USAID GLOBAL HEALTH SUPPLY CHAIN PROGRAM
Procurement and Supply Management

Assessment of Commodities for the Management of Hypertensive Disorders in Pregnancy in Ghana's Public Health Sector

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ACKNOWLEDGEMENT

The goal of USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC–PSM) project is to ensure uninterrupted supplies of health commodities to save lives and create a healthier future for all. In Ghana, GHSC-PSM through funding from USAID procures and delivers health commodities and provides technical assistance to the Ministry of Health and Ghana Health Service to strengthen the in-country supply chain and ensure better access to health commodities at the last mile. Part of this mandate focuses on maternal, newborn and child health commodities including those for hypertensive disorders in pregnancy (HDP). This assessment on the HDP commodity supply chain has been successfully completed through the input of the following contributors:

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List of Acronyms

ACE	angiotensin-converting enzyme
ACOG	American College of Obstetricians and Gynecologists
ARB	angiotensin receptor blockers
BP	blood pressure
CHPS	Community Health Planning Services
CVD	cardiovascular disease
FDA	Food and Drugs Authority
GHS	Ghana Health Service
GHSC-PSM	Global Health Supply Chain Program-Procurement and Supply Management
HAN	Health Access Network
HDP	hypertensive disorders of pregnancy
IM	intramuscular
IV	intravenous
LMIC	low- and middle-income countries
MCGL	MOMENTUM Country and Global Leadership
MNCH	maternal, neonatal, and child health
MoH	Ministry of Health
NEML	National Essential Medicines List
NHIA	National Health Insurance Authority
NHIS	National Health Insurance Scheme
RHA	Regional Health Administrations
RMS	Regional Medical Stores
SOPs	standard operating procedures
SR	sustained release
STGs	Standard Treatment Guidelines
USAID	United States Agency for International Development

Executive Summary

In fiscal year 2021, the USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project carried out a desk review to assess commodities used to manage hypertension in pregnancy. The review identified and documented issues impacting the availability of hypertensive disorders of pregnancy (HDP) commodities in the public sector and served as a first step in understanding how HDP commodities are managed in Ghana's public sector. Nonetheless, the lack of sufficient supply chain and programmatic data did not allow for a thorough understanding of HDP management and product availability at the point of care and elicited the need for further data collection and subsequent analysis to address the gaps identified.

The primary objective of this study was to develop a better understanding of how HDP commodities are prescribed in Ghana's public sector and identify bottlenecks that affect the availability of these commodities.
More specifically, the study examined:

- The availability of HDP commodities in Ghana's health service delivery points for managing hypertension in pregnancy.
- Data relative to case management and prescriber behavior in managing hypertension in pregnancy in Ghana.
- Care provider behaviors, practices, and preferences for HDP commodities.

The study used a mixed-method approach (quantitative and qualitative) to collect data on the management and use of HDP commodities in selected health facilities, the regional medical stores, and regional health administrations to understand the key factors affecting management, availability, and use of HDP products. The country was divided into three zones: coastal belt, middle belt, and northern belt. Based on Ghana's Standard Treatment Guidelines (2017) and the desk review conducted in 2021, a list of tracer products was developed for the study.

The sampling approach adopted is as follows:

- Purposive selection of two regions per zone based on the density of health facilities.
- Random selection of an allocated number of districts per region based on the number of districts in each selected region.
- Random sampling of health centers, polyclinics, and hospitals to achieve the sample allocation per region.
- Convenience sampling of one Community Health Planning and Services (CHPS) compound in districts with sampled facilities.
- Such CHPS compounds had midwives and were near a sampled facility.
- Only public health facilities were assessed to ensure alignment with study objectives.

In total, the study team collected data from 135 sites comprising 25 hospitals, five polyclinics, 60 health centers, and 45 CHPS compounds. The regional medical stores and regional health administrations in the selected regions were also included in the list of entities assessed.
Survey results cover 10 areas: product management, product availability, adherence to standard inventory management practices, capacity building for staff in stock management and HDP-related areas, pricing, product quality, prescriber preferences, client feedback on product access, as well as challenges and opportunities impacting the supply chain for HDP products.

As expected, the study showed that lower-level facilities (CHPS and health centers) generally manage a smaller range of HDP products compared to polyclinics and hospitals. A significant number of facilities were not managing nifedipine, methyldopa, and magnesium sulphate injection even though they are within their level of care. Management of calcium gluconate injection was 0 percent and 7 percent in CHPS and health centers, respectively. Labetalol oral tablets were not being managed across all facility types due to availability of alternative formulations.

Availability of HDP products ranged between 72 percent and 95 percent except for nifedipine, which was 50 percent. The main reason for reported stockouts in the three months before the survey was non-availability at the supply point. This was corroborated by regional medical store (RMS) results, which showed 0–33 percent availability for eight out of 12 products assessed. Other factors that contributed to stockouts at service delivery points include product rationing and inadequate funds to procure products. Generally, health facilities tend to procure from the private sector when HDP products are not available at RMS. The median selling price for six out of nine HDP products assessed in the health facilities were equal to the National Health Insurance Scheme (NHIS) reimbursement prices, and three of the products had prices higher than NHIS prices.

In the key informants' interviews, respondents reported NHIS payment delays, Ministry of Health (MoH) framework contract (FWC) structure, and macro-economic dynamics, such as price instability and inadequate storage space, are some of the key factors that impact product availability at RMSs and subsequent supply to health facilities. Despite the huge potential benefits, FWC implementation has been impacted in several ways. First, funding has been inadequate at the regional level, mainly due to NHIS delayed payments. Second, the current macro-economic dynamics (high inflation and high exchange rate) have increased the cost of pharmaceuticals beyond levels that can be contained under the current FWC price list.

In all, about 50 percent of the top three brands of HDP products had been registered as of the time of the survey. Although the availability of inventory tools for HDP commodities ranged between 50 percent and 95 percent, these were often not updated and records on them did not reflect current happenings at the facility. With only 40 percent of commodity managers receiving logistics management training, Ghana Health Service (GHS) needs to target capacity-building

initiatives to facilities that have not been trained as well as those having challenges with product availability and management.

For all facility types (CHPS, health centers, polyclinics, and hospitals), the nifedipine sustained release tablet was selected as the most preferred anti-hypertensive medication for pregnant women instead of methyldopa. In the management of severe hypertension, 34 percent of hospitals cited private sources as their main source of supply, whiles 56 percent sourced labetalol 5 mg/ml from the private sector, which reinforces the need for the RMS to strengthen its capacity to meet the needs of these hospitals. For HDP clients seeking health care, the single most important factor that influences access to HDP products is cost of medication, which accounted for 56 percent of responses. The next most important factor was coverage under the NHIS (18 percent). Furthermore, 70 percent of clients said they obtained their HDP products from the public health sector as compared to 15 percent for private pharmacies and 15 percent for private health facilities.

Study findings point to a multiplicity of factors that affect the procurement, supply, availability, and access of HDP commodities to clients seeking care at various health facilities. Based on the reported findings, the study team proposes the following recommendations to improve the availability, access, and use of HDP products.

Reduce National Health Insurance Scheme (NHIS) restrictions: The National Health Insurance Authority (NHIA) and the NHIS are perceived to have regulations that prevent the stocking of some HDPs products within the CHPS and health centers even though the personnel who require these products are available at post. These concerns and possible misconceptions need to be addressed by MoH/GHS to improve the number of lower-level facilities managing required HDP commodities for their level of care.

Resolve NHIS payment delays: Resolving the payment delays to facilities from the NHIS for services rendered is at the heart of improving funding for procuring the supply of HDP and other essential commodities. Without a steady flow of funds, facilities impair the revolving funds for purchase and supply, which makes RMSs unable to obtain supplies to make commodities available.

Revitalize the implementation of FWC: The non-performance of FWC has a big effect on the availability of HDP commodities. The MoH should be able to account for inflation and depreciation within the award of FWCs so that they do not become redundant after the award. Awarding the supply of HDP commodities to MoH-approved suppliers is an important step in product quality assurance.

Rethink the role of the private sector: The role of the private sector in sustaining the supply of HDP products at the health facilities, particularly in instances when the RMS are out of stock or are facing supply challenges, cannot be discounted. Whereas the RMS permit health facilities to procure from the open market when they are out of stock, it may be useful to restrict the

source of HDP commodities from pre-qualified vendors to minimize the effect of over-pricing and sale of unregistered products.

Review product management policy for calcium gluconate injection: MoH and GHS should assess and review the categories of health facilities that are allowed to manage calcium gluconate injection—an antidote for magnesium sulphate toxicity. This will ensure that all facilities that manage magnesium sulphate injection have the means to swiftly administer calcium gluconate injection to prevent missed opportunities for saving lives.

Review and align product management policies with NHIS reimbursement policy: MoH, GHS, and NHIS should review and align the National Essential Medicines List (NEML) with NHIS medicine reimbursement policy. This will ensure that facilities that manage products based on their level of care (e.g., nifedipine oral preparation in facilities with midwives) are duly reimbursed by the NHIA after dispensing to clients.

Improve regulation: The study identified that some brands of HDPs found in the health facilities were unregistered. This is a potential risk for the entry of sub-standard products and must be prioritized for immediate action.

Address human resource gaps: Whether in service delivery or supply chain management, the effect of inadequate human resource capacity in terms of competence and adequacy of numbers is deleterious to performance. We identified these gaps to be more pronounced at the CHPS and health centers, so our prescriptions should be prioritized in order of support.

Improve dissemination and uptake of treatment protocols and guidelines: There are recommendations, changes, and updates in the Standard Treatment Guidelines, the NEML, and the protocol for managing HDP that are not implemented. We encourage the role of continuous development programs, such as mandatory annual online training courses, to increase awareness and use of updated treatment protocols.

Encourage good supply chain management practices: We would like to encourage the regular update of stock records and submission of accurate data from health facilities to the RMS to enhance planning for commodity stocking and supply. The RMS should aim at stocking at the required quantities, since more than 75 percent of facilities depend on them as the main source for product supply. Training for facilities should emphasize the importance of good logistics management practices for product quality, particularly products that are stored.

Reinforce good practices: Throughout this report, we have cited good practices at various levels of the supply chain that can be harnessed either for mentoring or peer-to-peer learning. It is important to build on the capacities within the system to address some of the gaps identified. For example, the products that can be managed by CHPS compounds with a midwife can be enhanced if non-stocking facilities are encouraged to learn from those applying the updated guidelines.

1.0 Introduction

The USAID Global Health Supply Chain Program-Procurement and Supply Management (GHSC-PSM) project enhances the health care experience in communities through transformative supply chain solutions. GHSC-PSM purchases and delivers health commodities, strengthens national supply chain systems, and provides global supply chain leadership to ensure lifesaving health supplies reach those in need, when they need them.

In Ghana, GHSC-PSM works closely with the Ghana Health Service (GHS) and the Ministry of Health (MoH) to ensure continuous availability of quality-assured maternal, newborn, and child health (MNCH) commodities. In fiscal year 2021, GHSC-PSM carried out an assessment that examined the commodities used to manage hypertension in pregnancy. Hypertensive disorders of pregnancy (HDP), including pre-eclampsia, eclampsia, gestational hypertension, and chronic hypertension, increase the risk of adverse fetal, neonatal, and maternal health outcomes.

Availability of these commodities is essential for health care providers to deliver high-quality maternal health services, and as such, an effective health supply chain that ensures their appropriate procurement and management. With this goal in mind, GHSC-PSM collaborated with GHS from February to May 2021 to conduct a desk review of existing data and policies regarding the supply chain for HDP commodities. The purpose was to identify and document issues impacting availability of HDP commodities in the public sector. While this assessment served as a first step in understanding how HDP commodities are managed in Ghana, lack of sufficient supply chain and programmatic data did not allow for a thorough understanding of HDP management and product availability at the point of care. As a result, the assessment pointed out a critical need for further data collection and subsequent analysis to inform these gaps. Also, the assessment laid out a set of recommendations that should be implemented to ensure that HDP commodities are properly incorporated into national policies and readily available for pregnant women.

1.1 The Burden of Hypertension in Pregnancy

Hypertension is one of the most common medical problems encountered during pregnancy, complicating 2–3 percent of pregnancies. Hypertensive disorders of pregnancy are a major cause of severe morbidity, long-term disability, and death among mothers and their babies. Worldwide, they account for approximately 14 percent of all maternal deaths (Mammaro A, 2009). Hypertensive disorders during pregnancy are classified into four categories, as recommended by the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy: chronic hypertension, preeclampsia-eclampsia, preeclampsia superimposed on chronic hypertension, and gestational hypertension (transient hypertension of pregnancy or chronic hypertension identified in the latter half of pregnancy). This terminology is preferred over the older but widely used term pregnancy-induced hypertension (PIH) because it is more precise.

Chronic hypertension is high blood pressure that either precedes pregnancy, is diagnosed within the first 20 weeks of pregnancy, or does not resolve by the 12-week postpartum checkup. Two categories of severity are recognized: mild (up to 179 mm Hg systolic and 109 mm Hg) and severe

(≥180 systolic or 110 diastolic). Chronic hypertension complicates about 5 percent of all pregnancies, and prevalence rates are increasing due to delayed childbearing.

Gestational hypertension is the new onset of hypertension after 20 weeks of gestation. Also known as transient hypertension, gestational hypertension is diagnosed retrospectively when the patient does not develop preeclampsia and if blood pressure returns to normal by the 12-week postpartum visit. Fifty percent of women diagnosed with gestational hypertension between 24 and 35 weeks develop pre-eclampsia. Pre-eclampsia is a multiorgan disease process of unknown etiology characterized by the development of hypertension and proteinuria after 20 weeks of gestation. Various theories of pathogenesis of preeclampsia exist, the most popular theory been immunologic. Eclampsia is the development of convulsions in a preexisting pre-eclampsia or it may appear unexpectedly in a patient with minimally elevated blood pressure and no proteinuria. The exact cause is unknown but cerebral ischaemia and oedema were suggested. The timing of an eclamptic seizure can be antepartum (53 percent), intrapartum (19 percent), or postpartum (28 percent) (Leeman L, 2008).

Ghana has reported a 21.4 percent prevalence of HDP with gestational hypertension and pre-eclampsia/eclampsia in the majority (Kwame Adu-Bonsaffoh, 2017). Over the past 25 years, considerable progress has been made in lowering the maternal mortality rate. However, more progress is needed as the country still experiences an alarming rate of 308 deaths per 100,000 (2017), whereas the global rate stands at 211 deaths per 100,000 (The Borgen Project, 2020). Given the relatively high rate of maternal mortality in Ghana, it is imperative to identify the risk factors of maternal deaths to help guide intervention initiatives. Hypertension-related disorders have been identified as an important cause of maternal death. Evidence is found that effective interventions exist at reasonable cost for preventing or treating virtually all life-threatening maternal complications. Almost two-thirds of the global maternal and neonatal disease burden could be alleviated through optimal adaptation and uptake of existing research findings.

1.2 Diagnosis and Treatment of HDP

In contrast with non-pregnant adults, the diagnosis of hypertension in pregnancy is based primarily on office blood pressure measurements, and concordant diagnostic thresholds between office and ambulatory or home blood pressure measurements have not been defined. American College of Obstetricians and Gynecologists (ACOG) defines hypertension in pregnant women as clinical maternal systolic blood pressure greater than or equal to 140 mm Hg and/or diastolic blood pressure greater than or equal to 90 mm Hg on two or more occasions at least four hours apart. ACOG further categorizes severe-range hypertension as sustained systolic blood pressure greater than or equal to 160 mm Hg and/or diastolic blood pressure greater than or equal to 110 mm Hg; in this setting, verification should be performed in as few as 15 minutes to avoid delays in treatment (Khedagi AM, 2021). This includes women whose hypertension was diagnosed before pregnancy as well as during pregnancy. Known hypertensives on angiotensin-converting enzyme (ACE) inhibitors, angiotensin receptor blockers (ARBs), and alpha-blockers should be switched to medications considered safe during pregnancy. Once a HDP is detected, outpatient surveillance is continued unless supervened by overt hypertension, proteinuria, visual

disturbances, or epigastric discomfort. Hospitalization is considered if hypertension persists or worsens or proteinuria develops.

In mild pre-eclampsia, reduced physical activity throughout much of the day is beneficial. Absolute bed rest is not necessary. Sedatives and tranquilizers are not prescribed. Ample, but not excessive, protein and calories should be included in the diet. Sodium and fluid intakes should not be limited or forced. Delivery or termination of pregnancy is the cure for severe pre-eclampsia or eclampsia. The prime objectives in this situation are to forestall convulsion, prevent intracranial hemorrhage and serious damage to vital organs, and ultimately, deliver a healthy infant, if possible.

The National Institute for Health and Care Excellence recommends the use of antihypertensive medications such as hydralazine, labetalol, and nifedipine in managing HDPs. Ghana has also introduced a national guideline for managing cardiovascular diseases (CVDs), including HDPs, which provides guidelines to health workers to manage CVDs and streamline the referral processes of HDP conditions. Table 1 presents the recommended treatment of HDP according to the Standard Treatment Guidelines (STGs) (2017) in Ghana.

Table 1 Recommended treatment for HDP in Ghana

Hypertension disorder in pregnancy	Treatment option
Hypertension in pregnancy not associated with pre-eclampsia or eclampsia	**1st line** Methyldopa, oral, 250–500 mg 8–12 hourly (max. 2 g daily) **2nd line** Nifedipine sustained release, oral, 10–40 mg 12 hourly
Mild pre-eclampsia	Methyldopa, oral, 250–500 mg 8–12 hourly (max. 2 g/day) **Or** Nifedipine retard, oral, 10–40 mg 12 hourly **Or** Nifedipine slow release, oral, 30–60 mg daily
Severe pre-eclampsia and imminent eclampsia	Hydralazine, IV, 5–10 mg slowly over 20–30 minutes **Or** Nifedipine, sublingual, 10 mg stat. **Or** Labetalol, IV, 20 mg stat. over at least 1 minute Repeat at 10-minute intervals if the blood pressure (BP) remains >160/110 mm Hg as follows: 40 mg; 80 mg; 80 mg boluses to a cumulative dose of 220 mg
Management or prevention of seizures in severe pre-eclampsia and imminent eclampsia	Magnesium sulphate, intravenous (IV), 20 ml of the 20 percent solution (4 g) **And**

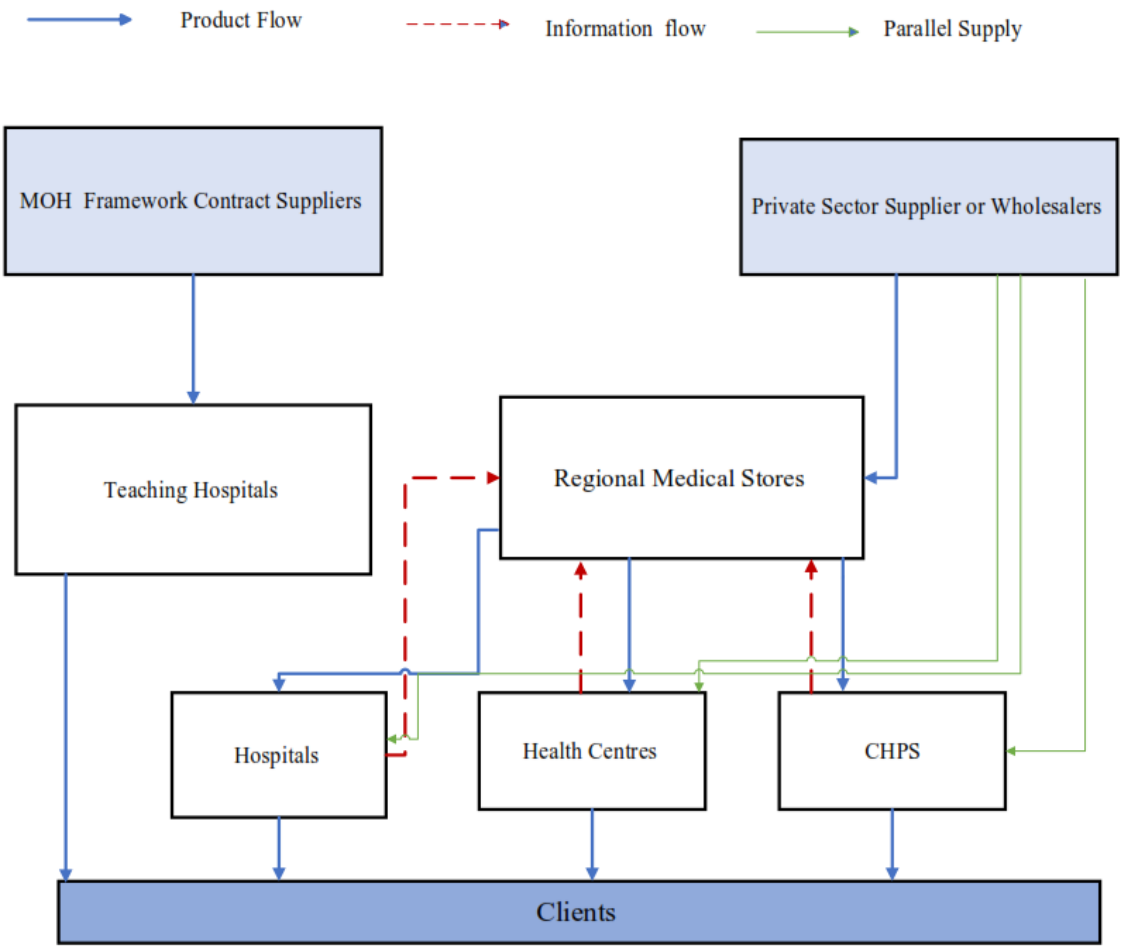
Hypertension disorder in pregnancy	Treatment option
	Magnesium sulphate, intramuscular (IM), 10 ml of the 50 percent solution, (5 g) into each buttock (total of 10 g)
Eclampsia	**Fluid replacement** Sodium chloride 0.9 percent, IV Or Ringer's lactate, IV (maximum 1 liter in six hours or 4 liters in 24 hours) **Treatment of convulsions** Magnesium sulphate, IV, 20 ml of the 20 percent solution (4 g) Administer slowly over 5 to 15 minutes **Then** Magnesium sulphate, IM, 10 ml of the 50 percent solution (5 g) into each buttock (total of 10 g) **Treatment of recurrent convulsions** If fits recur within 20 minutes, do not repeat Magnesium sulphate. (See other treatment options below.) If fits recur after 20 minutes, repeat magnesium sulphate, IV, >70 kg; 20 ml of the 20 percent solution (4 g) <70 kg; 10 ml of the 20 percent solution (2 g) once **Maintenance** Magnesium sulphate, IM, 5 g in alternating buttocks every 4 hours until 24 hours after last seizure or delivery, whichever is later
	Labetalol, IV, 20 mg stat. over at least 1 minute **Then** Repeat at 10-minute intervals if the BP remains >160/110 mm Hg as follows: 40 mg; 80 mg; 80 mg boluses to a cumulative dose of 220 mg When the BP <160/110 mm Hg start an infusion of 40 mg per hour. Double the infusion rate at 30-minute intervals until satisfactory response or a dose of 160 mg per hour is attained.

1.3 Factors Affecting the Management of HDP Products

Despite these recommended management practices, the high maternal and perinatal morbidity and mortality associated with HDP cannot be overlooked. Several underlying factors identified to contribute to the slow decline in poor pregnancy outcomes in the Sub-Saharan African Region are bordered around some challenges with health system inputs (physical resources, human resources, intellectual resources, and social resources). These inputs include the access to adequately trained human resource, availability of HDP management commodities, limitations with prescribing authorization of service providers, and health systems financing, delivery, and governance.

To provide good-quality care, health care providers at all levels of maternal health care services, particularly in low- and middle-income countries (LMICs), need to have access to appropriate medications.

Figure 1 Flow of HDP commodities in the Ghana public health supply chain



1.4 Purpose and Objectives

The primary objective of this study was to develop a better understanding of how HDP commodities are prescribed in Ghana's public sector and identify bottlenecks that affect the availability of these commodities. More specifically, this study examined:

- Data relative to case management and prescriber behavior to hypertension in pregnancy management in Ghana.
- The availability of HDP commodities in Ghana's health service delivery points for managing hypertension in pregnancy.
- Care provider behaviors, practices, and preferences for HDP commodities.

2.0 Methodology

This study used a mixed-method approach (quantitative and qualitative), drawing on quantitative and qualitative methods for collecting and analyzing data. The quantitative approach provided quantifiable and reliable data that were extended to the study population. The study team determined levels of availability of anti-hypertensive commodities used in pregnancy at health facilities through collecting and analyzing quantitative data. Kobo Collect platform was used to build the questionnaire. Once this was completed, the form was downloaded onto tablets/phones.

For the qualitative aspect of the study, the team used a semi-structured interview guide to obtain feedback from experts and key informants who had in-depth knowledge about the supply chain for antihypertensive commodities, which are recommended for use in pregnancy. Quantitative data were collected and entered into the Kobo Toolbox application on mobile android devices. The team conducted oral interviews for qualitative data, recorded interviews and transcribed them into MS Word format, and performed thematic analysis.

2.1 Sampling Strategy

The country was divided into three zones: coastal belt, middle belt, and northern belt. The coastal belt comprised Central, Greater Accra, Volta, and Western Regions; the middle belt was made up of Ahafo, Ashanti, Bono, Bono East, Eastern, Oti and Western North Regions; and the Northern belt comprised Northern, North East, Savannah, Upper East and Upper West Regions. Health Access Network (HAN) relied on the 2021 health facility database of GHS to purposively select two regions from each zone to allow for adequate representation of facilities from various geographical locations. Selection criteria were based on regions with the highest population of health facilities.

HAN applied two sampling approaches to respond to the objectives of this study, to determine the number of:

1. Health facilities in selected regions to assess the level of availability of HDP products
2. Prescribers and patients to assess the level of preference and access to commodities

2.2 Sample Size Determination

The widely used sample size equation cited in Singh and Masuku (2014) for selecting facilities from sampling frames was applied in selecting the study sites.

Table 2 Sampling frame for study

Region	District hospital	Health center	Hospital	Poly-clinic	Regional hospital	Grand Total
Ashanti	23	138	23	1		185
Eastern	18	127	5	3	1	154
Greater Accra	9	33	6	14	1	63
Western	10	52	5		1	68
Upper East	6	53	2		1	62
Upper West	1	70	7	4	1	83
Grand Total	**67**	**473**	**48**	**22**	**5**	**615**

2.3 Sample Allocation **(Number of Districts Required)**

To minimize the dispersion of the sample and maximize the use of resources within specific geographical zones, districts in the selected regions for the survey were randomly selected and allocated. Sample weights of the selected districts were determined using the number of health facilities within the district to minimize the impact of clustering on the representativeness of the sample. Representational sampling was used to determine the number of health facilities to visit in a district per region.

Table 3 Sample allocation per region

Region	Facilities in sampling frame	Percent weight	Number of districts required	Allocation of sample size per region
Ashanti	185	30%	14	26
Eastern	154	25%	12	21
Greater Accra	63	10%	5	9
Western	68	11%	5	9
Upper East	62	10%	5	9
Upper West	83	13%	6	11
Grand Total	**615**	**100%**	**46**	**85**

2.4 Selection of Health Facilities

The study team used a representational sampling to determine the number of health facilities to visit per region. This approach allows researchers to achieve a representative microcosm of the population (cited in Robinson, 2016). A randomized sampling approach was used to select hospitals, polyclinics, and health centers to achieve the allocated sample number per region (refer to Annex 3 for the list of health facilities used in the study). Since a small proportion of products

for HDP are managed in CHPS compounds with midwives, convenience sampling was used to include such facilities. In the sampled districts, one CHPS compound was selected that had midwives and was close to a sampled facility. Below is a summary of the sampling approach:

- Purposive selection of two regions per zone based on the density of health facilities.
- Random selection of an allocated number of districts per region based on the number of districts in each selected region.
- Random sampling of health centers, polyclinics, and hospitals to achieve the sample allocation per region.
- In districts with sampled facilities, convenience sampling of one CHPS compound, with midwives and close to a sampled facility
- Only public health facilities were assessed to ensure alignment with the study objectives.

The 12 facilities sampled in the Upper West region (based on the above outlined criteria) were substituted with an equal number of USAID MOMENTUM Country and Global Leadership (MCGL) facilities in the Northern and North East regions. The collaboration with MCGL was to facilitate an understanding of which HDP commodities were used by care providers within the project coverage area.

Table 4 Sampling output assessed based on GHSC-PSM inputs

REGION	District hospital	Health center	Hospital	Polyclinic	CHPS	Regional hospital	Grand Total without CHPS
Ashanti	3	22	1	1	14		27
Eastern	3	19	2		12		24
Greater Accra	3	2	1	2	5		8
Upper East	1	9			5		10
Northern/North East	3	7	1		5	1	12
Western	2	5			6	1	8
Grand Total	**15**	**64**	**5**	**3**	**46**	**2**	**89**

2.5 Selection of RMSs and Regional Health Administrations

Regional Health Administrations (RHAs) and RMSs in selected regions were assessed as part of the study.

2.6 Selection of Prescribers

For every facility visited, the team interviewed one prescriber and one midwife to help assess the level of preference for HDP products.

2.7 Selection of Patients

The prevalence of hypertension in pregnancy in Southern Ghana has been found to be 6.1 percent (Agbeno et al., 2022). Using this as a proxy, the minimum sample size of clients/cases to be assessed was calculated using a formula cited in Charan & Biswas (2013).

2.8 Survey Questionnaire

The team developed a quantitative survey questionnaire in addition to a semi-structured interview guide to help collect qualitative feedback from key informants at regional and central levels.

2.9 List of Products

Based on Ghana's Standard Treatment Guidelines (2017) and the anti-hypertensive landscape analysis conducted in 2021, the team developed a list of tracer products in consultation with GHSC-PSM. The following is the full list of products used in the study:

1. Methyldopa 250 mg tablet
2. Labetalol 5 mg/ml injection
3. Labetalol 300 mg tablet
4. Labetalol 200 mg tablet
5. Labetalol 100 mg tablet
6. Nifedipine 30 mg tablet
7. Nifedipine 20 mg tablet
8. Nifedipine 10 mg tablet
9. Hydralazine 20 mg injection
10. Magnesium sulphate injection, 0.5 g/ml in 10ml
11. Magnesium sulphate injection, 0.5 g/ml in 2ml
12. Calcium gluconate 100 mg/ml injection

2.10 Data Collection and Validation

Facility visits were done in two-person teams. The purpose and scope of the survey were shared with all respondents at the beginning of the survey to obtain consent. In most cases all necessary information about the study was shared with the heads of the facilities before the dates of the visitation. In addition to the letter from the Ghana Health Service, an introductory letter (introducing the data collectors) from HAN was also provided to respondents. At every facility, management was always contacted first for consent.

Quantitative Interview

- The survey question was administered electronically using the Kobo Collect application hosted by Health Access Network.
- Survey supervisors and data collectors reviewed the information provided in the questionnaire to ensure relevant sections were filled before submission.

- As a check and in ensuring quality, the data were reviewed before approval by the survey manager.

Qualitative Interview

The study team used a semi-structured interview guide to obtain feedback from key informants who are heads of regional medical stores (RMSs) and chief pharmacists at Regional Health Administration offices. These are officers who have in-depth knowledge about the supply chain for antihypertensive commodities, which are recommended for use in pregnancy. In all, 12 key informants were interviewed from six sampled regions. To ensure the trustworthiness of findings, methodological rigor strategies adopted were confirmability, dependability, credibility, and transferability of qualitative findings. The two independent qualitative analysis experts who transcribed and analyzed data ensured credibility of the findings. Lastly, for dependability of findings, themes and subthemes were supported by direct quotes from transcripts to illustrate key opinions and perceptions. A brief and quick summary thematic analysis of the verbatim transcription data was presented in a table format and discussed with the GHSC-PSM team.

2.11 Data Quality Assurance

- Measures to ensure data quality met the six dimensions of accuracy, completeness, consistency, timeliness, validity, and uniqueness were employed.
- The GHSC-PSM team helped to review the survey tools to ensure each question was clearly understood before the survey. GHSC-PSM was also given access to HAN's data collection platform (Kobo Toolbox) to review the data for quality control before final approval by HAN.
- Pre-tests of the survey tools were conducted to ensure the tool's data collections constraints, relevance, and skip logics work embedded in the survey tool were deployed.
- A screening process was used in recruiting data collectors and supervisors to ensure the right caliber of human resources was obtained for the survey.
- A comprehensive training was conducted for the data collection team to cover all aspects of the survey tool and data quality procedure.
- The survey managers were enabled to review and vet the accuracy and consistency of data submitted before approval and submission as part of the data set.
- Where there were errors that could not be rectified, the forms were rejected.
- Where oral interviews were conducted, interviews were later transcribed verbatim to prevent data loss.

2.12 Data Analysis

The study team used different methods to analyze quantitative and qualitative data collected from the field. Below are the methods used in analyzing quantitative and qualitative data.

Quantitative

Quantitative data analysis was conducted through Microsoft Excel. This included generating charts, tables, and graphs. The analytical outputs were mainly descriptive and included indicators

that can broadly be categorized into the following major sections: Product Management and Availability, Case Management, Storage Conditions, and Client Feedback on HDP Management.

Qualitative

Open-ended responses from the interviews were transcribed and analyzed using Microsoft Excel. Verbatim transcription was done for each data set to ensure all participants' narratives were fully captured. To ensure accuracy in the transcription of data, an independent expert also transcribed and reviewed the narratives. A thematic analysis approach was used for analyzing the 12 interviews. It helps to interpret data by the systematic generation of codes leading to the formation of patterns and themes. Responses from each question were analyzed for the 12 interviews and data coded. Subsequently, two qualitative analysis experts worked independently to preliminarily identify and agree on the themes and categories for all the narratives. Upon data familiarization, responses were coded line-by-line based on an agreed set of themes and patterns to determine main findings. Also, direct quotes were used during interpretation to illustrate key opinions and perceptions.

2.13 Informed Consent

Respondents were contacted by phone to book appointment for briefing and administration of the quantitative and qualitative questionnaire/interview tool. They were adequately briefed about the study. Informed consent was also obtained. Participants were interviewed in their various offices. For qualitative interviews, respondents were recorded after consent had been received.

3.0 Results

Overall, the study team collected data from 135 sites comprising 25 hospitals, five polyclinics, 60 health centers and 45 CHPS compounds (refer to Annex 3 for actual facilities visited). Facility types vary slightly due to the upgrade of some facilities and accommodation of MCGL facilities in the study. Results of the survey cover 10 areas: product management, product availability, adherence to standard inventory management practices, capacity building for staff in stock management and HDP-related areas, pricing, product quality, prescriber preferences, client feedback on product access, as well as challenges and opportunities impacting the supply chain for HDP products.

3.1 Management of HDP Products in Health Facilities

Results in this section have been disaggregated according to facility types because MoH/GHS policy prescribes different product categories for different levels of care.

The results indicate that 40 percent of CHPS compounds manage magnesium sulphate injection 0.5g/ml (10ml). Methyldopa, which is the first-line treatment for the management of hypertension in pregnancy, was managed in only 20 percent of CHPS. Per the GHS policy, any facility with a midwife is allowed to manage this product. Nifedipine 20 mg and 30 mg were managed by 29 percent and 22 percent of CHPS compounds, respectively. Less than 5 percent of CHPS compounds were managing hydralazine 20 mg injection and labetalol 5 mg/ml injection; while calcium gluconate 100 mg/ml injection, oral preparations of labetalol, magnesium sulphate 0.5 g/ml (2ml) and nifedipine 10 mg were at 0 percent. Management of anti-hypertensive injectables in CHPS compounds point to a knowledge gap or non-adherence to the national policy guideline on managing cardiovascular diseases.

Results from health centers indicate that 70 percent of them were managing magnesium sulphate injection 0.5g/ml (10ml). A higher proportion of health centers were managing methyl dopa (53 percent) and nifedipine 20mg (60 percent) compared to CHPS compounds as those with physician assistants may manage a wider scope of HDP conditions. Management of calcium gluconate injection, a key product needed for the management of magnesium sulphate injection toxicity was at 7 percent. This highlights the need to explore measures aimed at increasing management and access to this product. The proportion of health centers that were managing any of the labetalol oral preparations was 0 percent while those that managed labetalol 5 mg/ml injection and hydralazine 20 mg injection was 2 percent and 13 percent, respectively.

Polyclinics in Ghana are higher than health centers in level of care. The results indicate that all the polyclinics included in the survey were managing nifedipine 20 mg and nifedipine 30 mg. However, just 60 percent were managing methyldopa and magnesium sulphate injection even though these products are required to be managed in facilities with midwives. Forty percent of polyclinics had labetalol injections though MoH/GHS policy (National Essential Medicines List) restricts management to regional hospitals and teaching hospitals. Hydralazine injection was being

managed in 80 percent of polyclinics while 40 percent indicated they manage calcium gluconate injection. Also, none of the polyclinics had any of the formulations of labetalol tablet.

Hospitals serve as referral points for lower-level facilities and are hence required to manage a wider range of HDP products. The results indicate that all the hospitals assessed were managing methyldopa. Also, 84 percent and 92 percent of hospitals managed nifedipine 20 mg and nifedipine 30 mg, respectively. However, similar to CHPS, health centers, and polyclinics, none of the hospitals managed any of three labetalol oral formulations included in the study. Management of hydralazine injection (100 percent) and magnesium sulphate injection (96 percent) was high; however, just 60 percent and 52 percent of hospitals were managing calcium gluconate injection and labetalol injection, respectively. Figures 2–5 present the proportion of the various facility types that were managing HDP products.

Figure 3 Percentage of CHPS that manage HDP products (n=45)

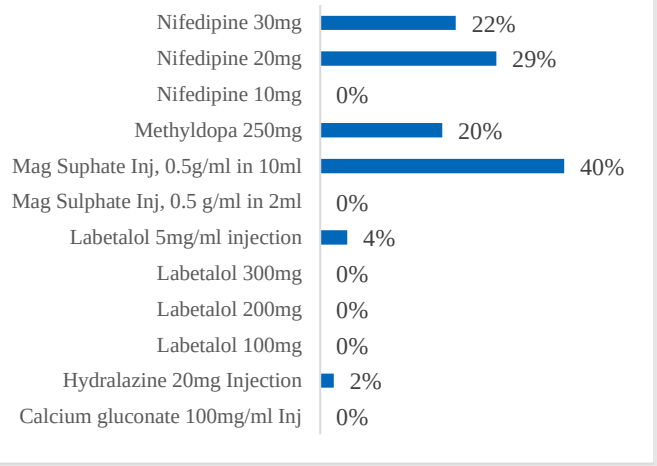


Figure 2 Percentage of health centers that manage HDP products (N=60)

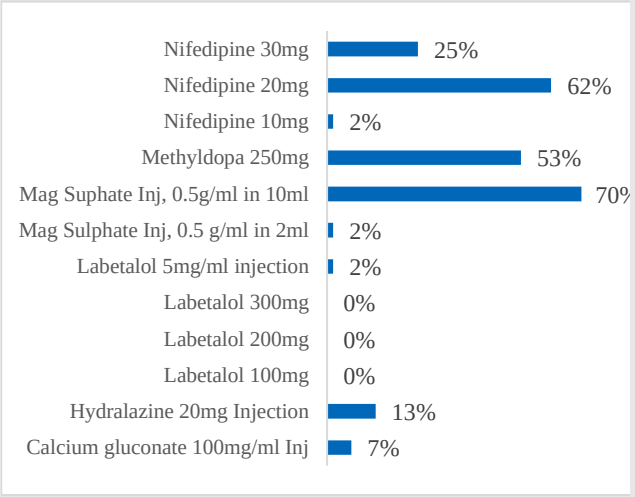


Figure 4 Percentage of polyclinics that manage HDP products

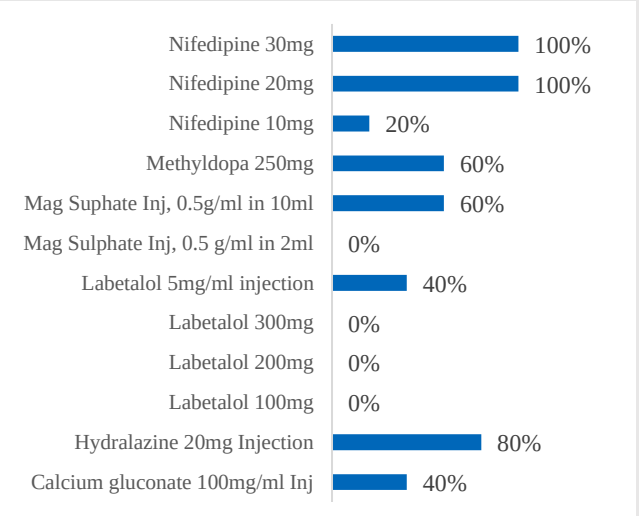
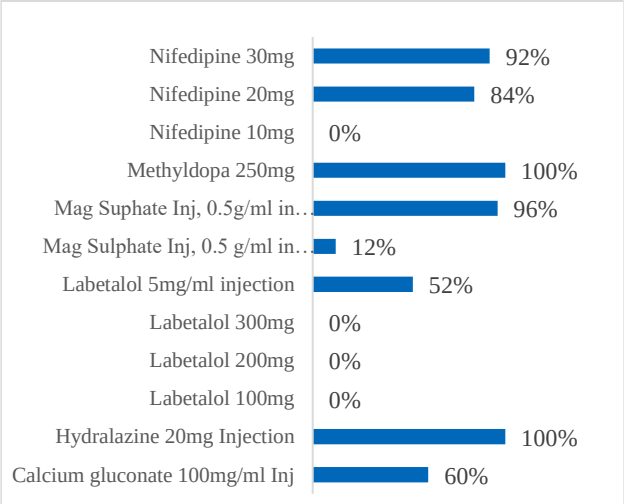


Figure 5 Percentage of hospitals that manage HDP products



3.2 Reasons for Non-Management of HDP Products

A significant proportion of CHPS compounds (40–80 percent) mentioned "above their level of care" as the main reason for not managing various HDP products; this finding is largely consistent with MoH/GHS policy requirements. Availability of alternative formulations was also cited by 2–18 percent of CHPS compounds as the reason for non-management of various oral anti-hypertensive products. No or low incidence of HDP conditions accounted for 2–19 percent of non-management decisions.

For health centers, non-management of magnesium sulphate injection, methyldopa, and nifedipine formulations was mainly driven by four factors: availability of alternative formulations (17–53 percent), above level of care (15–44 percent), high level of expiry (12–35 percent), and non-availability at the supply point (9–32 percent). For the remaining HDP products (labetalol 5mg/ml injection, labetalol oral formulations, hydralazine injection, and calcium gluconate injection), above level of care accounted for 77–90 percent of non-management decisions.

For polyclinics, one out of the two facilities that did not manage methyldopa indicated the product was above its levels of care. This suggests a knowledge gap, since methyldopa can be managed by any facility with a midwife. Similarly, polyclinics that were not managing labetalol 5mg/ml injections (67 percent) and nifedipine 10 mg (75 percent) mainly attributed it to above level of care. A combination of factors including non-availability at supply point, availability of alternative formulations, lack of trained staff, and above level of care were the main reasons influencing management decisions for calcium gluconate injection and labetalol oral formulations. Only one polyclinic was not managing hydralazine injection, as it was above its level of care.

The main reason for the non-management of HDP products in hospitals was availability of alternative formulations and this accounted for 44 percent to 100 percent of responses except for calcium gluconate injection, which was 20 percent. Non-availability at supply point and high level of expiry were the next two most important issues that impacted non-management decisions in hospitals. Figures 6–9 present the reasons for non-management of HDP products across various facility types.

Figure 6 Reasons why CHPS compounds do not manage HDP products

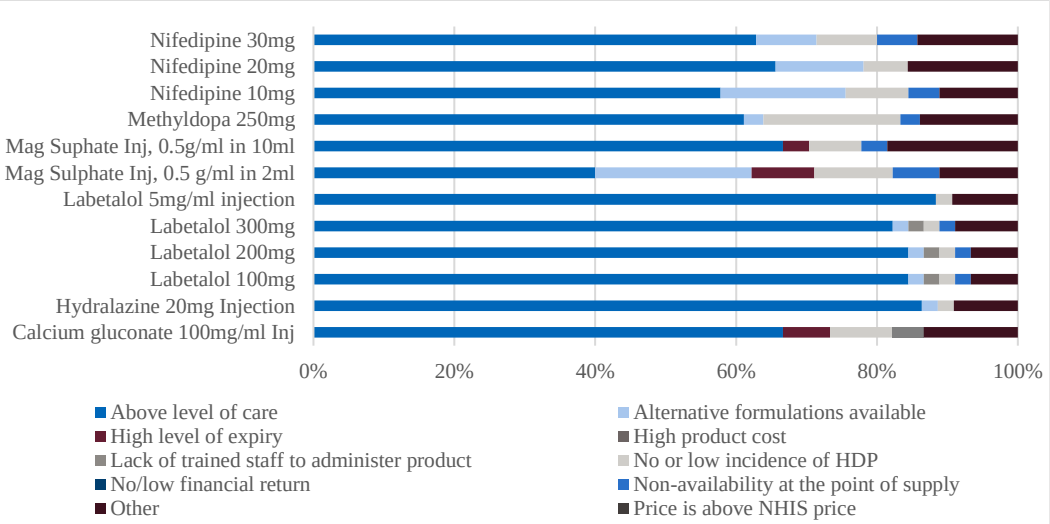


Table 5 Number of CHPS that do not manage HDP products

CHPS	Nº
Calcium gluconate 100mg/ml Inj	45
Hydralazine 20mg Injection	44
Labetalol 100mg	45
Labetalol 200mg	45
Labetalol 300mg	45
Labetalol 5mg/ml injection	43
Mag Sulphate Inj, 0.5 g/ml in 2ml	45
Mag Suphate Inj, 0.5g/ml in 10ml	27
Methyldopa 250mg	36
Nifedipine 10mg	45
Nifedipine 20mg	32
Nifedipine 30mg	35

Figure 7 Reasons why health centers do not manage HDP products

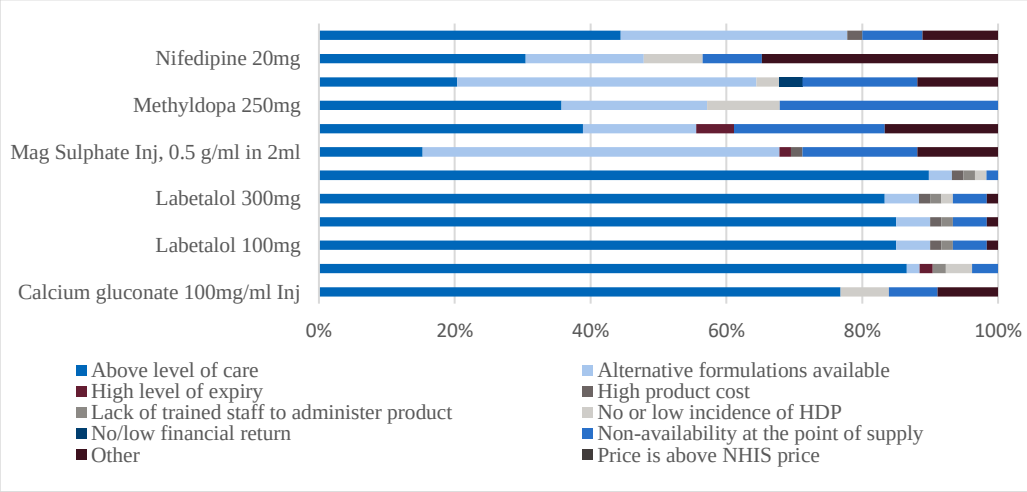


Table 6 Number of health centers that do not manage HDP products

Health Center	Nº
Calcium gluconate 100mg/ml Inj	56
Hydralazine 20mg Injection	52
Labetalol 100mg	60
Labetalol 200mg	60
Labetalol 300mg	60
Labetalol 5mg/ml injection	59
Mag Sulp. Inj, 0.5 g/ml in 2ml	59
Mag Sulp. Inj, 0.5g/ml in 10ml	18
Methyldopa 250mg	28
Nifedipine 10mg	59
Nifedipine 20mg	23
Nifedipine 30mg	45

Figure 8 Reasons why polyclinics do not manage HDP products

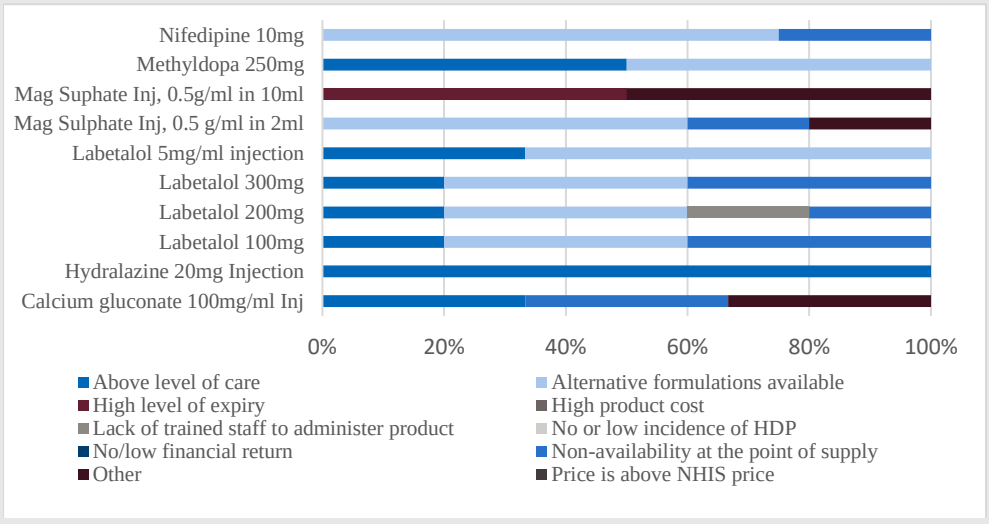


Table 7 Number of polyclinics that do not manage HDP products

Clinic	Nº
Calcium gluconate 100mg/ml Inj	3
Hydralazine 20mg Injection	1
Labetalol 100mg	5
Labetalol 200mg	5
Labetalol 300mg	5
Labetalol 5mg/ml injection	3
Mag Sulph. Inj, 0.5 g/ml in 2ml	5
Mag Suph. Inj, 0.5g/ml in 10ml	2
Methyldopa 250mg	2
Nifedipine 10mg	4

Figure 9 Reasons why hospitals do not manage HDP products

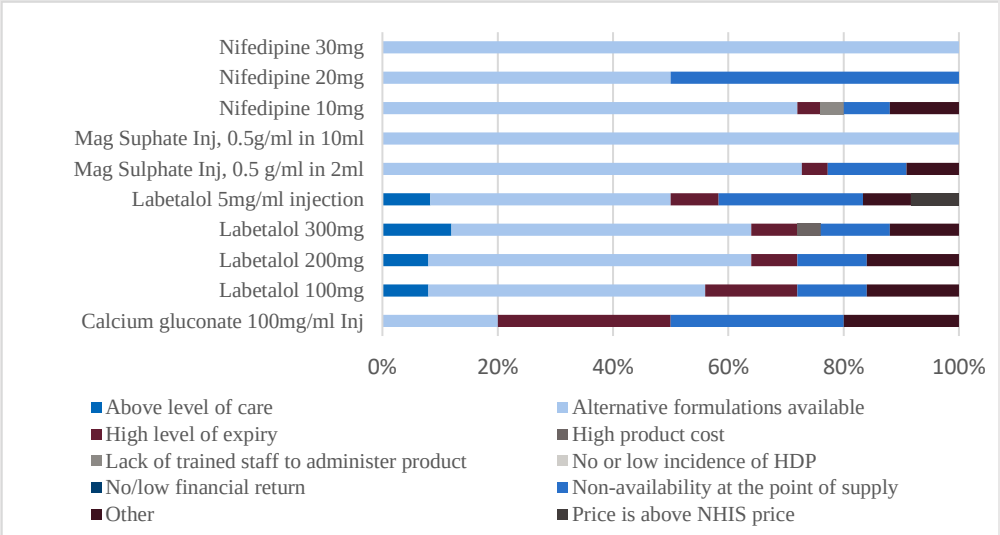


Table 8 Number of hospitals that do not manage HDP products

Hospital	Nº
Calcium gluconate 100 mg/ml Inj	10
Labetalol 100 mg	25
Labetalol 200 mg	25
Labetalol 300 mg	25
Labetalol 5 mg/ml injection	12
Mag sulp. Inj, 0.5 g/ml in 2 ml	22
Mag sulp.inj, 0.5 g/ml in 10 ml	1
Nifedipine 10 mg	25
Nifedipine 20 mg	4
Nifedipine 30 mg	2

3.3 Perception of Key Informants on Factors that Influence Product Management

Based on the key informant interview conducted at the regional level, the factors that influence product management within health facilities include policy issues, staffing, and National Health Insurance Scheme (NHIS) payment delays.

Policy Issues

Policy issues found to impact product management decisions was the restriction on the stocking of HDP products based on levels of care. For example, a respondent indicated that:

"The levels of care too, I think for some of the antihypertensives, the health center levels are not allowed to prescribe."

Staff-related challenges

Staff-related challenges cited by respondents included inadequate staffing and human resource capacity gaps. A key informant stated that:

"Also, human resources are a problem. In health centers in the north, there are no [pharmacy] technicians, it is the midwives who run the place. It is a big problem. They sometimes are ignorant of their position and what they can prescribe."

Delayed payment

Respondents mentioned the issue of delays in NHIS payment as one of the factors influencing the management of HDP products.

"You have to wait for the entire cycle before insurance reimburses you so any delay in reimbursement by the national health insurance also goes a long way in affecting our procurement of these commodities."

3.4 Availability of HDP Products in Health Facilities

Availability of HDP products ranged between 72 percent and 95 percent except for nifedipine 10 mg, which was not available in one out of the two facilities that manage the product. Nifedipine 20 mg and nifedipine 30 mg were found in 79 percent and 85 percent of facilities. Those that recorded stockouts in the three months before the survey mostly attributed them to non-availability at the supply point. Other reported reasons for stockouts of nifedipine formulations include inadequate funds to procure the product, product not requested on time, and rationing by the supply point. Methyldopa was available in 86 percent of facilities; with stockouts being driven by non-availability at the supply point. Together, high consumption, inadequate funds, and product rationing accounted for 46 percent of reported stockouts for methyldopa. Magnesium sulphate injection 0.5g/ml (10 ml) was available in 80 percent of facilities. Reported stockouts

were mainly due to stockouts at the supply point and inventory management issues such as challenges in determining re-order quantities and delays in placing orders. Fear of expiry also impacted stocking decisions for this product. Almost all facilities that manage hydralazine injection had the product in stock (95 percent). Availability of labetalol injection was 72 percent; with stockouts and product rationing at the supply point accounting for reported non-availability at service delivery points. Seventy-six percent of facilities had calcium gluconate injection. Similar to other HDP products, stockouts for calcium gluconate injection were mainly due to non-availability at the supply point. Facilities also provided "other" reasons for calcium gluconate injection stockouts, including high expiry and sales price being higher than NHIS price.

Figure 11 Availability of HDP products in health facilities

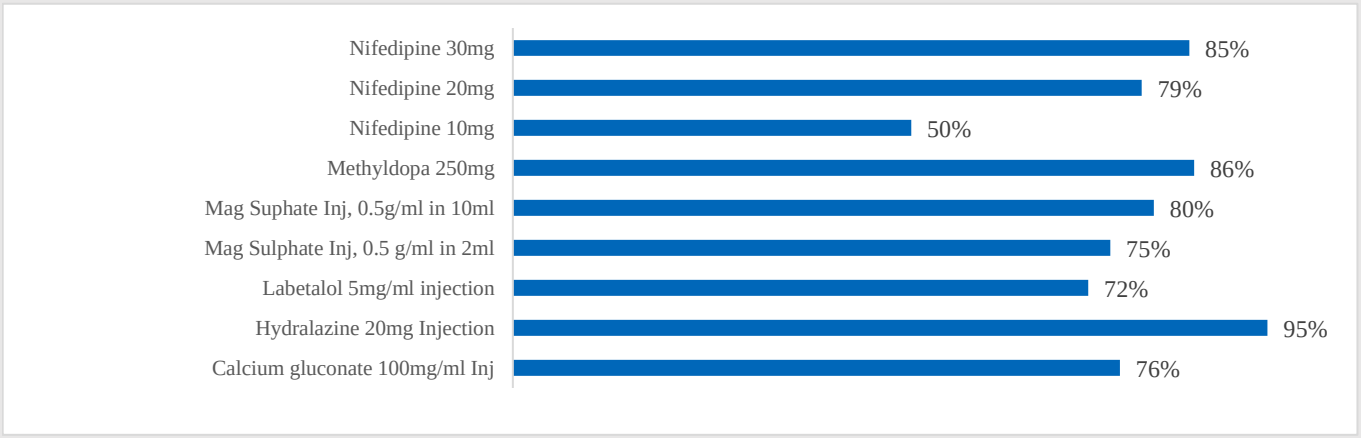


Figure 10 Reported reasons for stockouts in the past three months

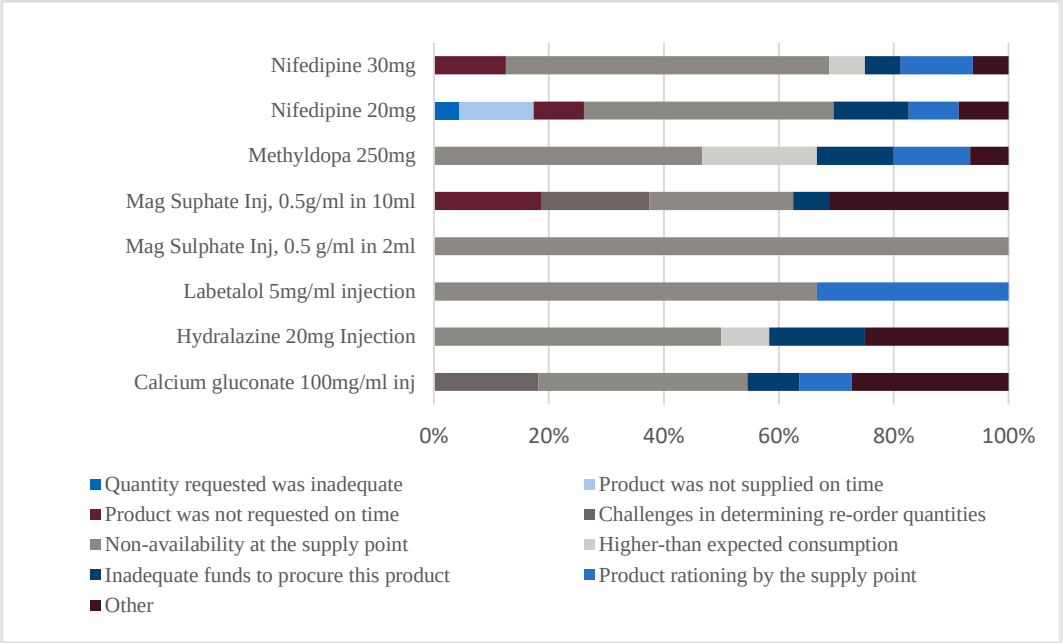


Table 9 Other reasons for stockouts

Product	Reason
Nifedipine 30mg	Product not supplied on time
Nifedipine 20mg	Indebtedness to RMS
Methyldopa 250mg	Rationing by RMS due to indebtedness
Mag suphate inj, 0.5g/ml in 10ml	Rarely prescribed leading to expiries
Hydralazine 20mg injection	Not prescribed, hence facility does not stock
Calcium gluconate 100mg/ml injection	High expiry, sales price above NHIS price

3.5 Perception of key informants on factors influencing the level of availability of HDP products

Based on the key informant interview conducted at the regional level, the factors that influence the level of availability of HDP products within health facilities include financing and administrative challenges and prescriber policy restrictions.

Respondents indicated that NHIS payment delays affect reimbursement by health facilities, leading to their inability to replenish stock and maintain consistent and adequate supply to health facilities.

"We are also not able to service our indebtedness to our suppliers because the facilities that are picking these medicines are not able to pay us promptly [and this is] because of delays in NHIS payment to the facilities. As a result, we are not able to restock and meet the demand from health facilities", stated a respondent.

Administrative challenges

Respondents mentioned lack of trained staff, mismanagement, and cumbersome procurement processes as some of the administrative challenges that impact the availability of HDP products.

The administrative challenge related to the lack of trained staff was mentioned by a key informant.
"People are trained [in logistics management] and they leave, people are trained and they leave and that also affects availability."

Mismanagement/misapplication of funds was cited by a respondent as contributing to the non-availability of HDP products, which was
"I can go on to say misapplication of commodity funds affect availability of HDP products"

Regarding cumbersome procurement process, a respondent reported that:
"The cumbersome procurement processes, you get it! Because you cannot just go and buy, you have to procure."

Prescriber policy restriction

Key informants said that prescriber-level challenges negatively impact the availability of HDP products in health facilities.

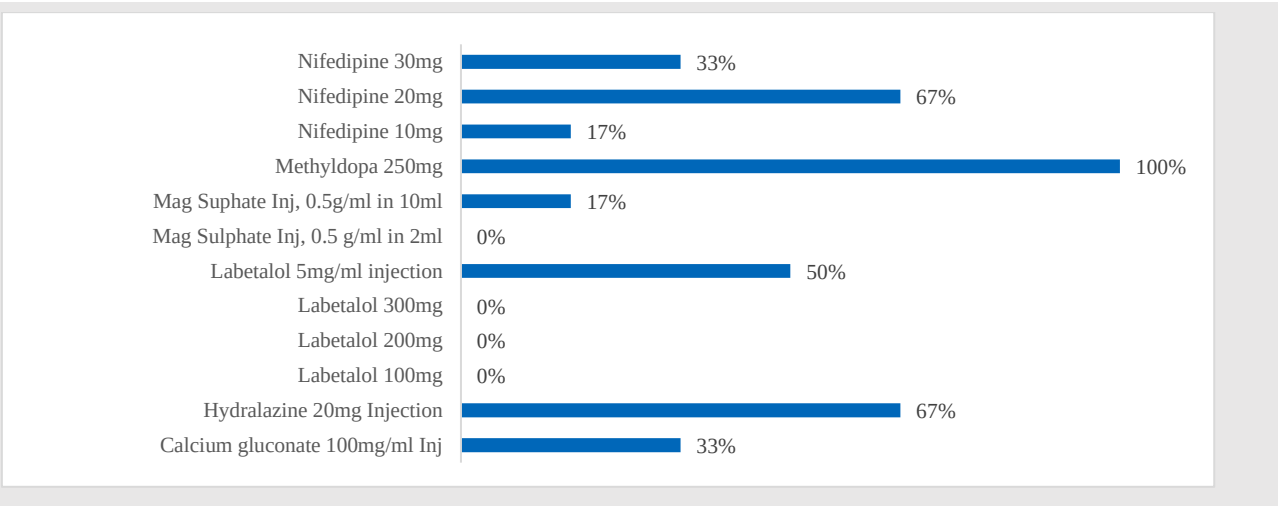
One respondent indicated that:
"The last NCT, looking at the list, none of these were part of it because we do not want to risk bringing them and no facility will request for it and it expires at the RMS."

3.6 Availability of HDP Products in Regional Medical Stores

Study Results

GHS policy (Guideline of Logistics Management of Public Sector Health Commodities in Ghana) requires all public health facilities in Ghana to access health commodities from RMSs located in their respective regions. This means that the first port of call for public health facilities seeking to replenish their stock is the RMS. As a result, stockouts at RMSs can have a huge impact on product availability at health facilities. The results indicate that availability of HDP products in health facilities ranged between 0 percent and 67 percent aside from methyldopa, which was available in all sites visited. A comparative analysis of availability levels at RMSs and health facilities reinforces the fact that health facilities usually turn to the private sector for supplies anytime an RMS runs out of commodities. For example, despite the low availability of nifedipine 30mg (33 percent) and magnesium sulphate injection 0.5 g/ml in 10 ml (17 percent) in RMSs, health facilities recorded relatively high availability levels of 85 percent and 80 percent respectively. Similar significant disparities (in favor of health facilities) were observed for calcium gluconate injection, hydralazine, labetalol injection, magnesium sulphate injection 0.5mg/ml in 2ml, sublingual nifedipine 10 mg, and nifedipine 20 mg. As seen in health facilities, labetalol oral preparations were stocked out in all RMSs visited. The high stockout rate for these products in both RMSs and health facilities indicates a preference for other anti-hypertensive products. Methyldopa was the only exception, recording an availability of 100 percent in RMSs compared to 86 percent in health facilities.

Figure 12 Availability of HDP products in RMSs



Regional-level Challenges with Availability of HDP Products

Factors affecting availability of HDP products at the regional level include the macro-economic dynamics, framework contract (FWC) implementation structure, financing, bureaucratic procurement procedures, and storage capacity.

Macro-economic dynamics

Ghana is experiencing high inflation, which is driving the cost of HDP commodities beyond levels that can be sustained under the NHIS and FWC mechanism. This has affected supply arrangements/transactions between RMSs and vendors as profit margins have been significantly impacted. Respondents cited inflation to contribute immensely to unavailability of HDP at the regional level. Two key informants indicated that:

"…. when the economic conditions change, and the cost of products increase they [suppliers] are unable to supply."

"The framework arrangement has a very tight margin, so the pricing is very competitive…… so in the event that there are price fluctuations, they are unable to deliver these commodities to the RMS", said another respondent.

FWC implementation structure

The FWC mechanism was introduced to guarantee the supply of quality medicines at highly affordable rates to health facilities within the public sector. Currently, 65 commodities are on the FWC list including three HDP products – methyldopa, nifedipine 20 mg tablet and nifedipine 30 mg tablet. Key informants cited a challenge with regards to the pricing regime, highlighting the need to introduce a price adjustment formula to offset exchange range fluctuations and high inflation.

"…..and then there must be a price adjustment factor whenever you are launching a tender (for FWC] so that in the event of exchange rate fluctuations and inflation, they will be able to quickly adjust the prices so vendors can supply."

Financing

Inadequate funding constitutes one of the key factors affecting the ability of RMSs to stock adequate quantities of HDP commodities at any point in time. This is mainly due to delays in the payment of NHIS claims to health facilities which also impacts reimbursement to RMSs and by extension payment of suppliers and resupply decisions. Respondents reported delays in payment to impact the availability of HDP at the regions.
Two key informants made the following statements:

"We are also not able to service our indebtedness to our suppliers because the facilities that are picking these medicines are not able to pay us promptly [and this is] because of delays in NHIS payment to the facilities".

"We are really having a challenge with the suppliers [due to payment delays]. Not only medicines used for these hypertensive disorders, essential medicines as well."

Bureaucratic procurement procedures

Respondents mentioned bureaucratic procurement procedures as having a negative impact on the availability of HDP products. One of them stated that:

"Bureaucratic procedures slow down the procurement process and therefore there are instances where commodities are not available."

Storage capacity

Respondents mentioned the issue of limited storage capacity at RMSs as an administrative challenge. A key informant stated that:

"All the RMSs, there are storage capacity challenges. Quite often they can store up to maybe 3 months….. that also affects it."

3.7 Inventory Management Practices

Application of inventory management best practices is important for maintaining consistent availability of HDP products in health facilities. Facilities were deemed to have an inventory management system in place if they had a ledger book, stock card, or an electronic inventory management system (e.g., Ghana Integrated Logistics Management System or any other system that has the capability to manage inventory). The results indicate that availability of a stock card/inventory management tool for labetalol injection, hydralazine injection, and calcium gluconate injection was 83 percent, 92 percent, and 95 percent respectively. The results can be attributed to the fact that these products are mainly managed by higher-level facilities, which normally have qualified supply chain personnel handling the pharmacy store. Availability of inventory cards for the remaining products ranged between 75 percent and 81 percent except for nifedipine 10 mg and magnesium sulphate injection 0.5g/ml in 10 ml, which recorded values below 60 percent.

The proportion of health facilities with updated stock card/inventory tool for HDP commodities ranged between 50 percent and 95 percent; with the top three values recorded for labetalol injection (72 percent), hydralazine injection (76 percent), and calcium gluconate injection (95 percent). About 50 percent of facilities managing nifedipine 10 mg, magnesium sulphate 5g/ml in 10 ml and magnesium sulphate 5g/ml in 2ml had updated their stock cards/inventory tools. The remaining products recorded values between 62 percent and 72 percent. Generally, the results highlight the need to keep sensitizing and working with health facilities to implement inventory management best practices. This was supported by the fact that 40 percent of personnel with logistics management responsibilities had not been trained (refer to Annex 1 for detailed results on capacity building indicators). Table 10 presents results of availability and updating of stock cards/inventory tools in facilities visited.

Table 10 Availability and updating of stock cards/inventory tools

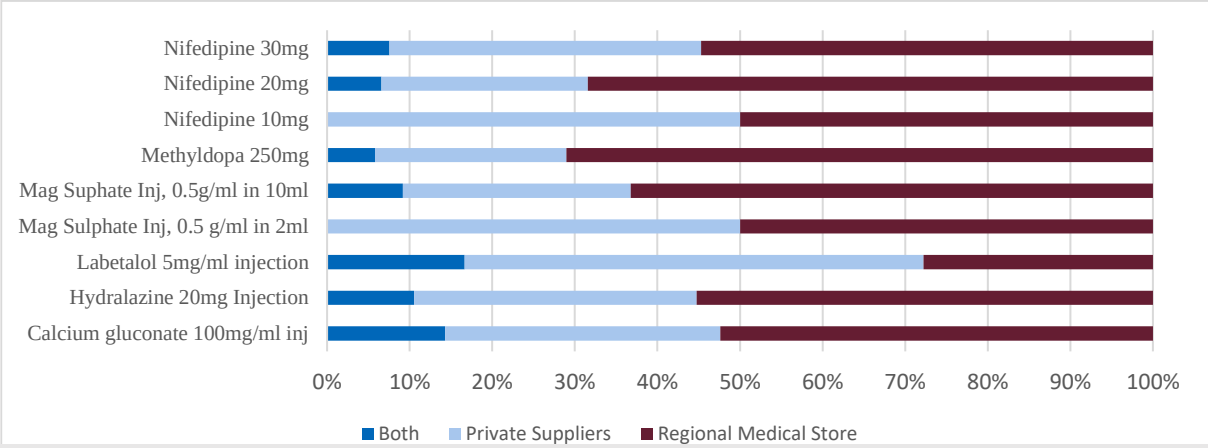
Commodity	Number of facilities managing commodity	Availability of inventory management tool/system		Inventory management too/system updated	
		Number of facilities with inventory tool/system	Percent facilities with inventory tool/system	Number of facilities with updated inventory tool/system	Percentage of facilities with updated inventory tool/system
Calcium gluconate 100mg/ml injection	21	20	95%	19	95%
Hydralazine 20mg injection	38	35	92%	29	76%
Labetalol 5mg/ml injection	18	15	83%	13	72%
Magnesium sulphate injection, 0.5 g/ml in 2ml	4	3	75%	2	50%
Magnesium sulphate injection, 0.5g/ml in 10ml	87	51	59%	44	51%
Methyldopa 250mg	69	56	81%	43	62%
Nifedipine 10mg	2	1	50%	1	50%
Nifedipine 20mg	76	57	75%	47	62%
Nifedipine 30mg	53	42	79%	36	68%

3.8 Source of HDP Products

According to policy of the Ghana Health Service (Standard Operating Procedure for Logistics Management of Public Health Sector Commodities), health facilities are required to source their medicines from the regional medical stores. General essential medicines are largely procured by the RMS directly for the health facilities. The advantages of such a policy are lower administrative costs and less need for facilities to carry inventory.

The results showed that the main source of most of the HDP products is the RMS. Most health facilities rely solely on the RMS for methyldopa (71 percent), nifedipine 20 mg (68 percent), magnesium sulphate injection 0.5 g/ml in 10ml (63 percent), hydralazine injection (55 percent), nifedipine 30 mg (55 percent), and calcium gluconate injection (52 percent). However, the private sector contributes significantly to the supply of labetalol injection (56 percent), magnesium sulfate injection 0.5g/ml in 2ml (50 percent,) and sublingual nifedipine 10mg (50 percent). Also, the proportion of facilities that rely on the RMS and private sector suppliers ranged between 6 percent and 17 percent depending on the product. Generally, RMS and private sector vendors are needed to ensure adequate stocking of HDP products to help prevent stockouts in health facilities.

Figure 13 Source of HDP products



3.9 Pricing of HDP Products

The median selling price for four HDP products (calcium gluconate injection, hydralazine injection, magnesium sulphate injection, 0.5g/ml in 10ml and methyldopa) was consistent with the NHIS price. The median price for labetalol injection was lower than the NHIS price, indicating that health facilities may obtain higher revenue when they administer the product to NHIS clients. Although the median price for sublingual nifedipine 10 mg, nifedipine 20 mg, and nifedipine 30 mg was higher in health facilities compared to the NHIS price, the percentage mark-up ranged between 20 percent and 100 percent. This means that facilities could still obtain revenue when they dispense these products to NHIS clients. In establishing the selling price of products, health facilities rely on two main approaches, and these include the application of NHIS prices and mark-up pricing.

Table 11 Median cost price, selling price and NHIS price of HDP product

Product	Median cost price	Median selling price	Percent mark-up	NHIS price
Calcium gluconate 100mg/ml inj	8.875	14.3	61%	14.3
Hydralazine 20mg injection	16.1	26	61%	26
Labetalol 5mg/ml injection	50	72	44%	78
Mag sulphate inj, 0.5 g/ml in 2ml	6.675	12.36	85%	N/A
Mag sulphate inj, 0.5g/ml in 10ml	7.9	12.48	58%	12.48
Methyldopa 250mg	0.3588	0.52	45%	0.52
Nifedipine 10mg	0.65	0.78	20%	0.52
Nifedipine 20mg	0.1	0.2	100%	0.11
Nifedipine 30mg	0.25	0.33	32%	0.17

3.10 Product Registration

All medicines used in Ghana are required to be registered under the Food and Drugs Authority (FDA). Table 12 presents the registration status of the top three brands of HDP products found in health facilities. The results indicate that none of the top three brands of calcium gluconate injection had been registered at the time of the survey. Also, the only brand of nifedipine 10 mg found in facilities had not been registered. Four products—methyldopa, magnesium sulphate injection 0.5 g/ml in 2 ml, magnesium sulphate injection 0.5 g/ml in 10ml, and labetalol injection—had two out of three brands registered, while two out of four hydralazine injection brands had also been registered. Nifedipine 20 mg and nifedipine 30 mg had two out of three brands not being registered. Overall, about half of the top three brands of HDP products had been registered. Since registration status is a predictor of product quality, the FDA needs to continue to work toward improving product registration in Ghana.

Table 12 Brands of HDP Products Assessed and their Registration Status

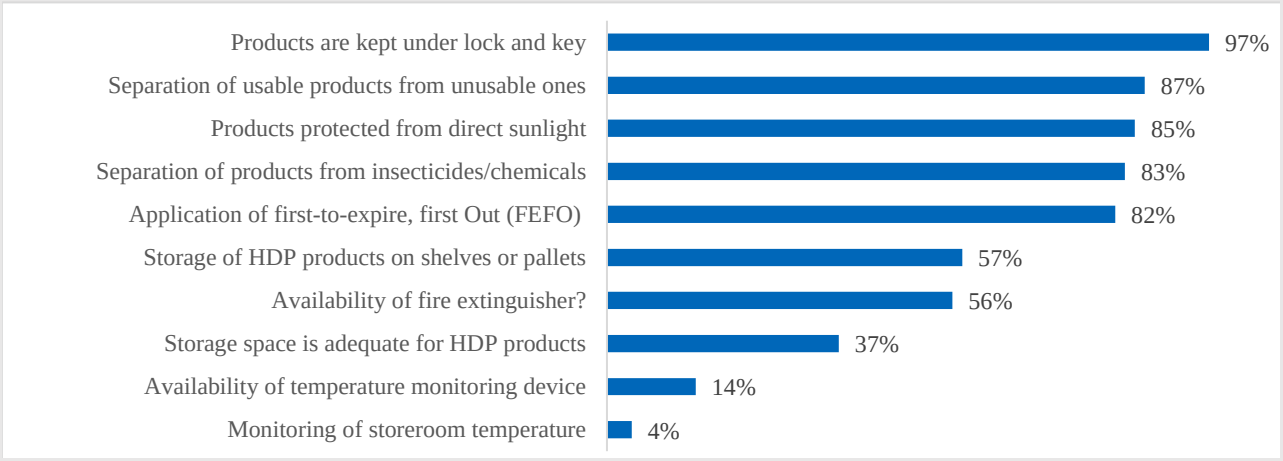
Product	Percentage split of top three HDP products	Registration status
Calcium gluconate 100 mg/ml Injection		
Calcium gluconate injection, Bhavani Pharmaceuticals Ltd	6%	Not registered
Calcium gluconate injection, Sanderson Laboratories	88%	Not registered
Philocalcium	6%	Not registered
Hydralazine 20 mg Injection		
Hydralazine injection, Afrowell Exports	8%	Not registered
Hydralazine injection, Jackson Laboratories PVT Ltd	33%	Not registered
Hydralazine injection, SG Pharma PVT Ltd	8%	Registered
Zidral 20 mg Injection	31%	Registered
Labetalol 5 mg/ml injection		
BluDate	15%	Not registered
Empracon	38%	Registered
Switalol	31%	Registered
Magnesium sulphate injection, 0.5 g/ml in 2ml		
Blumagsul injection	33%	Not registered
Intramag 50 percent injection	33%	Registered
Magnesium sulphate, Swiss Parenterals LTD	33%	Registered
Magnesium sulphate injection, 0.5 g/ml in 10ml		
Blumagsul injection	11%	Not registered
Intramag 50 percent injection	74%	Registered
Magnesium sulphate, Swiss Parenterals LTD	6%	Registered
Methyldopa 250 mg tablet		
MDP 250	47%	Registered

Product	Percentage split of top three HDP products	Registration status
Methyldopa 250 mg, PHARM-INTER	7%	Not registered
Novadopa 250 mg	34%	Registered
Nifedipine 10 mg Sublingual		
Nifedipine tablets 10 mg, Medopharm	100%	Not registered
Nifedipine 20 mg tablet		
N-DIP 20	17%	Not registered
Nifin-20R	20%	Not registered
Skydipin 20 SR	27%	Registered
Nifedipine 30 mg tablet		
N-DIP XR 30	11%	Not registered
Nifecard XL	16%	Registered
Vynif-30	38%	Not registered

3.11 Adherence to Standard Storage Practices

Adherence to standard storage practices was variable in facilities surveyed. In all, more than 80 percent of health facilities met the requirements for products under lock and key, separation of usable product from unusable ones, protection of products from sunlight, separation of products from insecticides, as well as the application of the first-to-expire, first--out inventory management system. On the other hand, performance in three areas (availability of temperature monitoring device, temperature monitoring, and adequacy of storage space) was low and ranged between 4 percent and 37 percent. Also, areas such as availability of fire extinguisher (56 percent) and storage of HDP products on shelves and pallets (57 percent) must be improved. Generally, these low-performance areas (availability of storeroom thermometers, fire extinguishers, shelves/pallets and adequacy of storage space) can be attributed to inadequate funds in some facilities (especially those at lower levels) to acquire the needed storage equipment/resources.

Figure 14 Percentage of health facilities adhering to standard storage practices



3.12 Capacity Building for HDP Prescribers/Midwives and Staff in Stock Management

GHS has had in-service training policies in place for several years, delineating training needs, frequency of training, area of training, and career progression. To provide good-quality care, health care providers at all levels of maternal health care services need to have access to appropriate training, which includes adequate supportive supervision. The presence and maintenance of trained staff constitute an essential component of HDP commodity management and service delivery. The results showed that the proportion of HDP commodity managers that had been trained in polyclinics and CHPS compounds was 38 percent and 40 percent, respectively. Also, 61 percent of logistics personnel in health centers had been trained while 70 percent of those in hospitals said they had received training in logistics management. The results demonstrate the need for GHS to identify and target logistics management training for facilities with capacity gaps, beginning with lower-level facilities that have significant human resource capacity challenges.

Regarding the availability of standard operating procedures (SOPs)/guidelines for HDP case management, 65 percent of CHPS compounds and 84 percent of health centers that manage HDP conditions had either a hard or soft copy of the document on the day of visit. Furthermore, all the polyclinics and hospitals assessed had the SOP available. HDP supportive supervision, which is useful for tracking adherence to guidelines and strengthening the capacity of staff to manage various HDP conditions, had been conducted with 80 percent of hospitals; however, less than half of polyclinics (40 percent), health centers (36 percent), and CHPS compounds (30 percent) had benefited from this exercise. In-service training on HDP case management was also assessed as part of the survey; results indicate that all hospitals and polyclinics had benefitted from training. Also, the proportion of CHPS compounds and health centers that received training on HDP case management training ranged between 83 percent and 95 percent. Overall, the gaps in human resource capacity at lower-level facilities compared to hospitals and polyclinics reinforces the need for key actors at regional and central levels to continue to explore measures aimed at bridging the capacity gap. Tables 13 and 14 present data on the percentage of trained commodity managers as well as facilities that had benefitted from capacity-building initiatives on HDP case management.

Table 13 Capacity-building indicators

Personnel trained in logistics management	Denominator	Numerator	Percentage of facility staff that have benefitted from capacity building initiatives
CHPS	75	30	40%
Polyclinic	13	5	38%
Health Center	168	103	61%
Hospital	150	105	70%

Table 14 Facilities that benefitted from capacity building initiatives

Capacity building in HDP case management	Denominator (facilities managing condition)	Numerator	Percentage of facility staff that have benefitted from capacity building initiatives
Availability of SOP/guideline on HDP management			
CHPS	20	13	65%
Polyclinic	5	5	100%
Health center	50	42	84%
Hospital	25	25	100%
Facilities benefitting from HDP supportive supervision			
CHPS	20	6	30%
Polyclinic	5	2	40%
Health Center	50	18	36%
Hospital	25	20	80%
Facilities trained on the management of hypertension in pregnancy			
CHPS	20	19	95%
Polyclinic	5	5	100%
Health center	50	44	88%
Hospital	25	25	100%
Facilities trained on the management of pre-eclampsia			
CHPS	14	12	86%
Polyclinic	5	5	100%
Health center	37	32	86%
Hospital	25	25	100%
Facilities trained on the management of pre-eclampsia			
CHPS	8	7	88%
Polyclinic	4	4	100%
Health center	24	20	83%
Hospital	25	25	100%

3.13 Prescriber Preference

STGs provide guidance on pharmacological and non-pharmacological treatment options that should be applied by prescribers in managing various clinical conditions. Treatment options may vary depending on other characteristics, including the age of patient, severity of disease, and other underlying conditions. The STGs are used together with the National Essential Medicines List (NEML), which specifies the level of use (i.e., CHPS compound, health centers, and hospitals) for health commodities, including HDP products. Therefore, the results in this section have been disaggregated by facility types to serve as proxy for determining the preference levels for the different various categories of prescribers—doctors, physician assistants, and midwives. Doctors are the main prescribers in hospitals and may widely be seen in polyclinics. Physician assistants

are the main prescribers in health centers, while midwives make up most prescribers in CHPS compounds in managing HDP conditions.

Mild Hypertension

For hypertension in pregnancy (without preeclampsia and eclampsia), the drugs of choice as prescribed in accordance with Ghana's STGs are methyldopa tablet (first-line treatment) and nifedipine sustained release (SR) oral tablet (second-line treatment). The results indicate that most prescribers in CHPS compounds (63 percent) prefer nifedipine SR tablet as the first-choice treatment for mild hypertension in pregnancy. For second choice, 75 percent of CHPS compounds selected methyldopa tablet, while labetalol tablet was regarded as the main third choice product (35 percent). Since labetalol tablet was stocked out in all the facility types, CHPS compounds with midwives likely rely mainly on nifedipine and methyldopa for treating mild hypertension in pregnancy. For health centers, similar dynamics were recorded for first (nifedipine oral tablet—71 percent) and second choice (methyldopa tablet—59 percent) except that amlodipine tablet was selected as the main third-choice product (49 percent). Like CHPS compounds and health centers, nifedipine SR oral tablet was the preferred first choice medication in hospitals and polyclinics, accounting for 53 percent and 86 percent of prescriber preferences respectively. Methyldopa tablet was the main second-choice medication in hospitals (51 percent) and polyclinics (86 percent). The main third-choice medication in hospitals was amlodipine tablet (39 percent) while labetalol tablet was the main third-choice medication in polyclinics (75 percent). As with lower-level facilities, hospitals and polyclinics likely rely on methyldopa and nifedipine, as labetalol tablet was totally stocked out in these facilities. Figures 15 to 18 present data on the choice medicines for mild hypertension in pregnancy across facilities visited.

Figure 15 Choice of medicines for mild hypertension in CHPS compounds

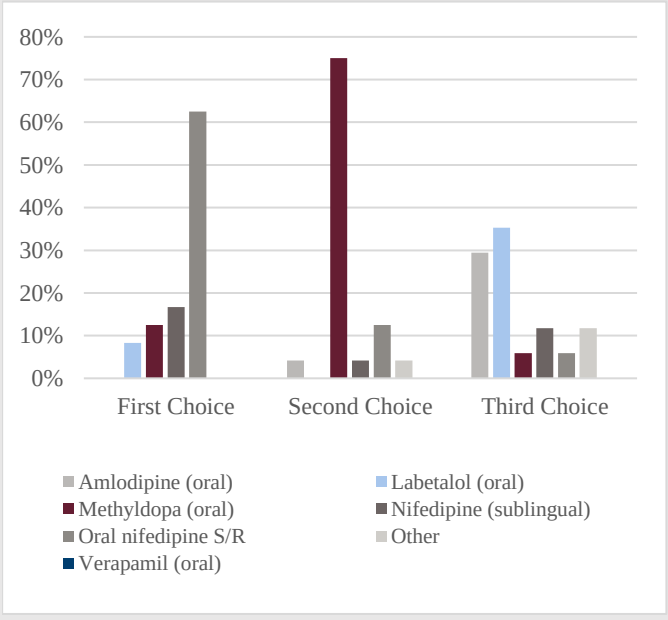


Figure 16 Choice of medicines for mild hypertension in health centers

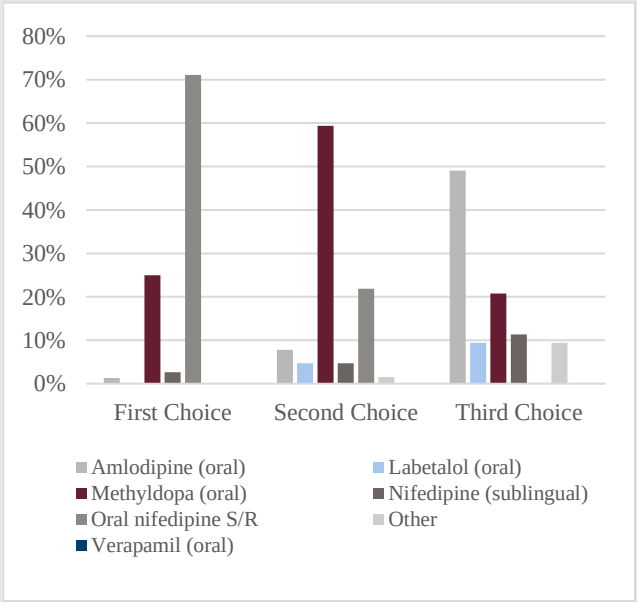


Figure 17 Choice of medicines for mild hypertension in polyclinics

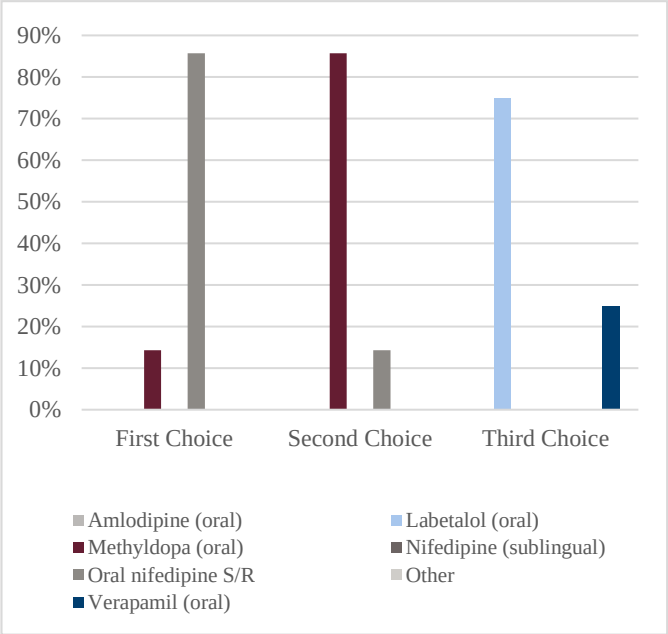
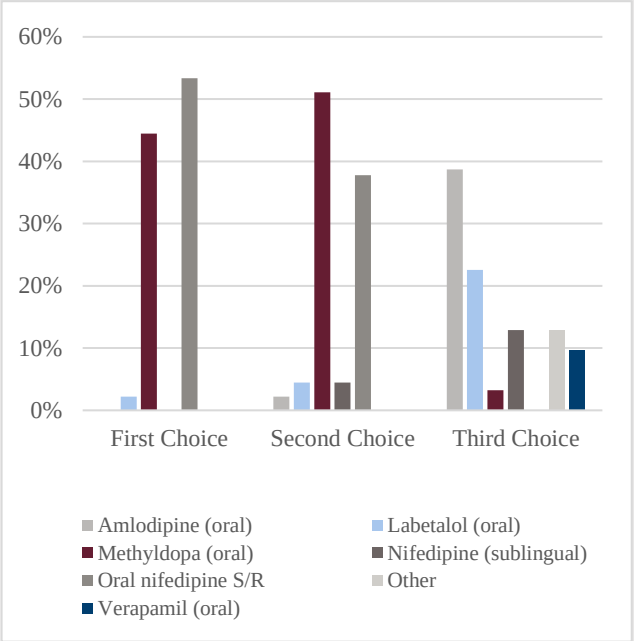


Figure 18 Choice of medicines for mild hypertension in hospitals



Severe Hypertension

Results in this section have been presented for polyclinics and hospitals, since management of severe hypertension in pregnancy is restricted to higher-level facilities. In polyclinics, hydralazine injection was the most preferred first- and second-choice product for managing severe hypertension in pregnancy, accounting for 43 percent of prescriber preferences in each case. For hospitals, hydralazine injection and labetalol injection were the first- and second-choice products among prescribers. Hydralazine injection accounted for 42 percent of first-choice prescriber preferences while labetalol injection was selected by 34 percent of prescribers as their preferred second-choice product. Figures 19 and 20 present the choice of medicines for severe hypertension in pregnancy in polyclinics and hospitals.

Figure 19 Choice medicines for severe hypertension in polyclinics

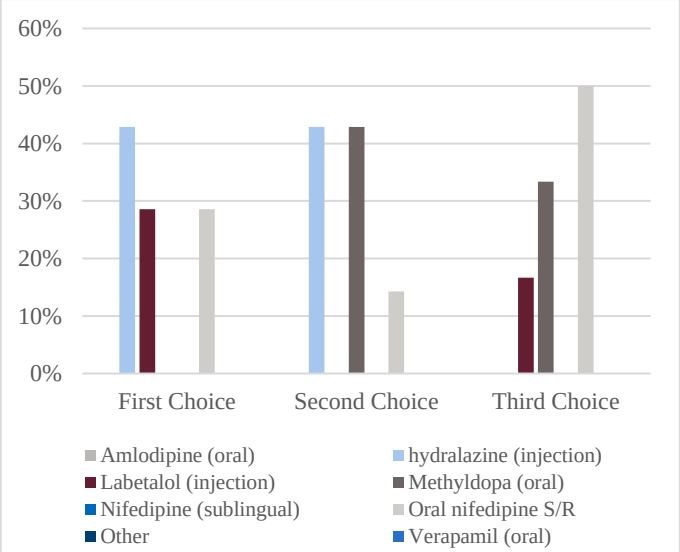
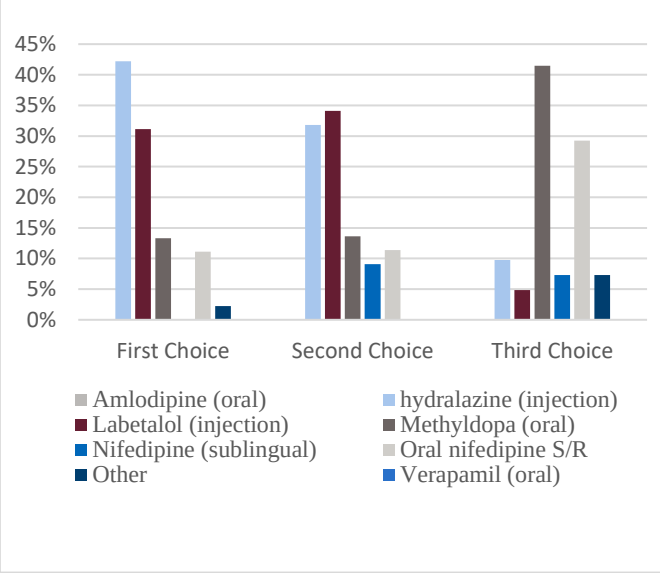


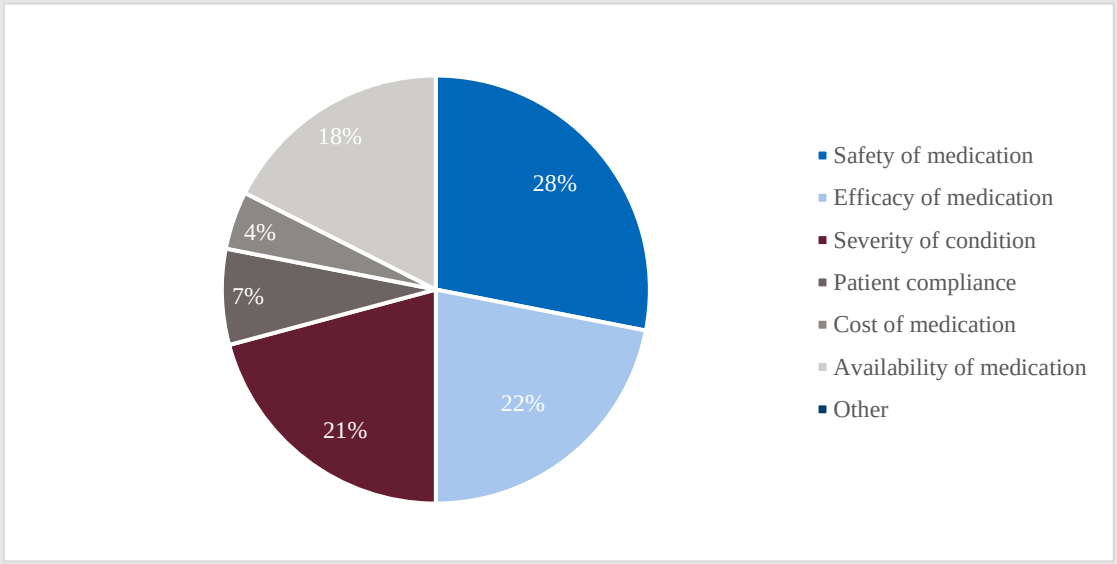
Figure 20 Choice medicines for severe hypertension in hospitals



Factors influencing prescriber choice of antihypertensive for pregnant women

When treating patients, the final responsibility for the well-being of the individual patient remains with the prescriber. The basis of the prescriber's choice should therefore reflect the expected outcome of the treatment. The top three factors influencing the choice of HDPs were safety of medication (28 percent), efficacy of medication (22 percent), and severity of condition (21 percent). Other factors include availability of medication (18 percent), patient compliance (7 percent), and cost of medication (4 percent).

Figure 21 Factors influencing prescriber choice of antihypertensive for pregnant women



3.14 Treatment of HDP in Health Facilities

In assessing the management of hypertensive disorders in pregnancy commodities, the study team collected data from a maximum of two patient folders per facility to obtain quantitative data on products used in managing HDP. Similarly, a maximum of two respondents were interviewed per facility to obtain feedback on the perception of clients in relation to access to HDP products.

From the results, 50 percent of hypertension in pregnancy cases (without eclampsia or pre-eclampsia) were treated with nifedipine SR oral while 28 percent of cases were treated with methyldopa. The results are largely consistent with the prescriber preference outputs, which showed that most prescribers across various facility types prefer nifedipine as the main first-choice medication, followed by nifedipine as second choice. Pre-eclampsia was managed mainly using nifedipine SR tablet (33 percent) and methyldopa tablet (31 percent). In managing eclampsia, the proportion of folders that had "other" medication (magnesium sulphate injection and labetalol injection) was 50 percent. Methyldopa tablet was prescribed in 25 percent of cases, while nifedipine SR tablet (13 percent) and hydralazine injection (13 percent) were prescribed for the remaining cases. Figure 22 presents the type of treatment given for HDP as per patient folders.

Figure 22 Type of treatment given for HDP as per client folders

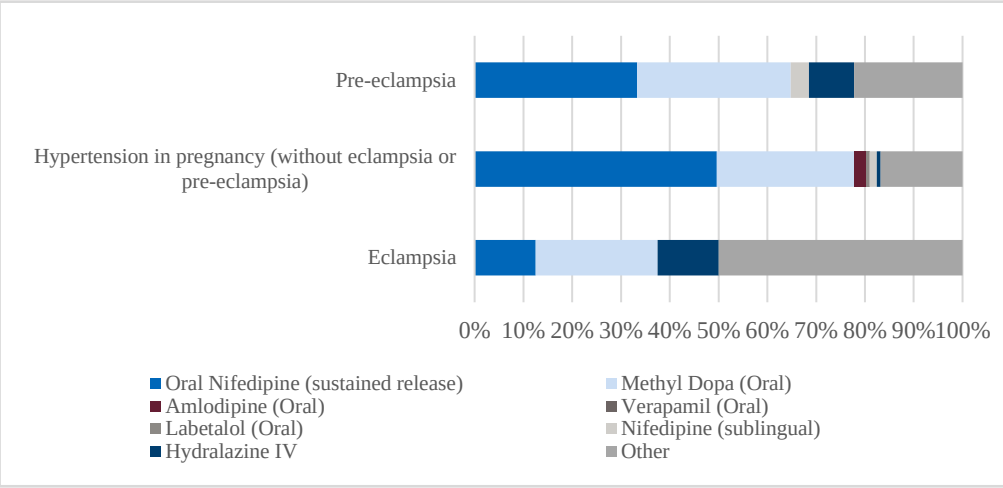


Table 15 Number of folders assessed for each HDP category

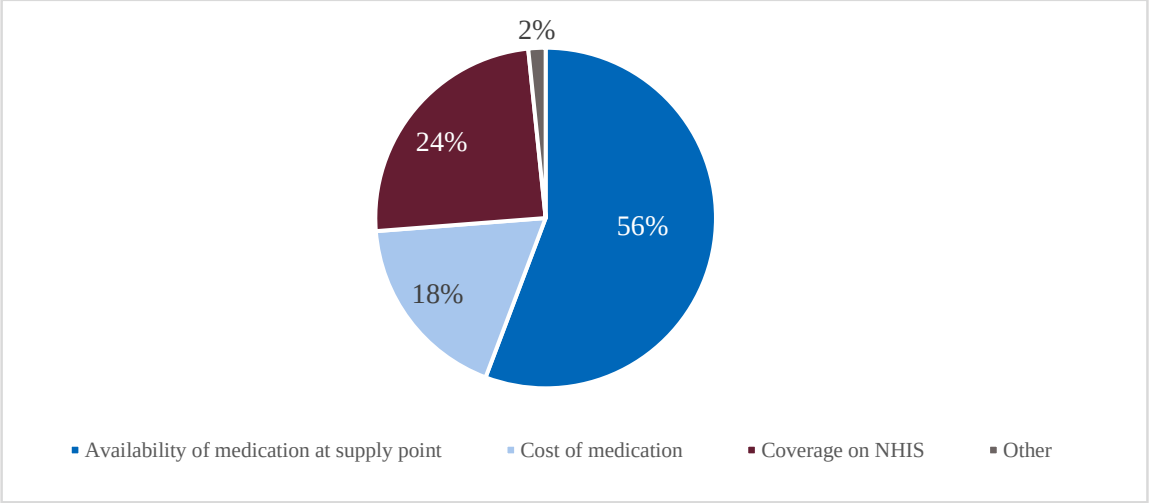
HDP	N° of Folder Assessed
Hypertension in pregnancy (without pre-eclampsia or eclampsia)	131
Eclampsia	8
Pre-eclampsia	54

- Other products used in eclampsia are magnesium sulphate injection and labetalol injection.
- Other products used in pre-eclampsia are magnesium sulphate injection and nifedipine sublingual.
- "Other" for hypertension in pregnancy indicates referral to a higher-level facility.

3.15 Single Most Important Factor Influencing Access to HDP Products by Clients

Several factors impact the ability of HDP clients to access their medication. To improve HDP outcomes, issues that restrict access to HDP products need to be identified and addressed. Based on feedback from clients with HDP, the single most important factor that impacts their ability to obtain and use HDP products is availability at the supply point (56 percent). Other factors that influence access are the inclusion of HDP products in NHIS benefit package (24 percent) and cost of medication (18 percent).

Figure 23 Single most important factor influencing client access to HDP products



3.16 Source of HDP Products for Clients and Perception on Level of Access

Knowledge about the source of HDP products for clients can be useful in targeting interventions to improve access and ensure better health outcomes. The results showed that 70 percent of clients obtain their HDP medication from health facilities within the public sector. Fifteen percent obtain their products from private pharmacies, while 7 percent rely on private health facilities for supplies. Also, 58 percent of clients said they could access HDP products to a great extent compared to 39 percent of clients who said HDP products are accessible to some extent. Figures 24 and 25 present data on the source of HDP products for clients and their perception on level of access.

Figure 25 Source of HDP products for clients

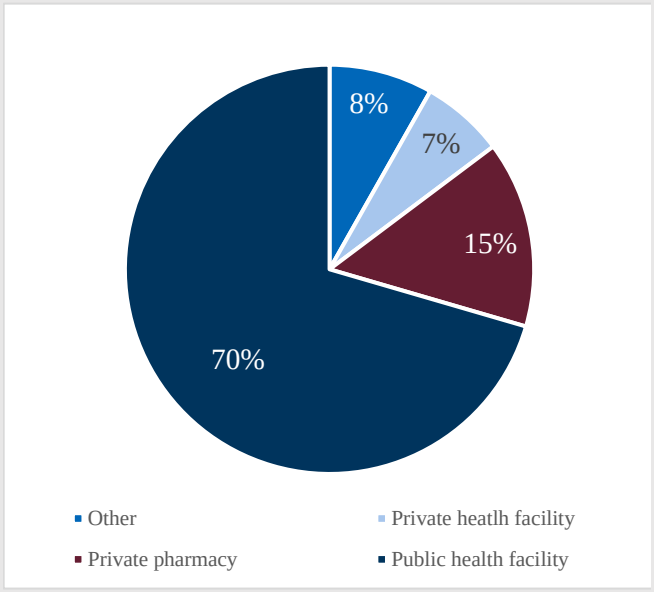
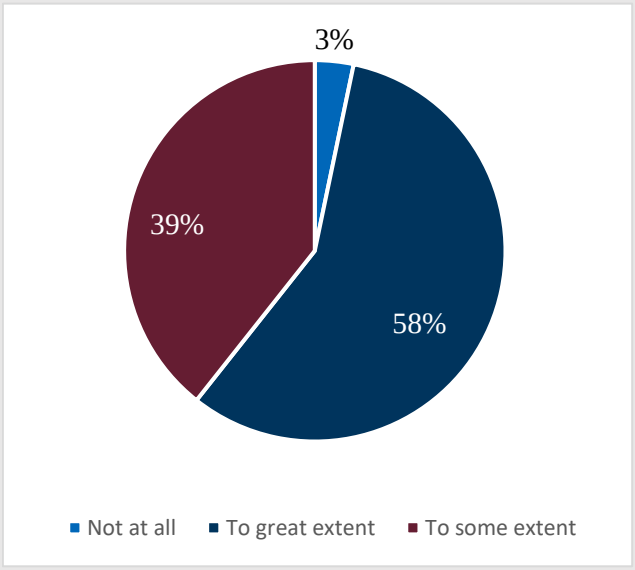


Figure 24 Perception on level of access to HDP products



4.0 Discussion

This section has been discussed in line with the research objectives of the study, to examine:

- The availability of HDP commodities in Ghana's health service delivery points for managing hypertension in pregnancy.
- Care provider behaviors, practices, and preferences for HDP commodities.
- Data relative to case management and prescriber behavior in managing hypertension in pregnancy in Ghana.

4.1 The Supply Chain for HDP Products in the Public Health Sector

This section presents a deep dive into the supply chain for HDP products within the public health sector. It goes beyond the first objective of the study, which seeks to examine the level of availability of HDP products to include other key factors, such as management, pricing, product quality, and storage, all of which are critical for the efficient running of the supply chain for HDP products.

4.1.1 Management of HDP Products in the Public Health Sector

Aligning product management policies with levels of care helps to guarantee patient safety while ensuring better health outcomes. At the same time, health policies must help to ensure critical lifesaving commodities can readily and equitably be accessed by people seeking health services. Globally, hypertensive disorders in pregnancy account for 14 percent of all maternal deaths, highlighting the need for countries to take the necessary action to protect the lives of women seeking maternal health care.

For this study, a facility is deemed to manage a product if it undertakes routine stocking, ordering, and dispensing of that product. Overall, the survey showed that lower-level facilities (CHPS compounds and health centers) manage a smaller range of HDP products compared to polyclinics and hospitals and this is mainly due to policy restrictions based on the level of care. Despite this, some facilities were not managing certain HDP products even though they are allowed by policy to stock them. For example, the NEML prescribes the management of magnesium sulphate injection 0.5 g/ml in facilities with midwives or above. However, 60 percent of CHPS compounds were not managing this product even though midwives were available. A similar situation was recorded in health centers and polyclinics, where 30 percent and 60 percent of the facilities visited, respectively, were not managing magnesium sulphate injection 0.5 g/ml. CHPS compounds and health centers attributed the non-management decision to above level of care while polyclinics cited high level of expiry. Availability of an alternative formulation (e.g., magnesium sulphate injection 0.5 g/ml, 10 ml formulation instead of the 2 ml preparation), non-availability at the supply point, and preference to refer to higher-level facilities were also mentioned as some of the reasons affecting the management of magnesium sulphate injection. These issues can be addressed in several ways. First, GHS needs to sensitize health facilities with midwives to stock magnesium sulphate injection 0.5 mg/ml, as it is within their level of care. Also, consistent availability at RMS coupled with regular capacity development in managing eclampsia will help in

management and availability of this product. To avoid expiries, facilities must be sensitized to stock minimum quantities, which will have negligible financial impact, even if expiries occur.

Calcium gluconate injection was not being managed in any of the CHPS visited mainly because it was above their level of care. This aligns with GHS policy (NEML), which prescribes management of this product in health centers with doctors and above. However, given that calcium gluconate injection is indicated for the management of magnesium sulphate injection toxicity, it will be useful for GHS to review relevant policies and allow facilities that manage magnesium sulphate injection to stock calcium gluconate injection. This will help avert treatment delays and improve health outcomes in case of magnesium sulphate injection toxicity.

For sublingual nifedipine 10 mg, only two facilities (one health center and one polyclinic) out of the 135 health facilities were managing this product. GHS policy (Standard Treatment Guidelines) prohibits use of sublingual nifedipine in hypertensive crisis since it can lower the blood pressure too rapidly and may cause ischaemia of vital organs. However, it is indicated in the management of blood pressure in severe pre-eclampsia and imminent eclampsia.

Nifedipine 20 mg and 30 mg were managed in all polyclinics assessed, while nifedipine 20 mg and nifedipine 30 m mg were managed in 84 percent and 92 percent of the hospitals assessed, respectively. Hospitals that were not using these two products (nifedipine 20 mg and nifedipine 30 m mg) attributed it to the availability of an alternative formulation and non-availability at the supply point. For lower-level facilities, some inconsistency is found in relation to managing nifedipine preparations. While the 2017 NEML prescribes use in facilities with midwives, the NHIS medicines list (2021 and 2022 editions) restricts reimbursements for only facilities with doctors. This clearly demonstrates the need for key stakeholders (GHS and NHIS) to review and align their policies to ensure clarity and consistency.

Management of methyldopa was low in CHPS compounds (20 percent), while 53 percent and 60 percent of health centers and polyclinics, respectively, were managing this product. Although facilities that were not managing this product mainly attributed it to above level of care, this is inconsistent with both GHS (NEML) and NHIS policies, which prescribe/recognize the management of methyldopa in facilities with midwives. In Ghana, methyldopa is the first-line treatment for hypertension in pregnancy so facilities that offer delivery services are expected to ensure this product is always available.

Labetalol tablet is required to be managed in facilities with doctors; however, none of the higher-level facilities (hospitals and polyclinics) had this product in stock on the day of visit. They cited availability of an alternative formulation and non-availability at the supply points as the main reasons for not managing any of the labetalol preparations. Similarly, none of the CHPS compounds and health centers had the product as it was above its level of care. Facilities likely prefer methyldopa and nifedipine SR tablets, since they are the recommended first- and second-line options used in managing hypertension in pregnancy. This was supported by the fact that 65 percent of prescribers prefer nifedipine as their first-choice medication while 75 percent rely on methyldopa as their second choice. Although labetalol and hydralazine injections are required to be managed in hospitals, 2 percent of CHPS compound and 13 percent of health centers indicated they manage these products. Similarly, 40 percent of polyclinics and 52 percent of hospitals

indicated they manage labetalol injection, although the NEML restricts use to regional hospitals and teaching hospitals. This points to the need for increased sensitization on adherence to STGs.

Overall, policy-related issues (above level of care), stockouts at supply point, and reliance on alternative formulations were the main factors that impacted product management in health facilities. At the same time, knowledge of product management policies can help improve the range of HDP products managed in health facilities while promoting quality service delivery through improved compliance with relevant guidelines. Where conflicts exist in policy direction, stakeholders must take the needed steps to review and ensure clarity while aligning with emerging trends and practices.

4.1.2 Availability of HDP Products in the Public Health Sector

For facilities that manage the various HDP products, availability levels were generally high except for sublingual nifedipine 10 mg, which was at 50 percent. The main reason cited for reported stockouts was non-availability at the supply point. This was supported by the RMS results, which showed zero to 33 percent availability for eight out of the 12 products assessed. Other issues that led stockouts at the health facilities include product rationing at the supply points, inadequate funds to procure, product not requested on time, higher than expected consumption, and challenges in determining re-order quantities. Generally, health facilities tend to procure from the private sector when HDP products are not available at the RMS. This means the role of the private sector in complementing the supply obtained through the RMS cannot be discounted. Indeed, 23 percent to 50 percent of the HDP products assessed are procured solely from the private sector. Therefore, identifying the complementary role played by the private sector is critical is promoting availability of HDP products at the point of care.

Furthermore, key informants interviewed at the regional level mentioned NHIS payment delays, FWC implementation structure, macro-economic dynamics such as price instability and inadequate storage space as some of the key factors that impact product availability at RMSs and subsequent supply to health facilities.

The National Health Insurance Scheme (NHIS) was introduced in 2003 to provide equitable access and financial coverage for basic health services. The National Health Insurance Authority (NHIA) has credentialed various types of health facilities to provide services under the scheme. The National Health Insurance Act (Act 852) enjoins the NHIA to reimburse health facilities within 90 days after the provision of serve to an NHIS client. Despite this, payments are usually delayed, which results in financial challenges in health facilities and by extension indebtedness to RMSs. This affects the ability of RMSs to pay suppliers resulting in non-replenishment/ undersupplies and subsequent stockouts. In Ghana, HDP products are part of essential medicines and are financed by the various RHAs using the drug revolving fund. Therefore, financial challenges imposed by delayed NHIS payment ultimately limits their ability to procure and supply HDP products to health facilities. To address this, MoH/GHS should advocate and collaborate with key stakeholders (NHIS, Ministry of Finance) to identify workable options for improving the timelines for claims payment.

The Framework Contract (FWC) arrangement was introduced by MoH/GHS to ensure improved access to high-quality and affordable health commodities at health facilities. It leverages the huge volumes of RMS orders to negotiate for highly competitive prices through a national competitive tender. Currently, FWC covers a focus list of 65 commodities including three HDP products: methyldopa tablet, nifedipine SR 20 mg tablet, and nifedipine SR 30 mg tablet. After the tendering process, MoH enters a Memorandum of Understanding with successful suppliers, after which the RHAs enter into FWCs with identified suppliers. FWCs, when implemented efficiently, are intended to maximize value for money, increase transparency and fairness, increase competition, provide a degree of certainty for the suppliers without diminishing competition as well as minimize cost through a standard common contract arrangement. Despite the huge potential benefits, FWC implementation has been impacted in a number of ways. First, inadequate funding (mainly due to NHIS delayed payments) at the regional level has resulted in indebtedness to suppliers, leading to a decline in commitments to fulfill orders. Second, the current macro-economic dynamics (high inflation and high exchange rate) have increased the cost of pharmaceuticals beyond levels that can be contained under the current FWC price list. To address this, MoH/GHS must review the current mechanism to include a price adjustment formula. This will help improve overall availability of FWC commodities, including the HDP products on the list.

4.1.3 Availability and Use of Inventory Management Tools

Although availability of stock cards/inventory tools for HDP commodities ranged between 50 percent and 95 percent, not all facilities had updated them. This can be attributed to logistics management capacity gaps, as 30–62 percent of commodity managers had not been trained. In conducting capacity-building activities, MoH and GHS must target lower-level facilities in the supply chain, which lack adequate human resources for logistics management activities.

4.1.4 HDP Product Pricing

The median selling price for six out of nine HDP products assessed in health facilities was either equal to or higher than the NHIS prices. Products (nifedipine 10 mg, nifedipine 20mg, and nifedipine 30 mg) that showed lower selling prices in comparison to the NHIS price recorded percentage markups between 20 percent and 100 percent. Because most public health facilities have a significant proportion of NHIS clients, they tend to adopt the NHIS price as their selling price. Beyond the price levels, NHIS must work to ensure timely reimbursement to health facilities to help sustain service delivery, including the procurement and provision of HDP commodities.

4.1.5 Product Quality

Registration of pharmaceutical products allows the FDA to protect the health and safety of people in Ghana by ensuring only high-quality products that meet accreditation standard are marketed and sold to the public. FDA expects manufacturers and importers to register their products in an effort to improve access to quality-assured health products across the country. In all, about 50 percent of the top three brands of HDP products had been registered as of the time of the survey. This highlights the need for FDA to continue to sensitize pharmaceutical importers and

manufacturers to register their products. It also shows the need for continuous collaboration with MoH/GHS to deepen pharmacovigilance activities at health facilities.

4.1.6 Adherence to Storage Conditions

Overall, health facilities must take the needed steps to improve storage conditions for HDP products. Specifically, health facilities must improve on the monitoring of storeroom temperature, adequacy of storage space, and availability of fire extinguishers and shelves/pallets. Where possible, regions should assist them to acquire relevant storage equipment/devices and enhance storage conditions for HDP products.

4.2 Care Provider Behaviors, Practices, and Preferences for HDP Commodities

This section aligns with objective two of the study, which aims to examine the preferences and underlying decisions behind the choice of medication for hypertension in pregnancy. It also provides some insight into key considerations that influence access levels for clients.

4.2.1 Prescriber Preferences in the Management of Mild Hypertension in Pregnancy

In managing mild hypertension in pregnancy, the STGs recommend the use of methyldopa and nifedipine SR tablet as the first- and second-line treatments, respectively. For all facility types (CHPS, health centers, polyclinics, and hospitals), nifedipine SR tablet was selected as the most preferred anti-hypertensive medication for pregnant women. To improve the management of mild hypertension in pregnant women, supply chain actors should work at improving the supply of nifedipine and methyldopa tablets to health facilities. According to the NEML, which has been derived from the STGs (2017) of the Ministry of Health, nifedipine tablets are expected to be reimbursed by the NHIA at both level B2 (health center with doctor) and at level M (midwifery) for treating hypertension in pregnancy. However, NHIA reimburses the use of nifedipine only at level B2. Midwives across the country's health facilities are not reimbursed by the NHIA when they prescribed nifedipine for hypertension in pregnancy, except when they prescribed methyldopa. The high level of preference across facilities reinforces the need for a review and alignment of the NEML level of care recommendations and NHIS reimbursement policy.

4.2.2 Prescriber Preferences in the Management of Severe Hypertension in Pregnancy

The American College of Obstetricians and Gynecologists (ACOG) defines hypertension in pregnant women as clinical maternal systolic blood pressure greater than or equal to 140 mm Hg and/or diastolic blood pressure greater than or equal to 90 mm Hg on two or more occasions at least four hours apart. ACOG further categorizes severe-range hypertension as sustained systolic blood pressure greater than or equal to 160 mm Hg and/or diastolic blood pressure greater than

or equal to 110 mm Hg; in this setting, verification should be performed in as few as 15 minutes to avoid delays in treatment

Blood pressure management in severe pre-eclampsia and imminent eclampsia according to the Ghana STGs is initially hydralazine injection, nifedipine sublingual, or labetalol injection, and after satisfactory response, nifedipine SR tablet or methyldopa tablet can be administered. Generally, prescribers in both polyclinics and hospitals, which are the referral facilities for these cases, prefer hydralazine injection as the first-choice product for managing severe hypertension in pregnancy. Unlike labetalol injection, which is required by policy to be managed in regional and teaching hospitals, hydralazine injection can be used in district-level hospitals. Given that 34 percent of facilities that manage hydralazine injection were sourcing from the private sector, key supply chain actors at the regional level must explore measures to increasingly improve the availability this product.

4.2.3 Factors Influencing Prescriber Preferences and Client-level Access

Factors that influence the choice of HDP products are critical for achieving desired outcomes in clients. This calls for a fine balance between safety, efficacy, cost, compliance, and availability of HDP products. Where equivalent HDP product options exist, cost implications need to be considered, as it may help avoid catastrophic health expenditures or out-of-pocket payments. Overall, 28 percent of prescribers cited safety of medication as the main factor that influences their choice of medication. This is important because patient safety is the basis of any drug approval/pharmacovigilance activity. The other key factors include efficacy of medication, severity of condition, and availability of medication. The importance of product availability to prescriber selection decisions reinforces the need for relevant actors to ensure a well-functioning supply chain for HDP products.

For HDP clients seeking health care, the single most important factor that influences access to HDP products is cost of medication, which accounted for 56 percent of responses. The next most important factor was coverage under the NHIS (18 percent). The motivation for selecting NHIS coverage can largely be attributed to cost considerations, since registration with the scheme offers financial protection for beneficiaries. Furthermore, 70 percent of clients said they obtain their HDP products from the public health sector compared to 15 percent for private pharmacies and 15 percent private health facilities and other sector health facility. Generally, the choice of health facilities, whether public or private, demonstrates the extent to which cost considerations impact access to HDP products by clients.

4.3 Case Management Data for HDP Commodities

This section aligns with study objective 3, to examine data relative to case management. It focuses on the treatment of HDP conditions based on quantitative data obtained from patient folders.

Of the 193 patient folders assessed, 131 (67.9 percent) were diagnosed with hypertension in pregnancy. Consistent with results of prescriber preferences, most cases (50 percent) were

treated with nifedipine SR tablet while 28 percent were treated with methyldopa. Pre-eclampsia cases were mainly treated with nifedipine oral tablet (33 percent) and methyldopa (31 percent), while about half of eclampsia cases were referred. The high referral rate likely points to a capacity gap and reinforces the need for MoH/GHS to identify and target trainings/orientation to facilities with capacity gaps.

Per the discussions above, the availability and use of HDP products in the Ghana public health supply chain are influenced by a myriad of factors, such as supply chain challenges, policy restrictions, financial arrangements for procuring supply of these commodities, prescriber preference for some medications, and human resource capacity gaps. Understanding the inter-relation and dependability of these factors is key to understanding the challenges affecting availability, access, and use to improve maternal health outcomes.

Conclusion and Recommendations

The GHSC-PSM project led the implementation of this study to examine the availability of HDP commodities; assess care provider behaviors, practices, and preferences; and access data relative to case management, following the need for additional insights into the management of HDP commodities after a desk review was completed in 2021. The findings of this study point to a multiplicity of factors that affect the procurement, supply, availability, and access of HDP commodities to clients seeking care at various health facilities. These factors are related to the practices within the supply chain, financial arrangements for procurement and supply, policy restrictions within the STGs, institutional capacity for case management, prescriber knowledge, and preference, among others. The role of the NHIS and structure of framework contract implementation were identified to be at the core of the ability to access and use these commodities. Whereas the NHIS and FWC do not specifically target HDP products, their performance or implementation can have a cascading effect on the ability of health facilities to access and use the required products. Misalignments and inconsistencies within the STGs, the NEML, and the NHIS approval for using HDP commodities also need to be addressed with respect to the level of care to address policy constraints that affect stocking and use. Based on the reported findings, the study team offers the following recommendations to improve the availability, access, and use of HDP products.

Reduce NHIS restrictions: The NHIA and the NHIS are perceived to have regulations that prevent the stocking of some HDPs products within the CHPS and health centers even though the personnel who require these products are available at post. These concerns and possible misconceptions must be addressed to improve the number of lower-level facilities managing required HDP commodities for their level of care.

Resolve NHIS payment delays: Resolving the payment delays to facilities from the NHIS for services rendered is at the heart of improving funding for procurement of the supply of HDP and other essential commodities. Without a steady flow of funds, facilities impair the revolving funds for purchase and supply, which makes RMS unable to obtain supplies to make commodities available.

Revitalize the implementation of FWC: Non-performance has a big effect on the availability of HDP commodities; the MoH should be able to account for inflation and depreciation within the award of FWCs so that they do not become redundant after the award. Awarding the supply of HDP commodities to MoH-approved suppliers is an important step in product quality assurance.

Rethink the role of the private sector: The role of the private sector in sustaining the supply of HDP products at the health facilities particularly in instances when the RMSs are out of stock or are facing supply challenges cannot be discounted. Whereas the RMSs permit health facilities to procure from the open market when they are out of stock, it may be useful to restrict the source of HDP commodities from pre-qualified vendors to minimize the effect of overpricing and sale of unregistered products.

Improve regulation: The study identified that some brands of HDPs found in the health facilities were unregistered. This is a potential risk for the entry of sub-standard products and must be prioritized for immediate action.

Address human resource gaps: Whether in service delivery or supply chain management, the effect of inadequate human resource capacity on competence and adequacy of numbers is deleterious to performance. We identified these gaps to be more pronounced at the CHPS and health centers, so our prescriptions should be prioritized in order of support.

Review product management policy for calcium gluconate injection: MoH and GHS should assess and review the categories of health facilities that are allowed to manage calcium gluconate injection—an antidote for magnesium sulphate toxicity. This will ensure that all facilities that manage magnesium sulphate injection have the means to swiftly administer calcium gluconate injection to prevent missed opportunities for saving lives.

Review and align product management policies with NHIS reimbursement policy: MoH, GHS, and NHIS should review and align the NEML with NHIS medicine reimbursement policy. This will ensure that facilities that manage products based on their level of care (e.g., nifedipine oral preparation in facilities with midwives) are duly reimbursed by the NHIA after dispensing to clients.

Sensitize health facilities about product management policies: GHS should integrate product management policies into HDP case management supervision and training to bridge knowledge gaps while improving product availability and adherence to product management guidelines.

Improve dissemination and uptake of treatment protocols and guidelines: Some recommendations, changes, and updates in the STGs, NEML, and protocol for managing HDP have not been implemented. We encourage the role of continuous development programs such as mandatory annual online training courses to increase awareness and use of updated treatment protocols.

Encourage good supply chain management practices: We would like to encourage the regular update of stock records and submission of accurate data from health facilities to the RMS to enhance planning for the stocking and supply of commodities. The RMSs should aim at stocking the required quantities, since more than 75 percent of facilities depend on them as the main source for product supply. Training for facilities should emphasize the importance of good logistics management practices for product quality, particularly products that are stored.

Reinforce good practices: Throughout this report, we have cited good practices at various levels of the supply chain that can be harnessed either for mentoring or peer-to-peer learning. Building on the capacities within the system to address some of the gaps identified is an important step. For example, the products that can be managed by CHPS compounds with a midwife can be enhanced if non-stocking facilities are encouraged to learn from those applying the updated guidelines.

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Annexes

Annex 1 Study Oversight and Coordination

The survey management team consisted of one survey director, three survey technical experts comprising a data manager/analyst with statistics capabilities, technical experts on public health and hypertension supply chain within the public sector, and survey specialist with adequate knowledge of the supply chain, public sector (GHS) system of operation and experience in supervision of data collectors. The survey director was the lead with responsibility for planning and implementing the study. He had overall responsibility for survey management and was the chief liaison between the study team and GHSC-PSM team. Six regional field supervisors and 22 data collectors were responsible for field data collection.

The GHSC-PSM team participated in and supported the coordination of the study before, during, and after data were collected and analyzed, all the way through to report writing. Weekly and ad hoc updates were provided to the GHSC-PSM team on the progress of the assessment. Through this arrangement, all challenges that arose over the course of the assessment were resolved.

All 12 participants were interviewed. Probing questions were asked when necessary to ensure each question was fully exhausted. Exit questions were also asked at the end of each interview to confirm that questions have been explored. Each interview lasted between 20 and 40 minutes. The interviews were audiotaped. Permission to record was always obtained for oral interviews.

Annex 2 Training and Testing

Before the field visit, a comprehensive orientation was organized for data collectors and the regional field supervisors on the administration of survey questionnaires (the quantitative and qualitative data collection tools). Data collectors were primarily tasked with visiting and collecting data (through the administration of questionnaires and interview guides) from health facilities while regional field supervisors were assigned to provide direct oversight for data collectors in their respective regions. The supervisors and data collectors were trained on the overall approach, methodology, objectives, target audience, and ethical considerations of this study.

Training of data collectors

Training was held for data collectors in three sessions from September 17 to September 24, 2022. A total of 24 supervisors and data collectors were trained.

Piloting of tools

The tool was piloted during the training to enable the data collectors to familiarize themselves with the tools as well as identify challenges that needed to be resolved.

2.11 Planning for Data Collection

The study team obtained the list and total number of facilities for the survey through sampling. Facilities to be surveyed were allocated to each team of data collectors. Based on this plan, the team of data collectors, supervisors, and managers designed a route and schedule for data collection. The team obtained the telephone numbers and locations of most of the facilities where possible. In the period between completing the training and beginning data collection, facilities were contacted by telephone to book appointments as well as get directions to facilities. To facilitate communication, a WhatsApp group was created for data collectors, supervisors, managers, and survey directors to encourage good practices and correct common errors among team members.

Annex 3 List of HDP Commodities and Indication

Methyldopa 250 mg tablet: A centrally acting α2-adrenergic receptor agonist. Works by inhibiting vasoconstriction through a central mechanism by reducing the release of catecholamine release. Regarded as the first-line treatment of hypertension in pregnancy.

Labetalol 5 mg/ml injection: A non-selective β-blocking agent with α-1-receptor blocking capabilities. Widely used in severe cases of hypertension in pregnancy.

Labetalol 100 mg, 200 mg and 300mg tablet: A non-selective β-blocking agent with α-1-receptor blocking capabilities. Widely used in severe cases of hypertension in pregnancy.

Oral nifedipine 10mg, 20 mg, 30 mg: Regarded as second-line agent used for the treatment of hypertension in pregnancy. Inhibits the influx of calcium ions to vascular smooth muscle, resulting in arterial vasodilation.

Hydralazine 20 mg injection: Now mainly used intravenously for the treatment of severe hypertension in pregnancy.

Magnesium sulphate injection, 0.5 g/ml: Although not an anti-hypertensive agent, it has been shown to reduce more than half the risk of eclampsia. Also contributes to a reduction in maternal deaths.

Calcium gluconate 100 mg/ml injection: Although not an anti-hypertensive agent, it has been found to be valuable in managing magnesium sulphate toxicity.

Annex 4 List of Facility Types

Region Name	Type of Facility	Count of Type of Facility
Ashanti	CHPS	13
	Clinic	2
	Health Center	20
	Hospital	6
Ashanti Total		**41**
Eastern	CHPS	12
	Health Center	17
	Hospital	5
Eastern Total		**34**
Greater Accra	CHPS	5
	Clinic	3
	Health Center	2
	Hospital	3
Greater Accra Total		**13**
North East	Health Center	3
	Hospital	1
North East Total		**4**
Northern	CHPS	5
	Health Center	4
	Hospital	3
Northern Total		**12**
Upper East	CHPS	3
	Health Center	11
	Hospital	2
Upper East Total		**16**
Western	CHPS	7
	Health Center	3
	Hospital	5
Western Total		**15**
Grand Total		**135**

Annex 5 List of Facilities

	Name of Facility	Region Name	District Name	Type of Facility
1	Dansoman Polyclinic	Greater Accra	Ablekuma West	Clinic
2	Nyameadom CHPS	Greater Accra	Ablekuma West	CHPS
3	Hawa Memorial Saviour Hospital	Eastern	Abuakwa North	Hospital
4	New Tafo Government Hospital	Eastern	Abuakwa North	Hospital
5	Osiem CHPS	Eastern	Abuakwa North	CHPS
6	Apapam CHPS	Eastern	Abuakwa South/East Akim	CHPS
7	Asiakwa Health Center	Eastern	Abuakwa South/East Akim	Health Center
8	Kibi Government Hospital	Eastern	Abuakwa South/East Akim	Hospital
9	Agorkpo CHPS	Greater Accra	Ada East	CHPS
10	Pediatorkope Health Center	Greater Accra	Ada East	Health Center
11	Ada East District Hospital	Greater Accra	Ada East	Hospital
12	Asokwa Health Center	Ashanti	Adansi Asokwa	Health Center
13	Pipiiso Chp Compound	Ashanti	Adansi Asokwa	CHPS
14	Aboabo Health Center	Ashanti	Adansi North	Health Center
15	Aboabogya Health Center	Ashanti	Afigya Kwabre South	Health Center
16	Apagya Methodist Clinic	Ashanti	Afigya Kwabre South	Hospital
17	Anyinasusu Health Center	Ashanti	Ahafo Ano North	Health Center
18	Pokukrom Health Center	Ashanti	Ahafo Ano South East	Health Center
19	Sabronum Health Center	Ashanti	Ahafo Ano South East	Health Center
20	Kom Health Center	Eastern	Akuapim South	Health Center
21	Obotwere Health Center	Eastern	Akuapim South	Health Center
22	Anyinase Health Center	Eastern	Akyemansa	Health Center
23	Ayirebi Health Center	Eastern	Akyemansa	Health Center
24	St Martin'S Catholic Hospital	Ashanti	Amansie South	Hospital
25	Tontokrom Health Center	Ashanti	Amansie South	Health Center
26	Essuowin Health Center	Ashanti	Amansie West	Health Center

	Name of Facility	Region Name	District Name	Type of Facility
27	Mother Of God Health Center	Ashanti	Amansie West	Health Center
28	Mpranease CHPS Compound	Ashanti	Amansie West	CHPS
29	Dwease Health Center	Ashanti	Asante Akim Central	Health Center
30	Konongo Odumasi Government Hospital	Ashanti	Asante Akim Central	Hospital
31	Obenimase	Ashanti	Asante Akim Central	CHPS
32	Akutuase CHPS	Ashanti	Asante Akim North	CHPS
33	Banso CHPS	Ashanti	Asante Akim South	CHPS
34	Banso CHPS Compound	Ashanti	Asante Akim South	CHPS
35	Ofoase Health Center	Ashanti	Asante Akim South	Health Center
36	Kramokurom CHPS Compound	Ashanti	Asante Akim Central	CHPS
37	Dwendwenase Health Center	Ashanti	Asante Akim South	Health Center
38	Sepe Dote Health Center	Ashanti	Asokore Mampong	Health Center
39	Asabi Health Center	Ashanti	Asokore Mampong	Health Center
40	Nkawie-Toase Government Hospital	Ashanti	Atwima Nwabiagya	Hospital
41	Binaba Health Center	Upper East	Bawku West	Health Center
42	Zebila Government Hospital	Upper East	Bawku West	Hospital
43	Adankranja CHPS Compound	Ashanti	Bekwai	CHPS
44	Gyasikrom Health Center	Ashanti	Bekwai	Health Center
45	Kokofu General Hospital	Ashanti	Bekwai	Hospital
46	Manga CHPS	Upper East	Binduri	CHPS
47	Amuana Praso Health Center	Eastern	Birim North	Health Center
48	New Abirem Government Hospital	Eastern	Birim North	Hospital
49	Anafobisi Hc	Upper East	Bongo	Health Center
50	Dua Hc	Upper East	Bongo	Health Center
51	Gowrie CHPS	Upper East	Bongo	CHPS
52	Namoo	Upper East	Bongo	Health Center
53	Vea Hc	Upper East	Bongo	Health Center
54	Adumasa Chp Compound	Ashanti	Bosome Freho	CHPS
55	Apewu Chp Compound	Ashanti	Bosome Freho	CHPS

	Name of Facility	Region Name	District Name	Type of Facility
56	Asiwa Health Center	Ashanti	Bosome Freho	Health Center
57	Dunkura Health Center	Ashanti	Bosome Freho	Health Center
58	Nsutem CHPS	Ashanti	Bosome Freho	CHPS
59	Sandema Hospital	Upper East	Builsa North	Hospital
60	Doninga Hc	Upper East	Builsa South	Health Center
61	Jiningsa CHPS	Upper East	Builsa South	CHPS
62	Kanjarga Hc	Upper East	Builsa South	Health Center
63	Langbinsi Health Center	North East	East Mamprusi	Health Center
64	Ga Central Municipal Clinic	Greater Accra	Ga Central Municipal	Clinic
65	Tabora Health Center	Greater Accra	Ga Central Municipal	Health Center
66	Anyaa CHPS	Greater Accra	Ga Central Municipal	CHPS
67	Garu Health Center	Upper East	Garu	Health Center
68	Songo Health Center	Upper East	Garu	Health Center
69	Bomfa Health Center	Ashanti	Juaben	Health Center
70	Dumakwai CHPS Compound	Ashanti	Juaben	CHPS
71	Juaben Government Hospital	Ashanti	Juaben	Hospital
72	Abaam Health Center	Eastern	Kwabibirem	Health Center
73	Abodom CHPS	Eastern	Kwabibirem	CHPS
74	Subi Health Center	Eastern	Kwabibirem	Health Center
75	Donkorkrom Rch Clinic	Eastern	Kwahu Afram Plains North	CHPS
76	Kwaekese CHPS	Eastern	Kwahu Afram Plains North	CHPS
77	Aduamoa CHPS	Eastern	Kwahu East	CHPS
78	Nkwatia Health Center	Eastern	Kwahu East	Health Center
79	Pepease Health Center	Eastern	Kwahu East	Health Center
80	Kwahu Government Hospital	Eastern	Kwahu South	Hospital
81	Kwahu Praso Presby Health Center	Eastern	Kwahu South	Health Center
82	Besease CHPS	Eastern	Kwahu South	CHPS
83	Agbogbloshi CHPS Zone	Greater Accra	La-Nkwantanang Madina	CHPS
84	Madina Polyclinic	Greater Accra	La-Nkwantanang Madina	Clinic
85	Pentecost Hospital	Greater Accra	La-Nkwantanang Madina	Hospital

	Name of Facility	Region Name	District Name	Type of Facility
86	Kpong Health Center	Eastern	Lower Manya Krobo	Health Center
87	Nuaso CHPS	Eastern	Lower Manya Krobo	CHPS
88	Asitey Health Center	Eastern	Lower Manya Krobo	Health Center
89	Kubori Health Center	North East	Mamprugu Moaduri District	Health Center
90	Yizesi Health Center	North East	Mamprugu Moaduri District	Health Center
91	Gyamfikrom CHPS	Eastern	New Juaben North	CHPS
92	Agavenya CHPS	Eastern	New Juaben South	CHPS
93	Abuakwa Polyclinic	Ashanti	Nwabiagya	Clinic
94	Bamiankor Health Center	Western	Nzema East	Health Center
95	Axim Government Hospital	Western	Nzema East	Hospital
96	Akomadan Health Center	Ashanti	Offinso North	Health Center
97	Kulungungu Health Center	Upper East	Pusiga District	Health Center
98	Widana Health Center	Upper East	Pusiga District	Health Center
99	Kanvelli Health Center	Northern	Sagnarigu	Health Center
100	Malshegu CHPS	Northern	Sagnarigu	CHPS
101	Gbrima CHPS	Northern	Sagnarigu	CHPS
102	Nyanshegu CHPS	Northern	Sagnarigu	CHPS
103	Taha CHPS	Northern	Sagnarigu	CHPS
104	Kalpohin Hc	Northern	Sagnarigu	Health Center
105	St. Lucy Catholic Hospital	Northern	Sagnarigu	Hospital
106	Dadease CHPS Compound	Ashanti	Sekyere Kumawu	CHPS
107	Kumawu Government Polyclinic	Ashanti	Sekyere Kumawu	Clinic
108	Sekyere Health Center	Ashanti	Sekyere Kumawu	Health Center
109	Effia Nkwanta Regional Hospital	Western	Stm	Hospital
110	Mempentemsrew CHPS	Western	Stm	CHPS
111	Takoradi Hospital	Western	Stm	Hospital
112	Kansaworado CHPS	Western	Stm	CHPS
113	Tamale Central Hospital	Northern	Tamale Metro	Hospital
114	Akateng Health Center	Eastern	Upper Manya Krobo	Health Center
115	Otrokper Health Center	Eastern	Upper Manya Krobo	Health Center
116	Sisiamang CHPS	Eastern	Upper Manya Krobo	CHPS

	Name of Facility	Region Name	District Name	Type of Facility
117	Abamkrom Health Center	Eastern	Upper West Akim	Health Center
118	Kwasi Nyarko CHPS	Eastern	Upper West Akim	CHPS
119	Mepom Health Center	Eastern	Upper West Akim	Health Center
120	Afransie Health Center	Western	Wassa Amenfi East	Health Center
121	Nananko CHPS Compound	Western	Wassa Amenfi East	CHPS
122	Dadieso CHPS Compound	Western	Wassa Amenfi East	CHPS
123	Wassa Akropong Government Hospital	Western	Wassa Amenfi East	Hospital
124	Asuohyiam CHPS Compound	Western	Wassa Amenfi West	CHPS
125	Bisaaso Health Center	Western	Wassa Amenfi West	Health Center
126	Father Thomas Allan Rooney Hospital	Western	Wassa Amenfi West	Hospital
127	Wassa Dunkwa CHPS Compound	Western	Wassa Amenfi West	CHPS
128	Yirase CHPS Compound	Western	Wassa Amenfi West	CHPS
129	Ga South Municipal Hospital	Greater Accra	Weija-Gbawe	Hospital
130	Royal Good Shepherd	Greater Accra	Weija-Gbawe	CHPS
131	Walewale Municipal Hospital	North East	West Mamprusi	Hospital
132	Nkwanta CHPS	Northern	Yendi	CHPS
133	Bumbong Hc	Northern	Yendi	Health Center
134	Yendi Hospital	Northern	Yendi Municipal	Hospital
135	Adibo Heath Center	Northern	Yendi Municipal	Health Center

Annex 6 Quantitative Questionnaire

Product Management and Availability

1. Name of region

2. District name

3. Name of health facility

4. Type of health facility

5. Date of visit

6. Does this facility manage this anti-hypertensive product (Hint: Management means that the facility stocked or tried stocking the product in the past one year)?

7. If this product is not managed by the facility, what are the reasons accounting for non-management (select all reasons that apply in this case)?

   i. High product cost

   ii. Non-availability at the point of supply

   iii. No or low incidence of hypertensive disorders in pregnancy

   iv. Above level of care

   v. Lack of trained staff to administer the product

   vi. Alternative formulations available

   vii. High level of expiry

   viii. Price is above NHIS price

   ix. No/low financial return

   x. Other

8. If this product is managed, how many units are currently available in the store?

9. If the product is managed, what is the price you purchase per unit?

10. If the product is managed, what is the price you sell per unit?

11. If the product is managed, how do you determine the selling price?

12. Is this product available in any of the dispensing points?

13. Are there expired products on the shelf?

14. If yes, how many expired units of the product are on the shelf?

15. What inventory system does the facility use to manage this product?

    i. A stock card

    ii. GHILMIS

    iii. Other electronic systems

    iv. N/A

16. What is the ending balance on the stock card/electronic inventory system being used?

17. Looking at the stock card/electronic inventory system, was there an instance where the facility was stocked out of this product in the three months before the month of the survey?

18. If yes, how many stock outs occurred within this period?

19. What was the total number of stockout days for this period?

20. What are the reasons that led to the stockouts for this product (select all that apply)?

    i. Non-availability at the supply point

    ii. Product rationing by the supply point

    iii. Inadequate funds to procure this product

    iv. Higher-than expected consumption

    v. Quantity requested was inadequate

    vi. Challenges in determining re-order quantities

    vii. Product was not requested on time

    viii. Product was not supplied on time

    ix. Other

21. How many units of the product was issued in the three months prior to the survey?

22. What is the main source of supply for this product?

    i. Regional medical store

    ii. Private suppliers

    iii. Both

23. How often does this facility request for this product?

    i. Monthly

    ii. Bimonthly

iii. Quarterly

iv. Every four months or above

24. How many people are responsible for managing medication for hypertensive disorders in pregnancy (HDP)?

25. Out of this number, how many have been trained in logistics management?

Section 2: Case Management

1. Does this facility manage hypertension in pregnancy?

2. If no, what are the reasons for not managing hypertension in pregnancy?

i. Above level of care

ii. No trained staff to manage condition

iii. Logistics not normally available

iv. Prefer to refer to higher-level facility

v. Other

3. Does this facility manage pre-eclampsia?

4. If no, what are the reasons for not managing pre-eclampsia?

i. Above level of care

ii. No trained staff to manage condition

iii. Logistics not normally available

iv. Prefer to refer to higher-level facility

v. Other

5. Does this facility manage eclampsia?

6. If no, what are the reasons for not managing eclampsia?

i. Above level of care

ii. No trained staff to manage condition

iii. Logistics not normally available

iv. Prefer to refer to higher level facility

v. Other

7. Does this facility have a protocol or guideline on the management of hypertensive disorders

in pregnancy (HDP)?

8. If yes, which protocol or guideline does the facility use in managing hypertensive disorders in pregnancy (HDP)?

9. Did this facility benefit from supportive supervision in HDP case management in the past year?

10. Have you received training in managing hypertension in pregnancy?

11. If yes, what type of training did you benefit from (check all that apply)?

i. On-the-job training

ii. Workshop/participation in a seminar or conference

iii. University/diploma training

iv. Other (Kindly specify)

12. Have you received training on the management of pre-eclampsia?

13. If yes, what type of training did you benefit from (check all that apply)?

i. On-the-job training

ii. Workshop/participation in a seminar or conference

iii. University/diploma training

iv. Other (kindly specify)

14. Have you received training on the management of eclampsia?

15. If yes, what type of training did you benefit from (check all that apply)?

i. On-the-job training

ii. Workshop/participation in a seminar or conference

iii. University/diploma training

iv. Other (kindly specify)

Prescriber/Midwife Specific Questions

16. Rate from 1 to 6 your preferred medication/formulation for the management of mild hypertension in pregnancy. (1 means most preferred). Note: Use 'not applicable' (N/A) if it does not apply.

i. Oral nifedipine (sustained release)

ii. Nifedipine (sublingual)

iii. Methyl Dopa (Oral)

iv. Amlodipine (Oral)

v. Labetalol (Oral)

vi. Verapamil (Oral)

vii. Other (kindly indicate medication and rate)

17. Kindly rate from 1 to 6 your preferred medication/formulation for managing severe hypertension in pregnancy. (1 means most preferred). Note: Use 'not applicable' (N/A) if it does not apply.

i. Oral nifedipine (sustained release)

ii. Nifedipine (sublingual)

iii. Methyl Dopa (Oral)

iv. Amlodipine (Oral)

v. Labetalol (Oral)

vi. Verapamil (Oral)

vii. Hydralazine IV

viii. Other (Kindly indicate medication and ranking)

18. What are the top three factors that influence the choice of anti-hypertensive products for pregnant women?

i. Safety of medication

ii. Efficacy of medication

iii. Severity of condition

iv. Patient compliance

v. Cost of medication

vi. Availability of medication

vii. Other

Assessment of Patient Folders

Select 2 HDP folders and complete the following:

19. Patient age (enter number)

20. Type of HDP

    i. Hypertension in pregnancy (not associated with eclampsia or preeclampsia)

    ii. Pre-eclampsia

    iii. Eclampsia

21. Treatment given

    i. Oral nifedipine (sustained release)

    ii. Nifedipine (sublingual)

    iii. Methyl Dopa (Oral)

    iv. Amlodipine (Oral)

    v. Labetalol (Oral)

    vi. Verapamil (Oral)

    vii. Hydralazine IV

    viii. Other (Kindly indicate)

Section 3: Client Feedback on HDP Management

Demographic Data

1. Age

2. Educational Level

    i. No formal education

    ii. Primary

    iii. JHS

    iv. Secondary

    v. Tertiary

3. Marital Status

4. Occupation

    i. Farmer

    ii. Trader

    iii. Government Worker

iv. Private Sector Worker

v. Student

vi. Housewife

vii. Unemployed

viii. Other (please specify……)

5. Do you have hypertension in pregnancy?

6. If yes, are you currently on any antihypertensive medication?

7. Which anti-hypertensive medication are you taking?

8. Where do you normally get this product (select one option)?

i. Public health facility

ii. Private health facility

iii. Private pharmacy

iv. Other (kindly indicate)

9. How will you describe the level of availability of this product in your main supply point?

i. Never available

ii. Sometimes available

iii. Often available

iv. Always available

10. To what extent are you able to access your medication

i. Not at all

ii. To some extent

iii. To a great extent

11. What is the single most important factor that influence your ability to access HDP medication?

i. Cost of medication

ii. Availability of medication at supply point

iii. Transport cost

iv. Coverage on NHIS

v. Other

Section 4: Storage Conditions

1. To what extent are HDP commodities kept on shelves or pallets?

i. None of the products are kept on shelves and pallets

ii. Some of the products are kept on shelves and pallets

iii. Most of the products are kept on shelves/pallets

iv. All products are kept on shelves/pallets

2. To what extent does this facility apply first-to-expire, first out (FEFO) in the management of HDP products?

i. FEFO has not been applied to any of the products

ii. FEFO has been applied to some products

iii. FEFO has been applied to most products

iv. FEFO has been applied to all products

3. To what extent have HDP products been protected from direct sunlight?

i. None of the products has been protected from direct sunlight

ii. Some of the products have been protected from direct sunlight

iii. Most of the products have been protected from direct sunlight

iv. All products have been protected from direct sunlight

4. To what extent have HDP products been separated from chemicals/insecticides?

i. None of the products has been separated from chemicals/insecticides

ii. Some of the products have been separated from chemicals/insecticides

iii. Most of the products have been separated from chemicals/insecticides

iv. All products have been separated from chemicals/insecticides

5. To what extent have expired HDP products been separated from usable commodities?

i. None of the expired products has been separated from usable commodities

ii. Some of the expired products have been separated from usable commodities

iii. Most of the expired products have been separated from usable commodities

iv. All expired products have been separated from usable commodities

6. Does this facility have a storeroom thermometer?

7. To what extent does this facility monitor storeroom temperature?

i. Not at all

ii. Storeroom temperature is sometimes recorded

iii. Storeroom temperature is often recorded

iv. Storeroom temperature is recorded daily

8. Does this facility have a fire extinguisher?

i. Yes

ii. No

9. How would you describe the storage space for HDP products?

i. Inadequate

ii. Somewhat adequate

iii. Adequate

10. Is there a lock on the storeroom to ensure security for HDP products?

i. Yes

ii. No

Annex 7 Qualitative Interview Guide

GUIDE TO QUALITATIVE INTERVIEW (HDP STUDY) - OCTOBER 2022

Demographic information (to be completed by the interviewer):

Name of Region

Facility Name	
Interviewee Role	
Interviewer Name	
Note-taker Name	
Date of Interview	

Introduction and background (to be read aloud by interviewer):

Thank you for taking the time to speak with us today about the role of public sector health facilities in Ghana.

My name is _____ and assisting me today is _____. We will be conducting this interview with you on behalf of USAID's Global Health Supply Chain program - Procurement and Supply Management project, which is a United States government–funded project that focuses on improving the availability of and access to lifesaving medicines and medicines and supplies.

This survey is meant to collect qualitative feedback on the supply management of anti-hypertensive products in the public health sector and to develop a better understanding of how HDP commodities are prescribed. Additionally, from the information that we gather, we will identify bottlenecks that affect the availability of HDP commodities in the public and make recommendations to develop solutions for these challenges.

Your participation in the survey is very important, as it will inform measures for improving the availability of anti-hypertensive products for pregnant women. Your insight will be highly valuable for our assessment. This interview will last approximately 20 to 30 minutes, during which I will ask you a few questions of interest. Please keep in mind that there are no wrong answers; therefore, please feel free to share your point of view. My colleague will be taking notes during the interview process to ensure that we have collected accurate information. In addition, we are planning to record this interview with your permission, as it helps us keep track of any information we may have missed during notetaking.

We ensure that the recording will not be shared outside of the research team. You will remain anonymous, and your responses will remain confidential. During our analysis and reporting process, we will not use any identifiable traits that could be attributed to you. At any point during

our conversation, please feel free to let me know if you have any questions or if you would rather not answer any specific question.

You may also stop the interview at any time for any reason. Is it okay if I start to record now (wait for response and if interviewee is not ok with recording, please put the recorder away and proceed with the interview and take detailed notes as you go). Before we get started, do you have any questions?

Interview Questions (probes are italicized, but remember to probe based on the responses):

Questions	Notes
1. Briefly describe the pipeline/supply plan for products used in the management of hypertensive disorders in pregnancy (HDP) in the public health sector?	
2. *How long has the plan existed?*	
3. *To what extent is the plan in operation?*	
4. What are the factors that impede the availability of HDP products at the regional level?	
5. In your view, how can this be addressed?	
6. *What are your recommendations for HDP availability and management?*	
7. What are the factors that impede the availability of HDP products at the facility level?	
8. *How can this be addressed?*	

9. What *are your recommendations for HDP availability and managem*ent in health facilities	
10. Which other opportunities exist for improving the availability of HDP products in the public health sector?	
11. What is the policy on managing anti-hypertensive products in relation to level of care?	
12. Where can we get a copy of the policy?	
13. What are some of the issues around the management of HDP products in relation to level of care?	
14. What can you say about the preferences of prescribers of HDP products at health facility levels?	
15. What opportunities exist to enhance the policy and improve on the availability of HDP products in health facilities?	
16. What are the factors that impede the availability of HDP products at the national level?	
17. Is there any other information you would like to provide concerning HDP product availability in the different levels of care in public health facilities?	