

**A COMPARATIVE STUDY TO ANALYSE THE COMPLIANCE OF NORTH-
EASTERN STATES EMLS WITH IPHS 2022 EMLS, WITH EMPHASIS ON
NON-COMMUNICABLE MEDICINES**

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Pharmaceutical Management

By

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Under the Supervision and Guidance of

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2024



National Health Systems Resource Centre

Technical Support Institution with National Health Mission
Ministry of Health & Family Welfare, Government of India



F.No.NHSRC/HR/0910/Rectt./Placement/Vol-3

Dated: 02nd July 2024

To

Mr. Abhishek Rewaskar

Intern- Quality and Patient Safety (Drug Cell)

NHSRC, New Delhi

Dear Mr. Abhishek Rewaskar,

This refers to your Summer Internship from 29th April 2024 to 28th June 2024 in National Health Systems Resource Centre (NHSRC).

You are relieved from the post of Intern- Quality and Patient Safety (Drug Cell) w.e.f 28th June 2024 (A/N), on completion of your internship. We would like to thank you and wish all success in your future endeavors.

Brig. Sanjay Baweja
Principal Administrative Officer

DECLARATION BY STUDENT

I hereby declare that this dissertation titled '**A COMPARATIVE STUDY TO ANALYSE THE COMPLIANCE OF NORTH-EASTERN STATES EMLS WITH IPHS 2022 EMLs, WITH EMPHASIS ON NON-COMMUNICABLE MEDICINES**' is the bonafide record of my original research work. I declare that it has not been submitted to any other university or institution for the award of any degree or diploma. Information derived from the published or unpublished work of others has been duly acknowledged in the text.


(Signature)

Abhishek Rewaskar

Date - 05/07/2024

CERTIFICATE

This is to certify that dissertation titled '**A COMPARATIVE STUDY TO ANALYSE THE COMPLIANCE OF NORTH-EASTERN STATES EMLs WITH IPHS 2022 EMLs, WITH EMPHASIS ON NON-COMMUNICABLE MEDICINES**' is a record of the research work undertaken by **Abhishek Rewaskar** in partial fulfillment of the requirements for the award of the degree of MBA (Pharmaceutical Management) from the IIHMR University, Jaipur under my guidance and supervision and his approach to the research study has been sincere, scientific, and analytical.

A handwritten signature in blue ink, with the date '5/7/24' written below it.

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Abstract

Purpose: Essential medicines are crucial for meeting primary healthcare needs, enhancing wellbeing, reducing suffering, and saving lives. The World Health Organization (WHO) first introduced the concept of essential medicines in 1977 to ensure the availability of affordable, effective, and safe medications. India's Free Drug Service Initiative (FDSI) aims to provide free essential medicines at public health facilities to alleviate the financial burden on patients, particularly in economically disadvantaged regions. A standard for the provision of necessary medications in different healthcare facilities is provided by the Indian Public Health Standards (IPHS) 2022 necessary Medicines List (EML).

Methodology: The study employed a cross-sectional design using secondary data obtained from the latest available EMLs of the North-Eastern states and the IPHS 2022 EML. Medicines were mapped and categorized based on their therapeutic class and indication, focusing on cardiovascular, diabetes, and cancer drugs. The comparative analysis involved quantitative measures of (compliance percentages) and qualitative assessments of (reasons for discrepancies) assessments. Data collection involved official websites, government publications, and communication with state health departments and data analysis was performed using Microsoft Excel to calculate compliance percentages and generate comparative charts and graphs.

Objectives:

- i) To assess the availability of NCD medicines in the EMLs of North-Eastern states compared to the IPHS 2022 EML.
- ii) To evaluate NCD drug availability across different healthcare facility levels (DH), (SDH), (CHC), (PHC), and (SHC-HWC).
- iii) To identify states with the highest and lowest compliance with IPHS standards for NCD medicines.
- iv) To analyze the availability of specific NCD drugs of these categories (cardiovascular, diabetes, cancer).
- v) To propose recommendations for improving compliance with IPHS standards.

Results/Findings: The study revealed significant variability in the availability of NCD drugs among the North-Eastern states. Meghalaya demonstrated the highest compliance with 52% of NCD drugs available, particularly at the District Hospital (DH) level. Mizoram had the lowest compliance with only 11% of NCD drugs available. Cardiovascular drugs were relatively more available in Assam and Meghalaya, while cancer drugs were largely absent across all states except at the DH level in Meghalaya.

Conclusions: The findings highlight substantial disparities in NCD drug availability among North-Eastern states. There is an urgent need for targeted interventions to improve compliance with IPHS standards, particularly regarding the accessibility of essential cancer medications. Policy measures and resource allocation are crucial to address these gaps and ensure equitable access to essential NCDs medicines across the region.

Keywords: Public health, North-eastern states, India, Non-communicable diseases, IPHS, EMLs

Acknowledgements

I am extremely obliged to **National Health Systems Resource Centre, (New Delhi)** professionals for sharing liberally their precious time and knowledge which encouraged me to do my best during dissertation.

I owe a great debt to Dr. J.N. Srivastava sir Advisor (NHSRC), for showing his concern and allowing me to work under his vibrant supervision in this prestigious organization.

I would also like to express my gratitude to the entire quality division team professionals especially Dr. Deepika Sharma, Ms. Nasrain Nikhat Khan, Dr. Biswasprakash Pradhan, Mr. Brajraj Tripathy, and Mr. Gulam Rafey for their continuous support, guidance, assistance, and motivation.

I would also like to thank the organization for providing extremely valuable opportunity of being part of the organization and enhance my knowledge with national level learnings.

Also, I am highly grateful to thank **IIHMR University**, the President, Professor Dr. P R Sodani sir and the Dean of Institute of Pharmaceutical Management Dr. Manthand D. Janodia sir, and my mentor Dr. Sudhinder Singh Chowhan sir, for supporting me in all the achievements and guiding me throughout and I would also like to thank all the faculty members and staff for giving me this opportunity to learn and to add phenomenal experience. Without their active participation and cooperation, it would not have been possible to accomplish my dissertation.

Lastly, forever grateful to have a family and mercy of God to keep me alive and kicking for all this to happen.

Thanks, and warmest regards

Abhishek Rewaskar

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List of Symbols and Abbreviations

1. EMLs - Essential Medicine List
2. IPHS - Indian Public Health Standards
3. NCDs - Non-Communicable Diseases
4. FDSI - Free Drugs Service Initiative
5. NE - North-Eastern
6. NER - North-Eastern Region
7. DH- District Hospital
8. SDH - Sub District Hospital
9. CHC - Community Health Centre
10. PHC - Primary Health Centre
11. SHC-HWC - Sub Health Centre (Health and Wellness Centre)
12. WHO - World Health Organization
13. OOPE - Out of Pocket Expense
14. NSSO - National Sample Survey Office
15. MoHFW - Ministry of Health and family Welfare
16. GoI - Government of India
17. HIV - Human immunodeficiency viruses
18. NHM- National Health Mission
19. RHD - Rheumatic Heart Disease
20. LMICs - Low-and middle-income countries
21. NRHM - The National Rural Health Mission
22. CHO - Community Health Officer
23. MPWs - Multipurpose Workers
24. CPHC - Comprehensive Primary Health Care
25. INNs - International Non-proprietary Names
26. **NPCDCS** - National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke

Chapter 1: Introduction

Essential medications are those that meet the population's top health care demands. They can enhance wellbeing, lessen suffering, and save lives. They are chosen on the basis of comparative costs and cost-effectiveness, evidence regarding clinical efficacy and safety, and prevalence of diseases and public health relevance. Pharmaceuticals systems and budgets across nations are being strained by the rising demand for important medications brought on by the rising number of illnesses.

The concept of essential pharmaceuticals was initially put forth by the World Health Organization (WHO) in 1977. Medications that address the population's primary healthcare needs are considered essential. They are selected taking into account comparative cost-effectiveness, efficacy and safety evidence, and public health significance. Crucial drugs must always be available within the framework of functional health systems, in appropriate dose forms, in adequate amounts, with assured quality and adequate information, and at a price that is affordable for the community as well as the individual. The concept of necessary drugs should be applied flexibly and adaptably to a variety of situations; the particular drugs that are deemed essential remain within national authority.

The original Essential Drugs List, which included 220 medications, was compiled by the World Health Organization in 1977 (the name was later changed). Since then, the Model List has been updated in an open process by the EML Expert Committee, which meets every two years. The list has changed over the years to reflect changing public health issues. Antiretroviral drugs for HIV and formulations to treat noncommunicable diseases are only two examples of the additions. The objective of the Model List is to function as a fundamental resource for nations creating their own national Essential Medicines Lists. By assisting in the identification of priority medications to address their nation's health needs, it can help national decision-makers cut expenditures.

1.1 Indian Scenario

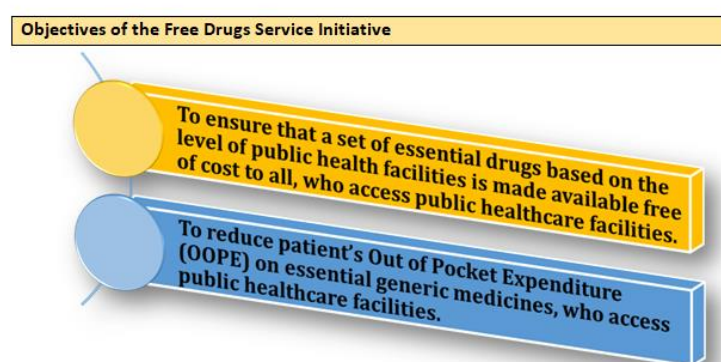
Medication is one of the most important aspects of health care, and it accounts for a large amount of family spending. The overall expense of pharmaceuticals differs significantly throughout Indian states. The State Government's expenditure trend on drugs shows that the states differ significantly from one another, with less than 2% in Punjab and 17% in Kerala in

2001–2002. Medication costs account for more than 15% of the health expenditures in the southern states, such as Kerala and Tamil Nadu. States that rank lowest in terms of health and economic development also tend to spend the least on pharmaceuticals. Medication accounts for five percent or less of the health expenditures in states like Bihar, Orissa, U.P., Assam, and Bihar.

Medication costs account for about 12% of the Central Government's total health expenditure. Medication purchases account for about 10 percent of India's health spending budget.

1.2 Free Drug Service Initiative

The majority of patients in India seeking treatment for acute or chronic illnesses were coping with a crisis related to access to essential medications. India has some of the highest Out of Pocket Expenses (OOPE) in the world for healthcare; the NSSO 68th round reports that over 67% of OOPE is attributed to prescription drugs. If all patients who visit public health institutions had free access to essential, high-quality pharmaceuticals, they would save a significant amount of money. Thus, giving out free prescriptions is one of the most important things you can do to ease the load of healthcare bills. Achieving universal health care coverage through affordable, safe, high-quality, and acceptable generic pharmaceuticals can contribute to achieving the Sustainable Development.



(Fig 1. Objectives of Free Drug Service Initiatives)

The Ministry of Health and Family Welfare of the Indian government has recognized the need of having essential pharmaceuticals publicly accessible and readily available at public healthcare facilities. Consequently, the "Free Drugs Service Initiative" (FDSI) was established

in 2015 by the National Health Mission (NHM). Operational Guidelines and Model RFPs were sent to the states for the initiative's execution along with the budget release. Finding reasonably priced generic copies of essential drugs is emphasized heavily in the suggestions, which do away with irrational prescriptions and non-scientific set dosing regimens.

1.3 National List of Essential Medicines (NLEM)

(NLEM) is a dynamic list of medications that are used to treat illnesses that are significant for a nation's public health. After updating the previous edition, which was released in 2015, In September 2022, India published the fifth version of the NLEM. The first three editions were published in 1996, 2003, and 2011. Drugs that address public health issues, are competitively priced, have a proven safety profile and efficacy, and comply with national practice recommendations have been included in the most recent edition. Every drug on the list has been approved by India's Drug Controller General and is supported by the relevant government programs. There are 384 medications on the list as of right now, up from 348 in NLEM 2011 and 376 in NLEM 2015. Twenty-six new medications have been added, and thirty-four pharmaceuticals from the prior list have been removed.

1.4 Indian Public Health Standards (IPHS)

The Indian government's Ministry of Health & Family Welfare initially introduced the IPHS to establish guidelines for healthcare services and infrastructure at different levels of healthcare facilities. At first, the Primary Health Centers (PHCs), Community Health Centers (CHCs), and District Hospitals were to set criteria for their facilities, staffing, and services. A universal right to comprehensive health security and a comprehensive state obligation to provide enough food and nutrition, appropriate medical care, safe drinking water, proper sanitation, education, health-related information, and other factors that promote good health served as the cornerstones of UHC. Public health facilities now have an obligation to provide high-quality care in order to fulfill all of these domestic and international obligations. The IPHS, which were essentially a set of universal criteria, were introduced to fulfill these goals and provide high-quality services to all residents in a respectful and dignified manner. For this reason, the IPHS for Sub Centers, PHCs, CHCs, Sub-District Hospitals (SDH), and District Hospitals (DH) was released in 2007 and updated in 2012 to serve as a guide for the development and renovation of public health care infrastructure in the States and UTs. In order to deliver health

services at these institutions, they offer advice on the infrastructure, human resources for health, medications, diagnostics, equipment, quality, and governance needs.

The initiative's effectiveness depends on the availability of Essential Medicines Lists. Updated IPHS 2022 recommendations with facility-specific Essential Medicines Lists (EMLs) were announced in April 2022 for the Health and Wellness Center - Sub Center, PHC, CHC, SDH, and DH. The National List of Essential Medicines (NLEM-2015), expert group recommendations, MoHFW Program Guidelines, and HWC service packages serve as the foundation for EMLs.

EML - FACILITY WISE	
Health Facilities	Total number of Drugs
Health & Wellness centre - SHC	106
Primary Health Care (PHC)	172
Community Health Centre (CHC)	300
Sub District Hospital (SDH)	318
District Hospital (DH)	381

(Table 1. IPHS, Essential Medicines List facility wise)

The District Hospitals (DH) and Sub-District Hospitals (SDH) have established the 2022 IPHS guidelines. Rural and urban Community Health Centers (CHC). Both rural and urban Primary Health Centers (PHCs) and Health and Wellness Centers are available, with multispecialty UPHCs (Polyclinics) located in metropolitan areas. Rural and urban areas' Sub-Health Center—Health and Wellness Center (SHC-HWC).

1.5 Relevance of Study

One important factor in determining health outcomes is having access to essential drugs, which are also a vital and frequently necessary part of medical care. "Essential drug policy" is a strategy that has been promoted to guarantee access to medications. Based on the current demographic profile and disease prevalence rate, the states must prioritize which medications should be made available. Out-of-pocket costs result from spending money on needless or illogical medications and diagnostic tests. When compared to the cost of a branded medication

purchased by an individual customer, the government's bulk generic drug procurement significantly reduces costs. Patients would save a great deal of money if all visitors to public health facilities received high-quality essential medications at no cost. In light of the aforementioned and in accordance with the Government of India's "Free Drug Service Initiative," all essential medications ought to be provided at no cost in all public health institutions.

Free drug medicines under the Essential Medicines List (EML) are highly relevant in the North Eastern states of India for several reasons:

- The region faces a high burden of both communicable (like malaria, tuberculosis) and non-communicable diseases (like hypertension, diabetes).
- Many residents in the North Eastern states face economic challenges. Free medicines under the EML significantly reduce out-of-pocket expenses, making essential healthcare more accessible.
- North Eastern states might have fewer healthcare facilities and pharmacies compared to other parts of India. The EML ensures essential medicines are available in public health settings, even in remote areas.
- Compared to other regions of India, the North Eastern states may have a higher rate of certain diseases. By adding pertinent drugs, the EML can be modified to meet these local needs.
- The rugged topography and isolated locations of the north-eastern states make it difficult to reach medical facilities.
- Because of higher rates of poverty than in other parts of India, a sizable section of the populace cannot pay for their own medical bills.

1.6 Non-Communicable Disease in North-Eastern States of India

Given the increased incidence of these illnesses and the particular difficulties in the north-eastern Indian states confront, addressing Non-Communicable Diseases (NCDs) under the Essential Medicines List (EML) is highly relevant. Here's a closer look at the significance:

- With an increasing burden of non-communicable diseases (NCDs) like diabetes, hypertension, cardiovascular illnesses, and malignancies, the north-eastern states of India, like the rest of the country, are going through an epidemiological transformation.
- Due to food habits, environmental circumstances, or lifestyle choices, the North-Eastern states may have particular risk factors for non-communicable diseases (NCDs).

These can be addressed by adding pertinent drugs for control and prevention to the EML.

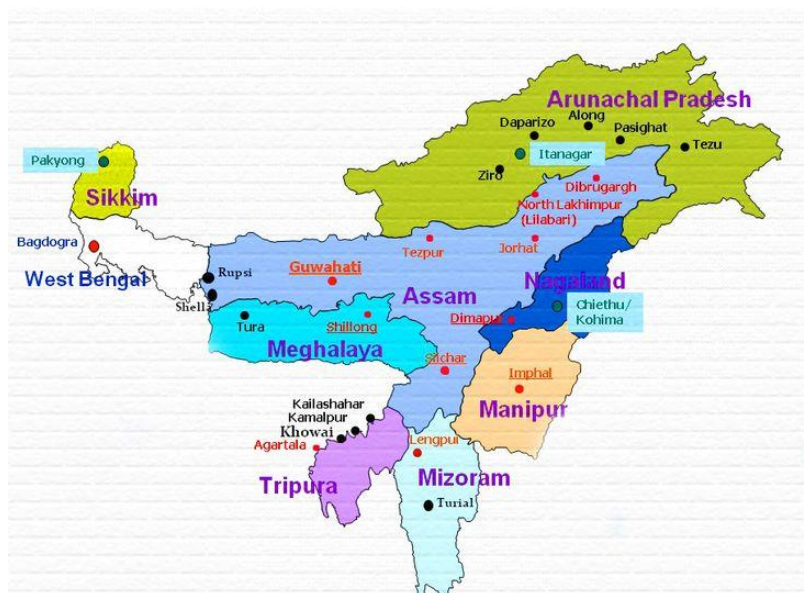
- For NCDs to be effectively managed, it is imperative that needed medications be made available. The EML aids in standardizing which medications ought to be offered at various healthcare facility levels.
- Patients' financial burden is lessened when needed medications are provided for free or at a reduced cost, especially in communities with low economic status.
- The north-eastern states are home to a large number of isolated and rural communities with poor access to medical care. For NCDs to be effectively managed, local healthcare facilities must have essential medications on hand.
- Having access to necessary medications for noncommunicable diseases (NCDs) can improve management of these ailments, resulting in better health outcomes and fewer problems.
- Specialized programs under the NHM concentrate on controlling and preventing NCDs, with the distribution of necessary medications serving as a vital element.
- The Ayushman Bharat program's construction of HWCs includes the supply of necessary medications for NCDs, guaranteeing thorough primary healthcare.
- By guaranteeing that all facets of the population, including those living in rural and underserved areas, have access to important treatments, key medications for NCDs help to close the gap in health care.

India's North-East Region is defined by diversity in its social systems, topography, and ethnic composition (NER). Over time, the region has witnessed an increase in socioeconomic and healthcare development, but non-communicable and communicable diseases (NCDs) have had a significant negative impact, particularly with regard to treatment. It is impossible for chronic diseases (NCDs) to spread from one person to another. They typically take a long time to manifest and evolve slowly. Although it affects people of various ages, those over thirty are most frequently associated with it. Studies show that diseases that affect people under the age of seventy-nine account for 16 million deaths globally. Cancer, diabetes mellitus, ischemic heart disease, cerebrovascular accidents, rheumatic heart disease (RHD), chronic obstructive pulmonary disease, and asthma are the main non-communicable diseases. Due to a combination of social, cultural, and environmental variables, high tobacco use, alcohol consumption, obesity, physical inactivity, stress, and a high-fat diet, the prevalence of cardio-metabolic

illnesses such diabetes mellitus and hypertension has rapidly grown. An epidemiologic transition has resulted from the observation that non-communicable diseases (NCDs) are now the leading cause of disease burden in the majority of low- and middle-income countries (LMICs), surpassing infectious diseases. It is anticipated that by 2020, the number of deaths in India from Non-Communicable Diseases will nearly double, from around 4.5 million in 1998 to 8 million. India is home to about 20% of the world's diabetic population. According to estimates, cardiovascular disease accounts for around 2.4 million fatalities in India each year.

The north-eastern states of India, which includes -

- 1) **Assam,**
- 2) **Arunachal Pradesh,**
- 3) **Manipur,**
- 4) **Meghalaya,**
- 5) **Mizoram,**
- 6) **Nagaland,**
- 7) **Sikkim, and**
- 8) **Tripura**



(Fig 2. Map of North Eastern States Of India)

Chapter 2 : Review of Literature

Sl. No.	Tittle	Author	Year	Findings
1	Essential medicines: An Indian perspective	Rituparna Maiti, Vikas Bhatia, Biswa Mohan Padhy, Debasish Hota, et al	01 Oct 2015	The rising incidence, early illness start, and high rates of morbidity and death associated with the cardiovascular disease epidemic in India are serious causes for concern. Among the indigenous population of Northeast India, smoking and junk food consumption are substantial cardiovascular risk factors, as is hypertension. At 24.70% in urban and 17.40% in rural settings, the prevalence of hypertension is noticeably higher in urban than in rural communities. The results highlight the critical need for public health initiatives in Northeast India's urban and rural areas that target cardiovascular risk factors and encourage healthier lifestyles. The study, carried out at a tertiary care facility in north-eastern India, analysed 112 cases in total. 48.21% of cardiovascular diseases (CVDs) were detected in patients between the ages of 61 and 90. Males were more likely to be impacted than females (33%), with 67% of patients being male.

				Ischemic heart disease (66.96%), hypertension (80.35%), and hyperlipidaemia (84.82%) were the most common diagnoses among CVDs. Hyperlipidaemia, hypertension, and ischemic heart disease were the most common cardiovascular diseases (CVDs) found in the study, with patients between the ages of 61 and 90 being the most affected. Statins and antihypertensive medicines were the most often prescribed medications for the treatment of CVDs; successful therapy often involved a combination of two or three treatments. The study emphasizes how important it is for doctors to use cardiovascular medications as safely and effectively as possible, given the typical ailments and medication usage patterns that are observed in the cardiology department of a tertiary care hospital in north-eastern India. The study's findings highlight the need of individualized treatment regimens for people with cardiovascular diseases by shedding light on the disease's incidence, drug usage habits, and comorbidities related to CVDs.
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2	Essential medicines	WHO	2024 Jun 15	The World Health Assembly heard the discussion thanks to the WHO. As a result, the Essential Medicines (EM) idea and its primary tactic, the Essential Medicine List (EML), sometimes referred to as the Model list, were developed. The most popular technique for prioritizing medications is the Empirical Medicine List (EML), which is a condensed list of drugs that covers all therapeutic classes.
3	Essential medicines for universal health coverage	Wirtz VJ, Hoyerzeil HV, Gray AL et, al	2017	The EML idea is a program that addresses every facet of managing drugs, including prescription, usage, distribution, storage, and purchase. It acknowledges the necessity of prioritizing and rationalizing the selection of efficacious medications for established medical needs. Evidence-based and priority need-based selection is the foundation of the EM concept. Essential medications are chosen based on the needs of the population, effectiveness, safety, affordability, and quality. They are eliminated or deselected if better options become available or if they are proven to be hazardous or ineffective. Additionally, the WHO needs proof that the drug's manufacturers have a license to manufacture it for human

				use, or market registration. Additionally, the WHO needs proof that the drug's manufacturers have a license to manufacture it for human use, or market registration.
4	Indian Public Health Standards	Ministry Of Health and Family welfare	2022	Public health facilities must provide high-quality care in order to fulfill all of these domestic and international obligations. The IPHS was established to provide high-quality services to all residents in a respectful and dignified manner in order to fulfill these goals. Consequently, the IPHS for (DH), (SDH), (PHCs), (CHCs), and (PHCs) was released in 2007 and updated in 2012.. In the States and UTs, they serve as the benchmark for developing and upgrading public health care infrastructure. They are intended to offer direction on the infrastructure, human resources, medications, equipment, diagnostics, quality, and governance requirements for providing healthcare services at these facilities, among other components of the health system. The following are some of the IPHS's main goals for public health facilities: To establish a consistent standard that guarantees excellent services that are responsible,

				adaptable, and mindful of community needs. To outline the expected minimum guaranteed (Essential) and feasible (Desirable) services that public health facilities should offer at various levels.
5	Health in north-east region of India – The new focus of attention	Anupam Prakash et, al	July 2016	In recent years, there has been increased focus on the expansion of north-eastern India. Development has undoubtedly been hindered by the region's particular issues, which include violence between ethnic groups, land stress, socioeconomic backwardness, rebel extort the networks, lack of access to high-quality education, and a weak international border, in addition to the region's rough, rocky terrain. In its Annual Report 2014–2015, the Government of India's Ministry for Health and Family Welfare identified the following issues with the health systems of the north-eastern states.: the lack of qualified medical personnel, the difficulty of reaching remote, isolated, and sparsely inhabited places, the need for better governance in the health system, the high rate of tobacco use and the resulting elevated risk of cancer. In order to effectively serve the rural populations of India, the National Rural Health Mission

				(NRHM) was established. Its focus is primarily on 18 states, including all eight of the north-eastern states of Arunachal Pradesh, Assam, Manipur, Mizoram, Meghalaya, Nagaland, Sikkim, and Tripura.. Despite the enormous progress made under the NRHM over the past ten years, there is still more to be done in the north-eastern states, where significant rural-urban disparities and restricted access to healthcare services in rural regions continue to be the so-called Achilles' heel.
6	Rural health infrastructures in the North-East India	Saikia, Dilip and Das, Kalyani Kangkana et, al	2012	It is not possible to treat North East India's health situation equally. This is a result of the health sector's lack of sufficient personnel or the poor development of the infrastructure supporting health. Due to the nation's weak health infrastructure, there are issues with access to quality medical care, a shortage of government hospitals in rural areas, and the provision of free medications for the impoverished in rural areas.
7	Cardiovascular Risk Factors In Northeast India Indigenous Population	Abigail Lalnuneng	June 2023	2010 saw the introduction of the National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases, and Stroke by the Indian government,

				which was aware of the rising number of NCDs. By altering lifestyles, this initiative seeks to prevent and control non-communicable diseases (NCDs), offer early diagnosis and treatment, and equip the public health system with the tools necessary to handle the growing NCD burden.
8	A Study on the Quality Management and Continuum of Care Approach for Diabetes (DM) and Hypertension (HTN) at Assam and Manipur HWCs	Regional Resource Centre for North-Eastern States (Branch of National Health System Resource Centre), Ministry of Health & Family Welfare, Government of India, Khanapara, Guwahati	-	Among the North-eastern states, Assam and Manipur were selected based on how well they executed the rollout of non-communicable diseases, how many HWCs were in existence, and how accessible the states were during the COVID-19 epidemic. Three (03) districts in each of the two states, Assam, and Manipur, with the highest percentage of people screening for hypertension and diabetes mellitus and the remaining three (03) districts with the lowest percentage of people screening for these conditions relative to the target population were chosen for the study. The availability of necessary medications and tests for a variety of medical needs, as guaranteed by the enlarged package of services for the HWC's catchment population, is the foundation of the organization's credibility. The Indian government

				introduced the "Free Drug Service Initiative (FDSI)" in 2015 as part of NHM, which offers necessary medications at no cost in public health institutions. FDSI guidelines from 2015 state that Sub Health Centers should stock 57 different medications. However, in 2020, MoHFW, GoI, and PHC HWCs amended the essential medicine list (EML), and as a result, 105 medications should be provided in SC-HWC. State of Manipur and Assam, however, have their own EMLs in accordance with regulations for all kinds of healthcare facilities. The Assamese government's EML notification states that SC should have access to 26 medications. In Manipur, the state EML (2019) states that SC shall have 127 medications. During the study, it was found that, in both the states, none of the SC-HWCs were stocking the required number of drugs as per the facility level EML. In Assam, all the SC-HWCs were having on an average of 12 to 17 number of drugs against the 26 recommended as per the EML. Out of the 12 SC-HWCs visited in Assam, in 6 facilities (3 in Goalpara, 3 in Kamrup Rural) the supply of
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				drugs for Hypertension and Diabetes were adequate. In 5 SC-HWCs (3 in Goalpara, 2 in Kamrup Rural) the supply was inadequate in regard to the patients under treatment and in 2 centres under Goalpara supplies of drugs were irregular. Most of the SCHWCs in Assam do not maintain buffer stock of at least 3 months. In Manipur, in 1 SC-HWCs the supply of drugs for Hypertension and Diabetes was adequate. In 2, the supply was inadequate in regard to the patients under treatment and in 9 supplies of drugs were irregular. There is no uniform system of indenting medicines in both the states. Most of the SC-HWCs in Assam and Manipur indent medicines once in a month and some indent as and when required. Although the health facilities in both the States follow state EML none of the SC-HWCs visited were having drugs as per EML.
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(Table 2. Literature Review)

Chapter 3: Objectives And Methodology

A comparative analysis to evaluate the compliance of the Essential Medicine Lists (EMLs) of the north-eastern states of India with the 2022 Essential Medicine List (EML) of the Indian Public Health Standards (IPHS), with a particular emphasis on non-communicable disease (NCD) medicines. The methodology encompasses data collection, data mapping, comparative analysis, and compliance assessment. The study is designed to be comprehensive, systematically evaluating the extent to which state EMLs align with the national standards set by IPHS.

3.1 Research Question ?

How compliant are the Essential Medicines Lists (EMLs) of the North-Eastern states of India with the Indian Public Health Standards (IPHS) 2022 EMLs, particularly concerning the availability of medicines for non-communicable diseases (NCDs) at various healthcare facility levels?

3.2 Research Objectives

- 1.** To compare the availability of non-communicable disease (NCD) medicines in the EMLs of the North-Eastern states with the IPHS 2022 EMLs.
 - Assess the overall percentage of NCD drugs available in each state.
 - Identify the specific categories of NCD drugs that are underrepresented in the state EMLs.
- 2.** To evaluate the availability of NCD medicines at different levels of healthcare facilities (DH, SDH, CHC, PHC, SHC-HWC) in each North-Eastern state.
 - Determine the percentage of NCD drugs available at each facility level within each state.
 - Highlight the differences in drug availability between higher-level (DH, SDH) and lower-level (CHC, PHC, SHC-HWC) healthcare facilities.
- 3.** To identify the states with the highest and lowest compliance with the IPHS 2022 EMLs regarding NCD medicines.

- Rank the North-Eastern states based on their compliance percentage.
 - Highlight the key strengths and weaknesses of each state's EML in relation to IPHS standards.
4. To analyze the availability of specific categories of NCD drugs (e.g., cardiovascular, diabetes, cancer) across the North-Eastern states.
 - Compare the availability of drugs for different NCD categories across states.
 - Identify the categories with the highest and lowest availability in each state.
 5. To provide recommendations for improving the compliance of North-Eastern states' EMLs with IPHS 2022 standards, focusing on NCD medicines.
 - Suggest strategies for enhancing drug availability in states with low compliance.
 6. To conduct a secondary analysis of existing data on the availability of NCD medicines in the North-Eastern states.
 - Review existing literature and reports on NCD drug availability in the region.
 - Utilize secondary data sources to corroborate the findings from the primary analysis.

These research objectives are designed to comprehensively analyze the compliance of North-Eastern states' EMLs with IPHS 2022 standards, focusing on the critical area of non-communicable diseases.

3.3 Duration of Study

The duration of the study was 2 months.

3.4 Design of Study

The study undergone for this research is cross-sectional study as the data used here is secondary in nature as extracted from North eastern states of India, which was collected from respective states official sites, and the observations were recorded and analysed.

1. Data Collection

The primary data for this study consists of the latest available Essential Medicine Lists from the north-eastern states of India, which includes -

- i. Arunachal Pradesh,
- ii. Manipur,
- iii. Assam,
- iv. Meghalaya,
- v. Mizoram,
- vi. Nagaland,
- vii. Sikkim, and
- viii. Tripura.

These lists were obtained from the respective state health department websites, official government publications, and communication with state health officials when necessary. The IPHS 2022 EML was sourced from the Ministry of Health and Family Welfare, Government of India.

2. Molecules/ Medicine Mapping

To facilitate a structured comparison, the medicines listed in each state's EML were mapped against the IPHS 2022 EML. This process involved the following steps:

- i. **Categorization:** Medicines were categorized based on their therapeutic class and indication, with a specific focus on those used for non-communicable diseases. Under three main categories which are medicines for cardiovascular diseases and stroke, diabetes, and cancer, only these 3 were finalised based on NPCPCDS guideline and IPHS drugs categories and final list was prepared based on that.
- ii. **Standardization:** Drug names were standardized to their International Non-proprietary Names (INNs) to ensure consistency and accuracy in comparison. Variations in brand names, dosage forms, and strengths were noted.
- iii. **Mapping:** Each medicine in the state EMLs at all facility level (DH, SDH, CHC, PHC, SHC-HWC) was cross-referenced with the IPHS 2022 EML. The presence or absence of each medicine was recorded, and discrepancies were highlighted as **(YES/NO)**.

(Note - The data of analysed table is attached to this paper for reference in Annexure Page.)

3. Comparative Analysis

The comparative analysis involved both quantitative and qualitative assessment techniques:

- i. **Quantitative Analysis:** The number and percentage of medicines listed in the state EMLs that are also present in the IPHS 2022 EML were calculated. This provided a measure of overall NCD drugs compliance for each state. To assess compliance in this crucial area, particular measures were also computed for NCD medications.
- ii. **Qualitative Analysis:** The qualitative analysis looked at the causes of such disparities, considering things like regional health priorities and medication accessibility. This analysis also revealed areas in which state EMLs lack critical NCD medications as advised by the IPHS.

4. Compliance Assessment

NCD - Specific Compliance: Specifically, medications for non-communicable disorders were the focus of this phase. This phase assessed the general alignment of state EMLs with the IPHS 2022 EML, identifying states with high, moderate, and low levels of compliance. During this phase, states with high, moderate, and poor levels of compliance were identified by evaluating the general alignment of their EMLs with the IPHS 2022 EML. Tables and graphs were used to illustrate this in order to give a clear comparison. This was visualized using tables and graphs to provide a clear comparison. The availability of these medicines in state EMLs was critically evaluated against the IPHS recommendations. The assessment highlighted areas where state EMLs meet or fall short of national standards, with a particular emphasis on high-burden NCDs.

5. Data Analysis Tools

Data was analyzed using Microsoft Excel. It was used for data entry, standardization, and initial mapping, statistical analysis, including the calculation of compliance percentages and the generation of comparative charts and graphs.

6. Validation

To ensure accuracy and reliability, the data mapping and analysis processes were subjected to validation by independent reviewers with expertise in public health and pharmacology. Discrepancies identified during the validation process were resolved through consensus.

7. Ethical Considerations

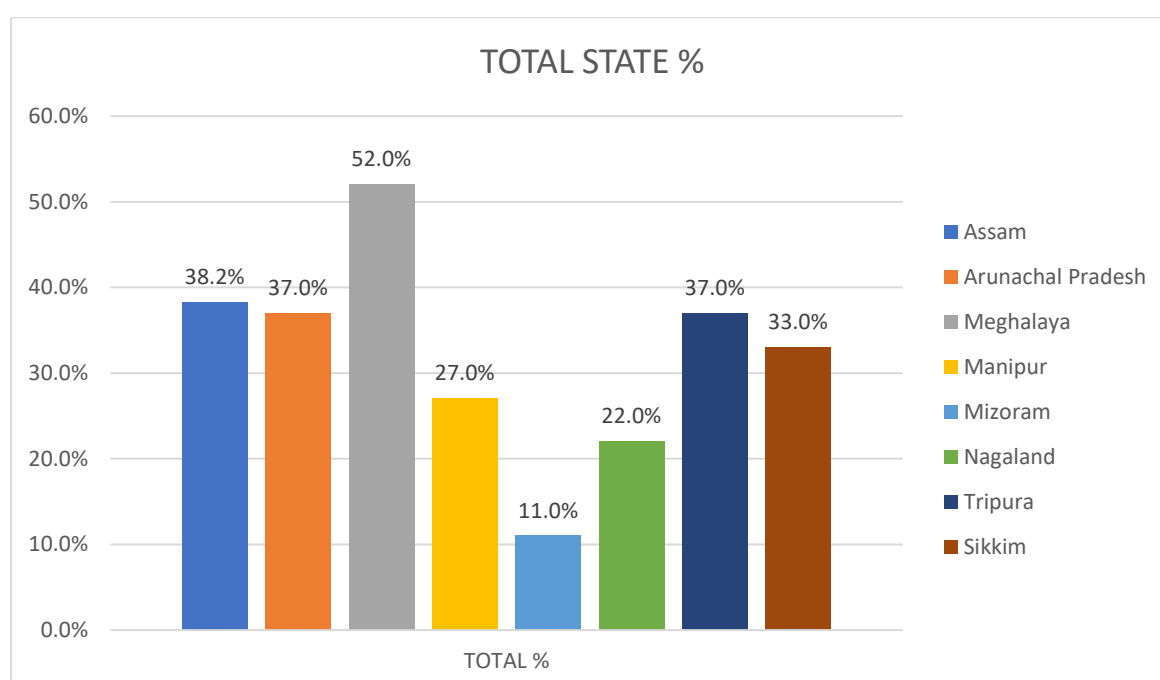
This study utilized publicly available data from state and national health departments. As such, it did not require ethical approval. However, care was taken to ensure that data was handled responsibly and that the findings were presented objectively and transparently.

Chapter 4 : Results

From our study we found that in the north-eastern states of India the availability of NCD as per the category wise drugs at different level of facility has the following results.

The key findings which are found are

1. **Meghalaya** stands out for its highest compliance with the IPHS 2022 EML, particularly in cardiovascular and cancer drug availability at the DH level.
2. **Mizoram** has the lowest compliance, reflecting significant gaps in essential NCD drug availability.
3. **Cancer Drugs:** Across all states, cancer drugs are notably absent at most facility levels, except for the DH level in Meghalaya.
4. **Cardiovascular Drugs:** Assam and Meghalaya show relatively better availability of cardiovascular drugs compared to other states.
5. **Primary Health Centers (PHCs):** Tripura is unique in having full compliance with NCD drug availability at the PHC level.



(Fig 3. Flow chart showing state wise total %)

STATE	TOTAL %
Assam	38.2%
Arunachal Pradesh	37.0%
Meghalaya	52.0%
Manipur	27.0%
Mizoram	11.0%
Nagaland	22.0%
Tripura	37.0%
Sikkim	33.0%

(Table 3. List of each state total %)

As per state wise, we have analysed each state particularly at every facility for all 3 categories:

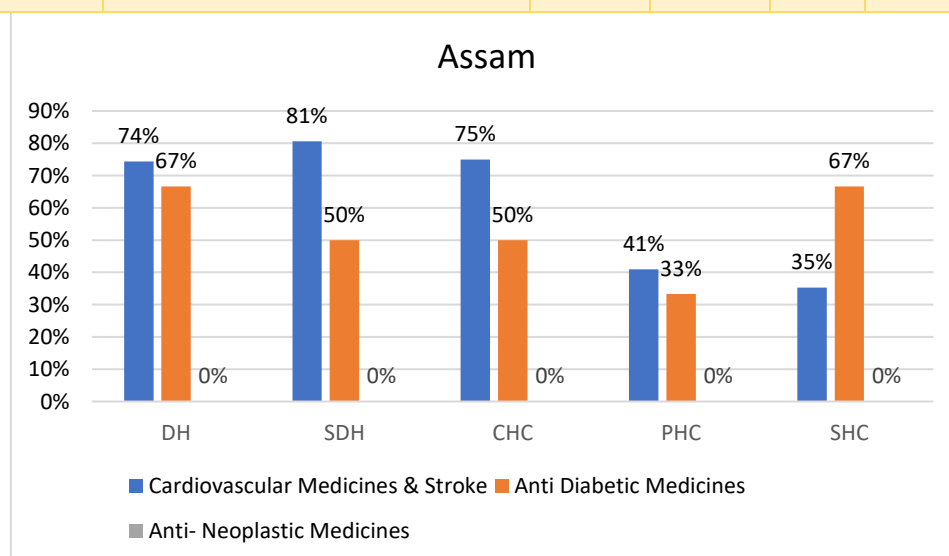
1. Cardiovascular & Stroke Medicines,
2. Anti-Diabetic Medicines, and
3. Anti- Neoplastic Medicines

Here are the state wise data which will show the total number of % at each state particularly and for every facility (DH, SDH, CHC, PHC, SHC-HWC) respectively -

4.1 Assam

- **Overall Availability:** 38.2% of NCD drugs available across all facility levels.
- **Cardiovascular Drugs:** Higher availability compared to other North-Eastern states.
- **Cancer Drugs:** Not available at any facility level.

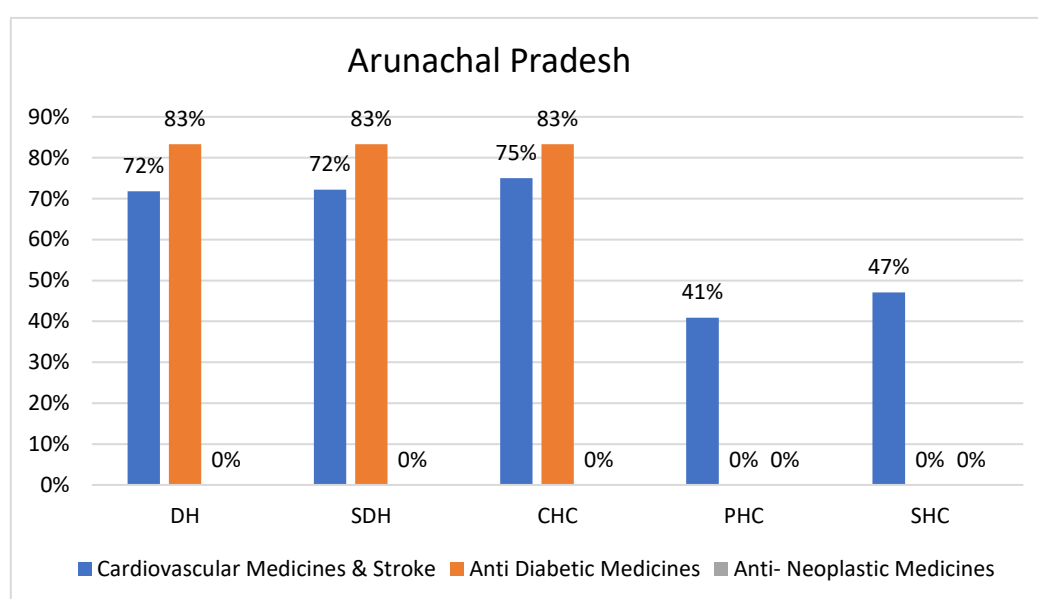
State	Classification	DH	SDH	CHC	PHC	SHC
Assam	Cardiovascular Medicines & Stroke	74%	81%	75%	41%	35%
	Anti-Diabetic Medicines	67%	50%	50%	33%	67%
	Anti- Neoplastic Medicines	0%	0%	NA	NA	NA



4.2 Arunachal Pradesh

- **Overall Availability:** 37.0% of NCD drugs available across all facility levels.
- **PHC and SHC Facilities:** No Diabetic drugs available.
- **Cancer Drugs:** Not available at any facility level.

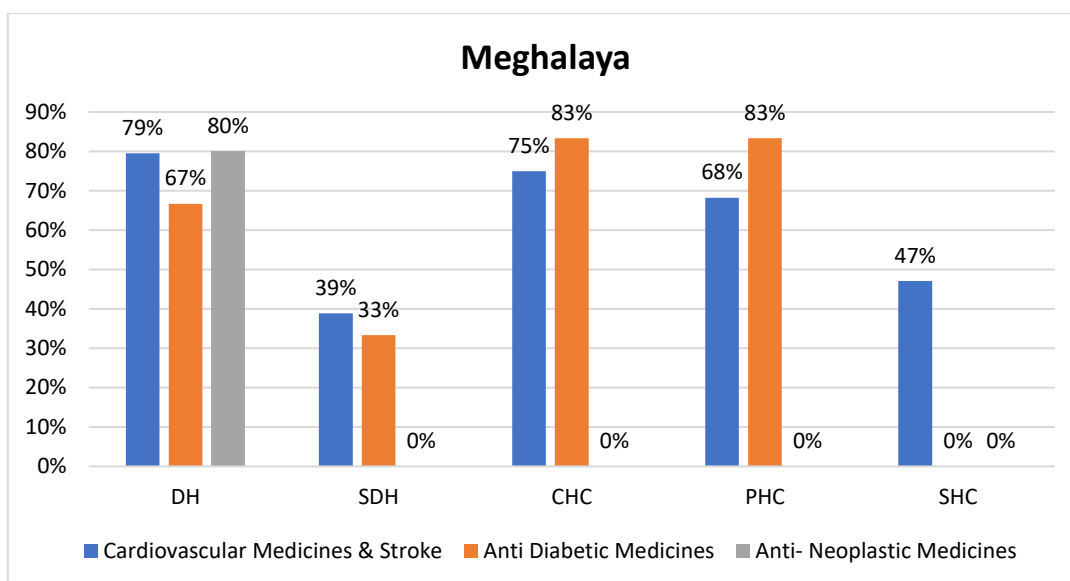
State	Classification	DH	SDH	CHC	PHC	SHC
Arunachal Pradesh	Cardiovascular Medicines & Stroke	72%	72%	75%	41%	47%
	Anti-Diabetic Medicines	83%	83%	83%	0%	0%
	Anti- Neoplastic Medicines	0%	0%	NA	NA	NA



4.3 Meghalaya

- **Overall Availability:** Meghalaya demonstrated the highest compliance with the IPHS EML, with 52% of the required NCD drugs available.
- **Cardiovascular & Stroke Medicines:** The state showed the highest availability, with 62% of these drugs present.
- **Cancer Drugs:** Only available at the District Hospital (DH) level, with an 80% availability rate.

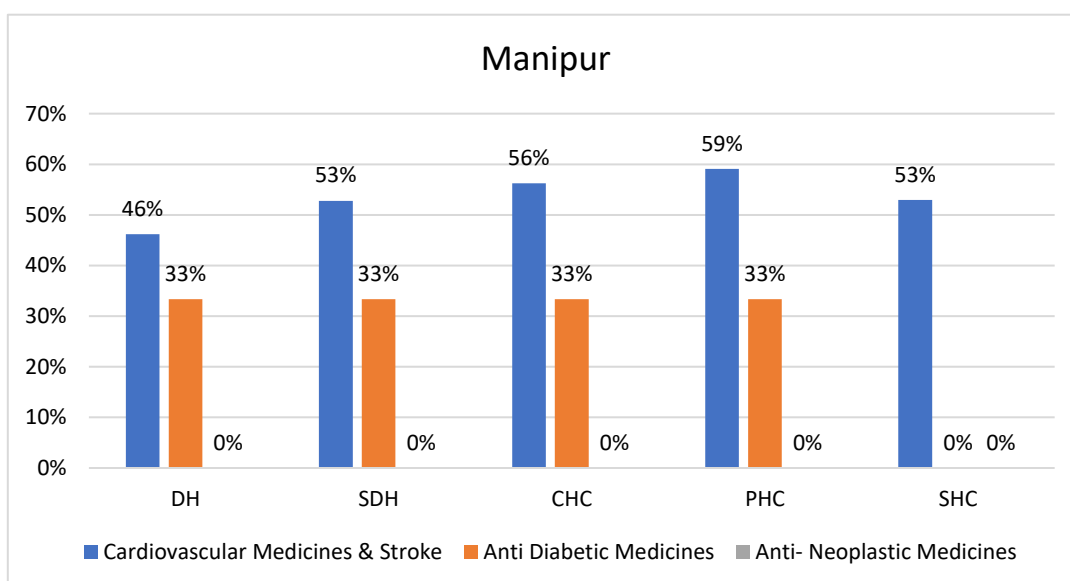
State	Classification	DH	SDH	CHC	PHC	SHC
Meghalaya	Cardiovascular Medicines & Stroke	79%	39%	75%	68%	47%
	Anti-Diabetic Medicines	67%	33%	83%	83%	0%
	Anti- Neoplastic Medicines	80%	0%	NA	NA	NA



4.4 Manipur

- **Overall Availability:** 27.0% of NCD drugs available across all facility levels.
- **Cancer Drugs:** Not available at any facility level.

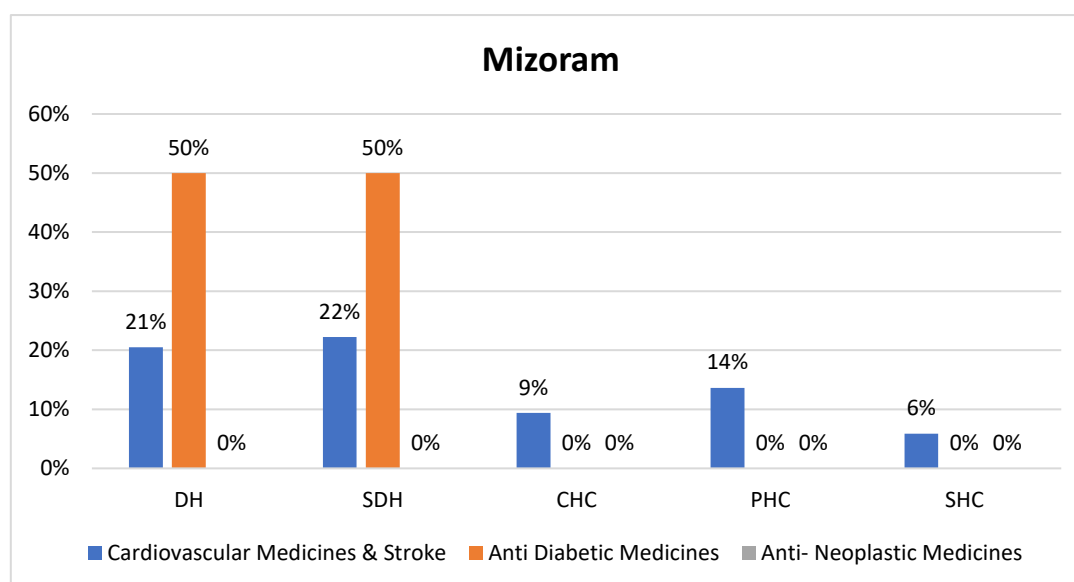
State	Classification	DH	SDH	CHC	PHC	SHC
Manipur	Cardiovascular Medicines & Stroke	46%	53%	56%	59%	53%
	Anti-Diabetic Medicines	33%	33%	33%	33%	0%
	Anti- Neoplastic Medicines	0%	0%	NA	NA	NA



4.5 Mizoram

- **Overall Availability:** Mizoram had the lowest compliance, with only **11%** of the NCD drugs available.
- **Cardiovascular Drugs:** The availability of cardiovascular drugs was the lowest compared to other North-Eastern states.
- **Cancer Drugs:** None of the cancer drugs were available at any facility level..

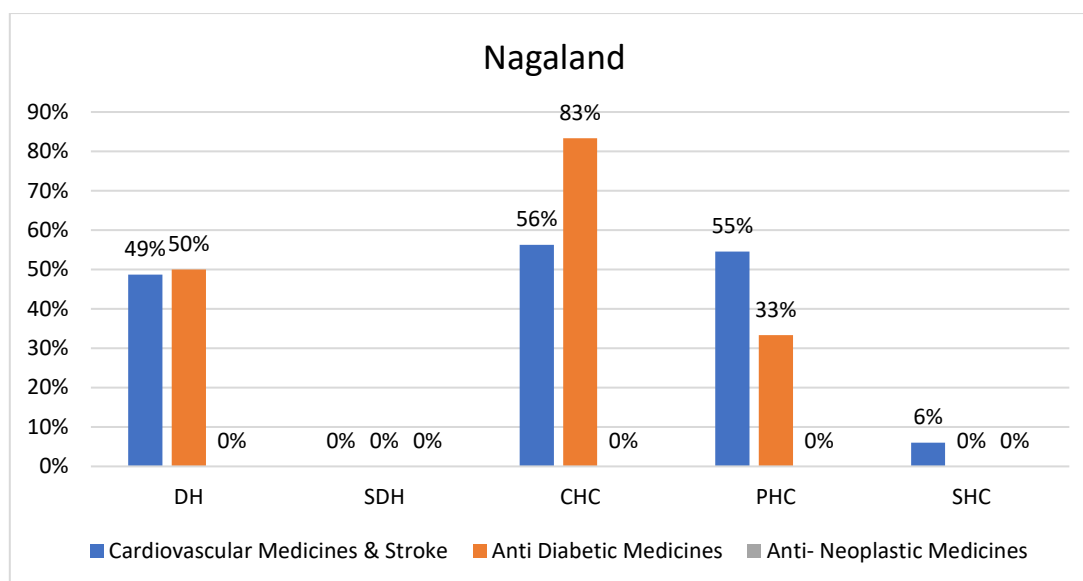
State	Classification	DH	SDH	CHC	PHC	SHC
Mizoram	Cardiovascular Medicines & Stroke	21%	22%	9%	14%	6%
	Anti-Diabetic Medicines	50%	50%	0%	0%	0%
	Anti- Neoplastic Medicines	0%	0%	NA	NA	NA



4.6 Nagaland

- **Overall Availability:** **22.0%** of NCD drugs available across all facility levels.
- **SDH Facility:** Nagaland does not have SDH facility.
- **Cancer Drugs:** Not available at any facility level.

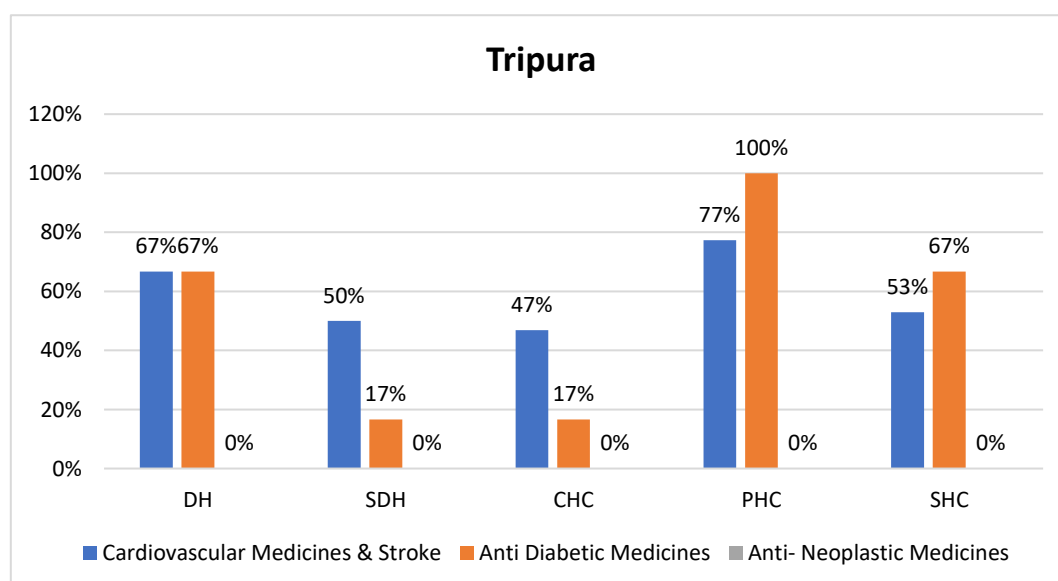
State	Classification	DH	SDH	CHC	PHC	SHC
Nagaland	Cardiovascular Medicines & Stroke	49%	NA	56%	55%	6%
	Anti-Diabetic Medicines	50%	NA	83%	33%	0%
	Anti- Neoplastic Medicines	0%	NA	NA	NA	NA



4.7 Tripura

- **Overall Availability:** 37.0% of NCD drugs available across all facility levels.
- **PHC Facility:** Tripura is the only state with **100%** NCD drug availability at the PHC level.
- **Cancer Drugs:** Not available at any facility level

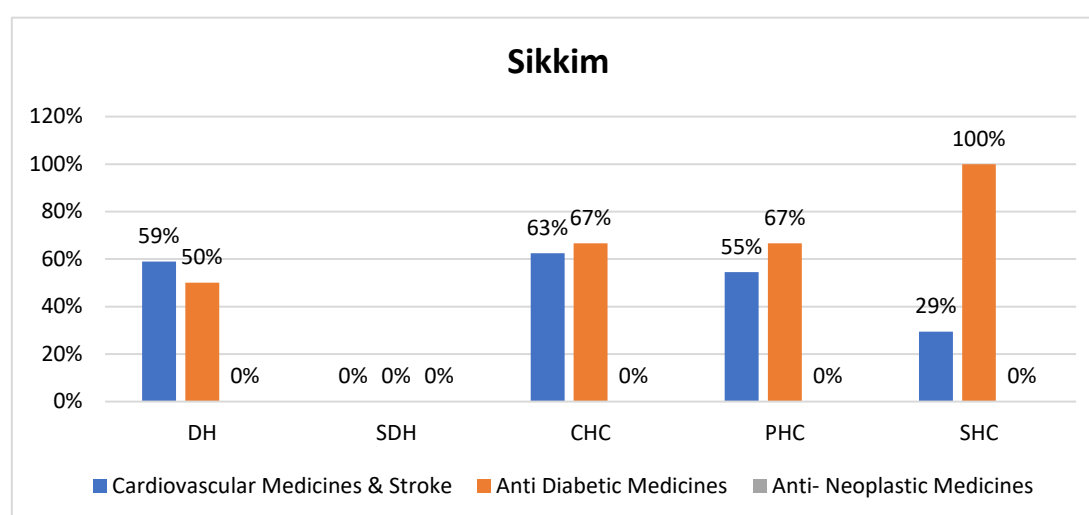
State	Classification	DH	SDH	CHC	PHC	SHC
Tripura	Cardiovascular Medicines & Stroke	67%	50%	47%	77%	53%
	Anti-Diabetic Medicines	67%	17%	17%	100%	67%
	Anti- Neoplastic Medicines	0%	0%	NA	NA	NA



4.8 Sikkim

- **Overall Availability:** 33.0% of NCD drugs available across all facility levels.
- **SDH Facility:** Sikkim also does not have SDH facility.
- **Cancer Drugs:** Not available at any facility level.

State	Classification	DH	SDH	CHC	PHC	SHC
Sikkim	Cardiovascular Medicines & Stroke	59%	NA	63%	55%	29%
	Anti-Diabetic Medicines	50%	NA	67%	67%	100%
	Anti- Neoplastic Medicines	0%	NA	NA	NA	NA



The analysis reveals significant variability in the availability of NCD drugs among the North-Eastern states. Meghalaya exhibits the highest level of compliance, while Mizoram falls well short. One significant issue is the dearth of cancer medications at the DH level in every state but Meghalaya. These results highlight the need for focused actions to increase access to important NCD medications, especially those for cancer, and to bring those medications closer to meeting the IPHS 2022 EML requirements. The study emphasizes how critical it is to allocate resources and implement policy changes in order to overcome the differences in NCD medication availability in the states around the Northeast. Enhancing adherence to IPHS guidelines can have a substantial positive impact on the region's non-communicable disease outcomes and healthcare delivery, especially in states like Mizoram. The results emphasized the need for focused approaches to guarantee fair access to necessary medications, with an emphasis on cancer medications in particular, which are severely deficient in the majority of institution levels.

Chapter 5: Discussion

The approach described above offers a thorough framework for assessing how well the EPMLs of the north-eastern states align with the IPHS 2022 EPML, especially when it comes to non-communicable disease medications. Significant variations in the accessibility of NCD medications throughout India's north-eastern states have been brought to light by this study. The results are consistent with earlier studies showing differences in healthcare infrastructure and resources amongst Indian areas. Research has demonstrated, for example, that the delivery of healthcare in north-eastern states is frequently hampered by logistical, economic, and topographical constraints (Rao et al., 2018; Kumar et al., 2020). In order to overcome these gaps, these studies also highlight how important it is to have customized healthcare policy.

5.1 High Variability in Drug Availability:

- **Meghalaya's Performance:** Meghalaya's comparatively high (52%), compliance with the IPHS EML for NCD medications points to improved resource allocation and healthcare administration. This is consistent with research by Das et al. (2019), who found that while Meghalaya's state health policies were more successful than those of some of its neighbours, the state had better health indices.
- **Mizoram's Low Compliance:** According to studies by Singh et al. (2017), Mizoram's poor compliance rate (11%) could be caused by a number of things, such as logistical difficulties, a lack of money, and an inadequate healthcare infrastructure.

5.2 Cardiovascular and Cancer Drug Availability:

- Research indicates that Assam and Meghalaya have focused on cardiovascular health programs, which is consistent with the greater availability of cardiovascular medications in these states (Sharma et al., 2018). Nonetheless, the almost total lack of cancer medications in the majority of states, with the exception of Meghalaya at the DH level, is consistent with national patterns in which cancer treatment centres are frequently centered on more prestigious medical facilities (Patel et al., 2019).

5.3 Strengths and Limitations of the Study

- **Strengths:**
 - i. **Comprehensive Data Collection:** The study's strength lies in its comprehensive data collection across multiple levels of healthcare facilities (DH, SDH, CHC, PHC, SHC-HWC).
 - ii. **Focus on NCD Medicines:** Focusing on NCD medicines is particularly relevant given the rising burden of non-communicable diseases in India.
 - iii. **Regional Focus:** The study provides valuable insights specific to the North-Eastern states, a relatively under-researched region in Indian healthcare studies.
- **Limitations:**
 - i. **Data Reliability:** The reliability of the data could be influenced by the accuracy and completeness of the state EML lists and the actual availability of drugs at the facilities.
 - ii. **Temporal Variability:** The availability of medicines can vary over time due to factors such as supply chain issues, budget allocations, and policy changes.
 - iii. **Exclusion of Other Factors:** The study primarily focuses on drug availability and does not account for other critical factors like healthcare workforce availability, patient access, and health outcomes.

Based on the following we came to the final discussion that the findings of this research highlight significant disparities in the availability of NCD medicines across the North-Eastern states of India. Meghalaya's relatively high compliance with the IPHS EML could serve as a model for other states, emphasizing the importance of effective state-level health policies and resource allocation. On the other hand, Mizoram's low compliance underscores the need for targeted interventions to improve healthcare delivery.

The almost universal lack of cancer drugs across the states, except at the DH level in Meghalaya, points to a critical gap in healthcare services for cancer patients. This necessitates urgent policy attention to ensure that essential cancer treatments are made available at all levels of healthcare facilities as per the requirements to fulfill the healthcare demands.

Chapter 6 : Conclusion And Recommendations

In conclusion, while there are strengths in the detailed and focused nature of your study, addressing the limitations and broadening the scope to include more factors could provide a more holistic understanding of healthcare challenges in the North-Eastern states. Future research could explore the impact of these disparities on health outcomes and identify strategies to bridge the gaps in healthcare delivery.

In terms of availability by facility levels, Assam had relatively higher availability of cardiovascular drugs, though cancer drugs were absent at all levels. Arunachal Pradesh lacked NCD drugs at PHC and SHC levels, with no cancer drugs available at any level. Meghalaya stood out with the highest availability of cardiovascular drugs (**62%**) and **80%** of cancer drugs at the DH level. Manipur and Mizoram both had no cancer drugs at any level, with Mizoram also showing the lowest overall availability of NCD drugs. Nagaland had no cancer drugs at any level and lacked SDH facilities. Tripura had full availability of NCD drugs at the PHC level but no cancer drugs at any level. Sikkim, like Nagaland, had no cancer drugs at any level and lacked SDH facilities.

6.1 Implications

- 1. Inequity in Drug Availability:** The stark differences in the availability of essential NCD drugs highlight the inequity in healthcare access within the North-Eastern region. This inequity could exacerbate health disparities and outcomes for populations in these states.
- 2. Cancer Drug Availability:** The general absence of cancer drugs across most states and facility levels, except for Meghalaya, suggests a significant gap in addressing cancer care, which is crucial given the rising burden of cancer in India.
- 3. Cardiovascular Drug Availability:** While Assam shows relatively better availability of cardiovascular drugs, other states, particularly Mizoram, lag considerably. This discrepancy can hinder effective management of cardiovascular diseases, which are a major component of NCDs.
- 4. Primary and Secondary Health Care:** The unavailability of NCD drugs at primary and secondary healthcare levels in several states (e.g., Arunachal Pradesh) indicates a need for strengthening these foundational levels of care to improve overall health outcomes.

6.2 Recommendations

To address the identified gaps and improve the compliance of North-Eastern states' EMLs with IPHS 2022 EMLs, the following recommendations are proposed:

- 1. Standardize EMLs Across States:** Ensure uniformity in EMLs across all North-Eastern states to align with IPHS 2022 EMLs. This standardization can be facilitated through central oversight and guidance.
- 2. Enhance Drug Procurement and Distribution:** Improve the drug procurement and distribution systems to ensure a steady supply of essential NCD medicines, particularly in states with lower availability such as Mizoram.
- 3. Focus on Cancer Drug Availability:** Develop specific strategies to enhance the availability of cancer drugs across all facility levels, learning from the relatively better performance of Meghalaya.
- 4. Strengthen Primary and Secondary Healthcare:** To guarantee that PHC and SHC facilities can deliver necessary NCD medications, invest in infrastructure and resources at these levels. This is essential for NCD management and early identification.
- 5. Capacity Building and Training:** Educate healthcare professionals on the value of following EMLs and successfully managing NCDs at all facility levels. This covers instruction on managing supply chains and making the most of currently available medications.
- 6. Regular Monitoring and Evaluation:** Establish a strong structure for monitoring and evaluating the availability and use of NCD medications on a regular basis. This can assist in quickly identifying gaps and enabling immediate solutions.
- 7. Public Awareness and Community Engagement:** Raise public knowledge of the availability and significance of critical medications for non-communicable diseases. Involve communities in the planning process for healthcare to guarantee that their needs are met and to promote responsibility.

The North-Eastern states can improve the management of NCDs, increase compliance with IPHS 2022 EMLs, and eventually improve population health outcomes by implementing these recommendations.

References

- 1) World Health Organization (WHO) [Internet]. World Health Organization; [cited 2024 Jul 2]. Available from: <http://apps.who.int/medicinedocs/en/d/Jh3011e/>
- 2) Kar S, Pradhan H, Mohanta G. Concept of essential medicines and rational use in public health. Indian Journal of Community Medicine/Indian Journal of Community Medicine [Internet]. 2010 Jan 1;35(1):10. Available from: <https://doi.org/10.4103/0970-0218.62546>
- 3) National List of Essential Medicines (NLEM), 2022 | Ministry of Health and Family Welfare | GOI [Internet]. Available from: <https://main.mohfw.gov.in/newshighlights-104>
- 4) Swargiary M, Lhungdim H. Disease burden and healthcare utilization in the north eastern region of India [Internet]. iipsindia.ac.in. [cited 2024 Jun 15]. Available from: https://www.iipsindia.ac.in/sites/default/files/ManaliLhungdim_DiseaseBurdenNER_DI21.pdf
- 5) Essential medicines [Internet]. Who.int. [cited 2024 Jun 15]. Available from: <https://www.who.int/westernpacific/health-topics/essential-medicines>
- 6) Nhsrindia.org. [cited 2024 Jun 15]. Available from: <https://nhsrindia.org/sites/default/files/CHC%20IPHS%202022%20Guidelines%20pdf.pdf>
- 7) Wirtz VJ, Hogerzeil HV, Gray AL. Essential medicines for universal health coverage – Authors’ reply. Lancet [Internet]. 2017 May 1;389(10082):1881–2. Available from: [https://doi.org/10.1016/s0140-6736\(17\)31209-6](https://doi.org/10.1016/s0140-6736(17)31209-6)
- 8) Van Den Ham R, Bero L, Laing R. The world medicines situation 2011: selection of essential medicines. Geneva: World Health Organization. 2011.
- 9) Reidenberg MM. Are we moving towards a new definition of essential medicines? Journal of Pharmacology and Pharmacotherapeutics [Internet]. 2015 Dec 1;6(4):233. Available from: <https://doi.org/10.4103/0976-500x.171874>
- 10) Gov.in. [cited 2024 Jun 15]. Available from: https://nhm.gov.in/images/pdf/guidelines/iphs/iphs-revised-guidelines-2022/01-SDH_DH_IPHS_Guidelines-2022.pdf

- 11) Nic.in. [cited 2024 Jun 15]. Available from:
<http://www.mohfw.nic.in/WriteReadData/l892s/963254697852336541.pdf>
- 12) Saikia D, Das KK. Rural health infrastructures in the North-East India. SSRN Electron J [Internet]. 2012 [cited 2024 Jul 2]; Available from: <http://mpa.ub.uni-muenchen.de/41859/>
- 13) Saikia D. Health Care Infrastructure in the Rural Areas of NorthEast India: Current Status and Future Challenges. J Eco Soc Develop. 2014;10(1):83–99.
- 14) Ministry of Health & Family Welfare. INDIAN PUBLIC HEALTH STANDARDS SUB DISTRICT HOSPITAL AND DISTRICT HOSPITAL [Internet]. Vol. Volume-I. 2022. Available from: https://nhm.gov.in/images/pdf/guidelines/iphs/iphs-revised-guidlines-2022/01-SDH_DH_IPHS_Guidelines-2022.pdf
- 15) Nic.in. [cited 2024 Jul 2]. Available from:
<http://www.mohfw.nic.in/WriteReadData/l892s/963254697852336541.pdf>
- 16) Saikia D. Health Care Infrastructure in the Rural Areas of NorthEast India: Current Status and Future Challenges. J Eco Soc Develop. 2014;10(1):83–99.
- 17) Saikia D, Das KK. Rural health infrastructures in the North-East India. SSRN Electron J [Internet]. 2012 [cited 2024 Jul 2]; Available from: <http://mpa.ub.uni-muenchen.de/41859/>
- 18) Hypertension O. Continuum of care approach and quality management [Internet]. Gov.in. [cited 2024 Jul 2]. Available from:
https://www.rrcnes.gov.in/workshop_report/cp/CoC_study_Assam_Manipur.pdf
- 19) Essential medicines: An Indian perspective Rituparna Maiti,Vikas Bhatia. Indian Journal of Community Medicine (Indian J Community Med). 2015;40:223–32.
- 20) Cardiovascular risk factors in northeast India indigenous population, Abigail Lalnuneng 01 Jun 2023. Journal of Hypertension. 2023.
- 21) Kumar M, Dahiya V, Mishra S, Dinesh K, Sharma N. Cardiovascular disease prevalence and drug utilization patterns at a tertiary care hospital in north-eastern India. Mangla Lahkar - International Journal of Pharmacy and Ph. 2016;20(6):116–9.
- 22) Ministry of Health and Family Welfare. National Programme For Prevention and Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS). 2016.

Annexures

Analysed Data Excel Sheets.

ANNEXURE 1: Table of mapped drugs of state EMLs with IPHS EMLs category wise for each north eastern state at SDH level of facility.

Sl. No.	Category	IPHS SDH EML	Assam	Arunachal Pradesh	Meghalaya	Manipur	Mizoram	Nagaland	Tripura	Sikkim
1	Cardiovascular Medicines & Stroke	Acetylsalicylic Acid (Aspirin)	YES	YES	NO	NO	NO	-	NO	-
2		Heparin Sodium	YES	YES	NO	NO	NO	-	YES	-
3		Furosemide	YES	YES	NO	YES	YES	-	YES	-
4		Chlorthalidone	NO	NO	NO	NO	NO	-	YES	-
5		Spironolactone	YES	YES	NO	YES	YES	-	YES	-
6		Nifedipine	YES	YES	NO	YES	NO	-	YES	-
7		Diazepam	YES	YES	NO	YES	YES	-	YES	-
8		Folic Acid	YES	YES	NO	YES	YES	-	YES	-
9		Clopidogrel	YES	YES	YES	YES	NO	-	NO	-
10		Diltiazem	YES	YES	NO	NO	NO	-	NO	-
11		Glyceryl Trinitrate	YES	YES	YES	YES	NO	-	NO	-
12		Isosorbide-5-mononitrate	YES	NO	NO	NO	NO	-	NO	-
13		Isosorbide Dinitrate	YES	YES	YES	YES	NO	-	NO	-
14		Atenolol	NO	YES	NO	NO	NO	-	YES	-
15		Metoprolol	YES	YES	YES	YES	NO	-	YES	-
16		Amiodarone	YES	NO	YES	YES	NO	-	YES	-
17		Amlodipine	YES	YES	YES	YES	YES	-	YES	-
18		Hydrochlorothiazid	YES	YES	YES	YES	NO	-	NO	-
19		Labetalol	YES	YES	NO	NO	YES	-	NO	-
20		Methyldopa	NO	YES	YES	YES	NO	-	NO	-
21		Enalapril	NO	NO	YES	YES	NO	-	NO	-
22		Captopril	NO	NO	NO	NO	NO	-	NO	-
23		Lisinopril	NO	NO	NO	NO	NO	-	NO	-
24		Verapamil	YES	YES	YES	YES	NO	-	NO	-
25		Ramipril	YES	YES	YES	YES	NO	-	NO	-
26		Telmisartan	YES	YES	YES	YES	YES	-	YES	-

27		Digoxin	YES	YES	YES	YES	NO	-	YES	-
28		Dobutamine	YES	YES	NO	NO	NO	-	YES	-
29		Dopamine	YES	YES	NO	NO	NO	-	YES	-
30		Protamine	YES	NO	NO	NO	NO	-	YES	-
31		Noradrenaline	YES	YES	NO	NO	YES	-	NO	-
32		Enoxaparin	YES	NO	NO	NO	NO	-	YES	-
33		Clofibrate	NO	NO	NO	NO	NO	-	NO	-
34		Streptokinase	YES	YES	NO	NO	NO	-	NO	-
35		Fenofibrate	YES	NO	NO	NO	NO	-	NO	-
36		Atorvastatin	YES	YES	YES	YES	NO	-	YES	-
37	Anti-Diabetic Medicines	Glimepiride	YES	YES	NO	NO	YES	-	NO	-
38		Gliclazide	NO	YES	NO	NO	NO	-	NO	-
39		Insulin (Soluble) Injection 4	YES	YES	YES	YES	YES	-	NO	-
40		Metformin	YES	YES	NO	NO	YES	-	YES	-
41		Premix Insulin 30:70 Injection	NO	YES	YES	YES	NO	-	NO	-
42		Glibenclamide	NO	NO	NO	NO	NO	-	NO	-
43	Anti-Neoplastic Medicines	All-Trans Retinoic Acid	NO	NO	NO	NO	NO	-	NO	-
44		Arsenic Trioxide	NO	NO	NO	NO	NO	-	NO	-
45		Calcium Folate	NO	NO	NO	NO	NO	-	NO	-
46		Capecitabine	NO	NO	NO	NO	NO	-	NO	-
47		Carboplatin	NO	NO	NO	NO	NO	-	NO	-
48		Chlorambucil	NO	NO	NO	NO	NO	-	NO	-

ANNEXURE 2 : Table - Showing total % of category wise medicines available against IPHS EML for each state at SDH level of facility.

Sl. No.	State	Category (SDH)	Total Medicines	Available in State	Total
1	Assam	Cardiovascular Medicines & Stroke	36	29	81%
		Anti-Diabetic Medicines	6	3	50%
		Anti- Neoplastic Medicines	6	0	0%
2	Arunachal Pradesh	Cardiovascular Medicines & Stroke	36	26	72%
		Anti-Diabetic Medicines	6	5	83%
		Anti- Neoplastic Medicines	6	0	0%
3	Meghalaya	Cardiovascular Medicines & Stroke	36	14	39%
		Anti-Diabetic Medicines	6	2	33%
		Anti- Neoplastic Medicines	6	0	0%
4	Manipur	Cardiovascular Medicines & Stroke	36	19	53%
		Anti-Diabetic Medicines	6	2	33%
		Anti- Neoplastic Medicines	6	0	0%
5	Mizoram	Cardiovascular Medicines & Stroke	36	8	22%
		Anti-Diabetic Medicines	6	3	50%
		Anti- Neoplastic Medicines	6	0	0%
6	Nagaland	Cardiovascular Medicines & Stroke	36	NA	NA
		Anti-Diabetic Medicines	6	NA	NA
		Anti- Neoplastic Medicines	6	NA	NA
7	Tripura	Cardiovascular Medicines & Stroke	36	18	50%
		Anti-Diabetic Medicines	6	1	17%
		Anti- Neoplastic Medicines	6	0	0%
8	Sikkim	Cardiovascular Medicines & Stroke	36	NA	NA
		Anti-Diabetic Medicines	6	NA	NA
		Anti- Neoplastic Medicines	6	NA	NA