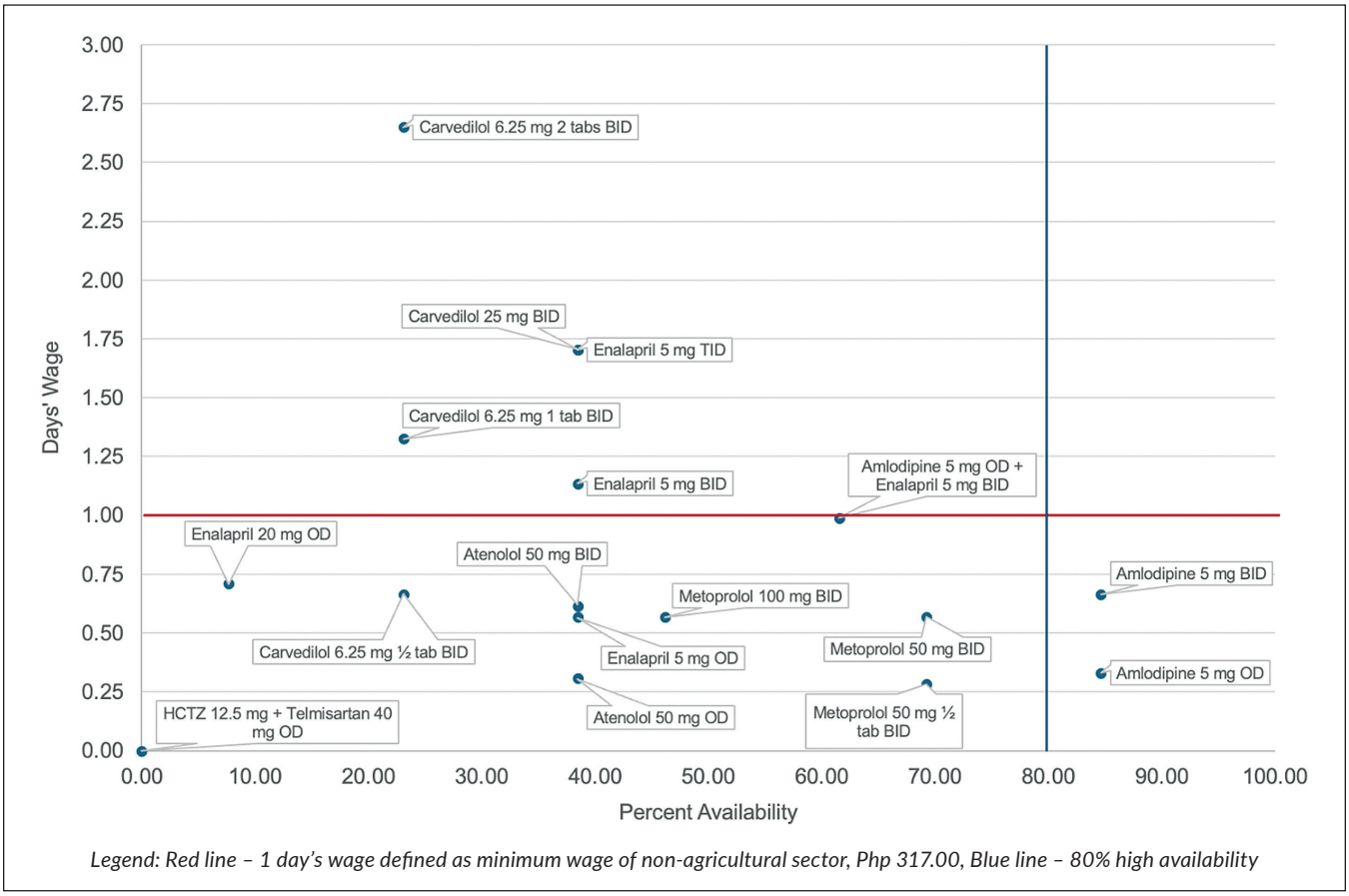
### Comparison of Availability and Affordability of Selected Essential Antihypertensive Medicines

A graphical illustration of the comparison between availability and affordability of selected essential antihypertensive medicines is found in Figure 2. The data shows that only the Amlodipine monotherapy treatment regimens are highly available and affordable in the municipality. Furthermore, carvedilol monotherapy and enalapril monotherapy treatment regimens are mostly of low affordability and with low to very low availability. Although treatments for atenolol and metoprolol are considered affordable, access to these medicines are hampered by their availability in the facilities. This data is provided in tabular format in the Appendix.

## DISCUSSION

Availability of essential medicines have constantly been observed to be lower in public facilities compared to private facilities in different countries.[5,16,17] This was further corroborated by a study on the availability of essential medicines in 11 countries in the Asia-Pacific region which showed a disproportion between the median percent availability of essential medicines were 35.5% in the public sector and 56.7% in the private sector.[18] While the results of this study have provided evidence that there is even greater disparity between the two sectors in rural communities which can restrict the delivery of individual-based services and would ultimately diminish treatment outcomes.[19] According to a study on the patient impact of drug shortages, patients can resort to using alternative products when their needed medicines are not available which can lead to medication errors, and in the worst case can lead to using substandard and falsified (SF) medicines.[20]

Most of the antihypertensive medicines were found to be affordable based on the reference minimum wage rate of PhP 317.00, however, all treatment regimens for carvedilol, a beta-blocker, were found to be unaffordable. This result was similar to the findings of Husain et al. which found that the originator brand and lowest price generic of captopril and enalapril were both unaffordable in both public and private settings. They further noted that these drugs were usually unaffordable in low and lower middle income countries.[21]




*Legend: Red line – 1 day's wage defined as minimum wage of non-agricultural sector, Php 317.00, Blue line – 80% high availability*

**Figure 2.** Comparison of availability and affordability of selected essential antihypertensives in Magallanes, Cavite (1 day's wage = PhP 317.00).

The study also observed a lack of originator brands in the 4th class municipality which highlights the effect of the Generics Act of 1988 in making more accessible generic alternatives of branded medicines. This was comparable to the study of Lambojon et al., where the percent availability of originator brands was only 1.3% while covering more areas in the Philippines.[5]

All observed medicine prices were less than 1 MPR which could mean that drug pricing strategies, such as the Generics Act of 1988, positively affect the prices of medicines in the community. However, some treatment regimens remain to be unaffordable as 5 out of the 17 drug regimens surveyed are still more than a day's wage of a Filipino worker. Although medicine prices have become cheaper than international reference prices, *per capita* income cannot cope with the current prices in the local market. Therefore, there is still a need for stricter drug pricing measures to ensure affordability.[22]

Public health facilities have an important role in the access to medicines especially for low-income households. However, the reality of access to antihypertensive medicines remains low which undermines the goal to reduce health disparities especially for the marginalized. This could be augmented by supply and demand mechanisms that can be established at the national level such as creating an essential formulary list for primary health care[23], establishing a drug shortage reporting mechanism[24], and a performance-based incentive system to drive decision-making at the local level towards medicine access[25].

A study by Ng et al. provided insights on how patients cope with barriers to access to medicines for non-communicable diseases in Kenya which found that patients try both monetary and non-monetary strategies to access their medicines. Monetary strategies include selling assets and borrowing money from friends and relatives. Non-monetary strategies are requesting for a new prescription, changing health facilities, establishing connections with the facility personnel to know when medicines will be stocked, hoarding medicines, and retrieving medicines in larger municipalities or cities.[26]

### Limitations of the Study

As the study only covers one 4th class municipality in the country at primary care, it cannot be used to extrapolate national data on availability or affordability of medicines. The study also selected antihypertensive drugs in the essential medicines list which are mostly drugs that have been in the market for more than 10 years, this would mean that the medicines already have available generic counterparts as what has been observed in the included facilities. Due to this, drug prices are expected to be already low due to increased market competition, compared to other drugs that have been in the market for a few years.

## CONCLUSION AND RECOMMENDATIONS

The results of this study underpinned the urgency to improve the availability of essential antihypertensive medicines, particularly in the public sector. Only amlodipine is highly available in both public and private facilities, while only amlodipine and metoprolol were available in public facilities, albeit limited. All medicines are below 1 MPR, but carvedilol and enalapril treatment regimens are unaffordable compared to a worker's day wage.

Availability of essential antihypertensive medicines is diverse comparing public and private facilities. There is a need to increase the availability of antihypertensive medicines in public facilities as this is an important quality measure of primary care services. Public facilities can leverage on the availability of medicines in private pharmacies by forming Primary Care Provider Networks. While most medicines were deemed affordable in the private setting, there are still drugs such as carvedilol and enalapril, that need to be regulated. There is a need to strengthen the local pharmaceutical subsystem because it is essential to ensure safe, effective, and quality medicines in the local health system through adequate mobilization of resources.

Recommendations on further studies to conduct assessments in the primary care setting in all local health systems in Philippines must be done to understand the condition of availability and affordability of essential medicines in the country. It is also recommended to increase the number of drugs to be analyzed guided by the Philippine National Formulary Manual for Primary Healthcare of the Department of Health.

### Statement of Authorship

All authors certified fulfillment of ICMJE authorship criteria.

### Author Disclosure

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# APPENDIX

**Table 1.** Comparison of Availability and Affordability of Selected Essential Antihypertensives in Magallanes, Cavite (1 day's wage = PhP 317.00)

| Essential Antihypertensive Medicines Treatment Regimen | Percent Availability | Days' Wage |
|---|---|---|
| ***Enalapril 5 mg OD*** | 38.46 | 0.57 |
| ***Enalapril 5 mg BID*** | 38.46 | 1.14 |
| ***Enalapril 5 mg TID*** | 38.46 | 1.70 |
| ***Enalapril 20 mg OD*** | 7.69 | 0.71 |
| ***Atenolol 50 mg OD*** | 38.46 | 0.31 |
| ***Atenolol 50 mg BID*** | 38.46 | 0.62 |
| ***Carvedilol 6.25 mg ½ tab BID*** | 23.08 | 0.66 |
| ***Carvedilol 6.25 mg 1 tab BID*** | 23.08 | 1.32 |
| ***Carvedilol 6.25 mg 2 tabs BID*** | 23.08 | 2.65 |
| ***Carvedilol 25 mg BID*** | 38.46 | 1.70 |
| ***Metoprolol 50 mg ½ tab BID*** | 69.23 | 0.28 |
| ***Metoprolol 50 mg BID*** | 69.23 | 0.57 |
| ***Metoprolol 100 mg BID*** | 46.15 | 0.57 |
| ***Amlodipine 5 mg OD*** | 84.62 | 0.33 |
| ***Amlodipine 5 mg BID*** | 84.62 | 0.66 |
| ***Amlodipine 5 mg OD + Enalapril 5 mg BID*** | 61.54 | 0.99 |
| ***HCTZ 12.5 mg + Telmisartan 40 mg OD*** | 0.00 | 0.00 |