Bangladesh Pharmaceutical Expenditure Tracking by Diseases, 2020

Final Report

9 November 2023

Acronyms

BBS	Bangladesh Bureau of Statistics
BNHA	Bangladesh National Health Accounts
CHE	Current Health Expenditure
DI	Data International Ltd.
DSA	Disease Specific Accounts
GOB	Government of Bangladesh
HDS	Health Services Division
HEU	Health Economics Unit
HIES	Household Income and Expenditure Survey
ICD	International Classification for Disease
MOHFW	Ministry of Health and Family Welfare
NGO	Non-Governmental Organization
NHA	National Health Accounts
OECD	Organization of Economic Development and Cooperation
OOP	Out of Pocket
SHA	System of Health Accounts
THE	Total Health Expenditure
TPE	Total Pharmaceutical Expenditure
WHO	World Health Organization

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EXECUTIVE SUMMARY

This study presents pharmaceutical expenditure estimates for Bangladesh for the year 2020. It is the first attempt to estimate total expenditure on pharmaceuticals that provides a breakdown of drugs sold by retail drug stores, and by healthcare facilities. Pharmaceutical expenditure incurred at healthcare facilities are reported as a component of inpatient and outpatient care; only medicine sold in the open market, primarily by retail drug outlets represent as pharmaceutical expenditure as guided by the System of Health Accounts 2011 edition (SHA2011). This study isolates and reports outlays of medicine used in hospitals and outpatient centers – which has not been done hitherto. In addition, the study reallocates total pharmaceutical expenditures by diseases and gender.

The study used internationally accepted guidelines for the approach and methodology for data collection, analysis, and reporting. These include OECD, Eurostat, WHO (2011), A System of Health Accounts guidelines for National Health Accounts (NHA), Voluntary Reporting of Disease-specific Expenditures, the International Classification of Diseases Tenth Edition (ICD-10), and others.

The study used data from the Bangladesh National Health Accounts (BNHA) 2020, as well as from (i) Healthcare Facility Survey 2020, (ii) Inpatient Admissions Records Survey 202, (iii) Outpatient Survey 2022, (iv) Pharmacy Patient Survey 2022, and (v) Household Income and Expenditure Survey (HIES) 2016.

ICD-10 aggregates diseases and conditions into 22 chapters. Accordingly, for Bangladesh for the year 2020, Total Pharmaceutical Expenditure (TPE) has been disaggregated across the 22 defined ICD-10 categories or chapters. This report is inclusive of those 22 categories and their sub-categories.

Selected indicators from Bangladesh National Health Accounts (BNHA), 2020

- Total Health Expenditure (THE) Taka 777 billion
- Share of THE:
  - Household Out-of-Pocket Spending: 68.5%
  - Government: 23.1%
  - Development Partners: 5%
  - NGOs: 1.7%
  - Corporations, autonomous bodies, and private companies: 1.5%, and
  - Voluntary health insurance schemes: 0.1%

Overall Findings of the Total Pharmaceutical Expenditure (TPE) study:

- Total Pharmaceutical Expenditure (TPE): Taka 373.5 billion, 42% of THE
- Share of TPE for male: 39%, female 61%
- TPE financing source in percent:
  - Households: 97%
  - Government: 1.4%
  - Development Partners: 1.2%
  - NGOs: 0.4%

Pharmacies are the predominant providers of drugs (88.53%); drugs are also dispensed by general hospitals (5.14%) and Specialized hospitals (3.32%). Medicine provided at ambulatory health centers (medical services performed on an outpatient basis) is very low, only 0.77%. Around 2.13% of pharmaceuticals are provided through providers of preventive care (Figure 1).

Figure 1: Share of Total Pharmaceutical Expenditure (TPE) by Providers

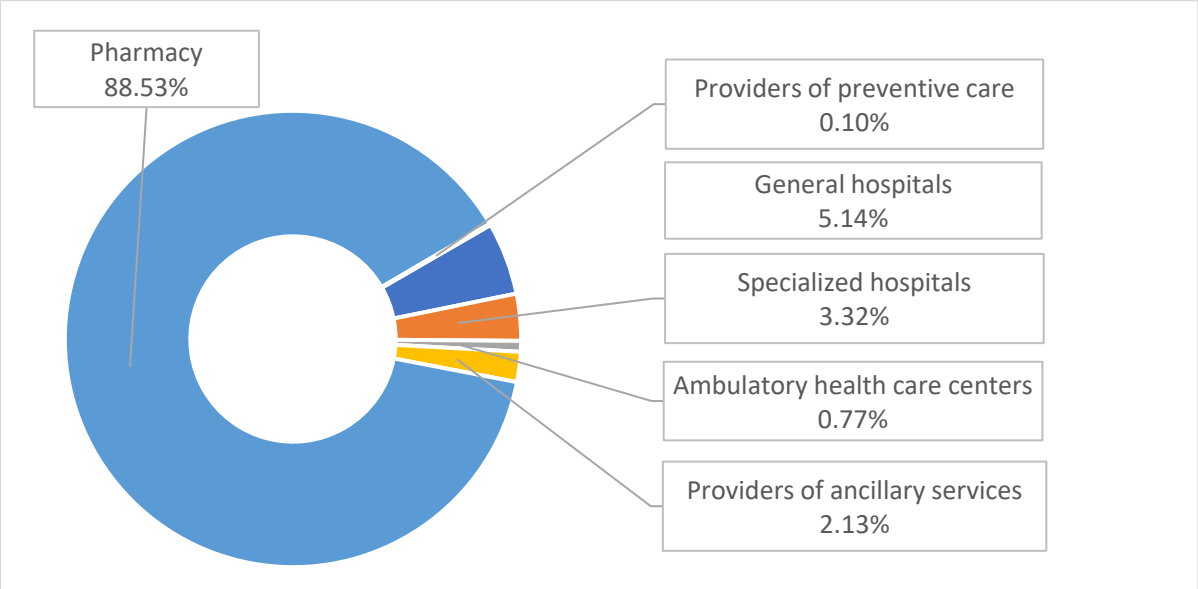


Table 1, Table 2, and Table 3 presents pharmaceutical expenditure by source of financing, outlays disaggregated by gender, and brief ICD-10 narrative of each of the diseases and conditions respectively.

Table 1: Top Five Pharmaceutical Expenditure by Financing Type and Diseases Classification, 2020

	Govt.	NGOs	Household	Dev. Partners	Total		Remarks
ICD-10 Description	Taka (Crore)					Col.%	Households have the highest share of financing across all diseases and conditions. Relatively higher government spending (13%) for Symptoms, signs and abnormal clinical and laboratory findings, nec classified is likely due to COVID-19 pandemic.
Diseases of the musculoskeletal system and connective tissue	132	1	6,638	-	6,771	17.4%	
Diseases of the circulatory system	189	0	5,936	-	6,125	15.7%	
Diseases of the digestive system	205	1	5,290	-	5,497	14.1%	
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	394	4	3,031	-	3,429	8.8%	
Diseases of the respiratory system	98	1	2,871	-	2,971	7.6%	

Table 2: Top Five Pharmaceutical Expenditure by Disease Group and Gender, 2020

ICD-10 Description	Male		Female		Total		Remarks
	Taka (crore)	%	Taka (crore)	%	Taka (crore)	%	
Diseases of the musculoskeletal system and connective tissue	2,441	36%	4,330	64%	6,771	1	Pharmaceutical expenditure is higher for females -- 61% (Taka 23,581 crore) than males – 39% (Taka 15,103). Top three pharmaceutical outlays for either gender: (i) Diseases of the musculoskeletal system and connective tissue; (ii) Diseases of the circulatory system; and (iii) Diseases of the digestive system. Combined, their share of TPE 47.5% (Taka 18,385 crore).
Diseases of the circulatory system	2,081	34%	4,037	66%	6,118	2	
Diseases of the digestive system	2,358	43%	3,139	57%	5,496	3	
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1,572	46%	1,857	54%	3,429	4	
Diseases of the respiratory system	1,537	52%	1,434	48%	2,971	5	

Table 3: Description of Top five ICD-10 Chapters and their Pharmaceutical Expenditure Share

Chapter Code	ICD-10 Description	Description (Source: https://coder.aapc.com/icd-10-codes-range/154)	TPE Share %
M00-M99	Diseases of the musculoskeletal system and connective tissue	The ICD-10 code range for Diseases of the musculoskeletal system and connective tissue M00-M99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (M00-M99), Diseases of the musculoskeletal system and connective tissue, contains ICD-10 codes for Arthropathies, Dentofacial anomalies [including malocclusion] and other disorders of jaw, Systemic connective tissue disorders, Dorsopathies, Soft tissue disorders, Osteopathies and Chondropathies, Biomechanical lesions, not elsewhere classified.	17.5%
I00-I99	Diseases of the circulatory system	The ICD-10 code range for Diseases of the Circulatory System I00-I99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (I00-I99), Diseases of the circulatory system, contains ICD-10 codes for Acute rheumatic fever, Chronic rheumatic heart diseases, Hypertensive diseases, Ischemic heart, Pulmonary heart disease, Cerebrovascular, Other forms of heart disease.	15.8%
K00-K95	Diseases of the digestive system	The ICD-10 code range for Diseases of the digestive system K00-K95 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (K00-K95), Diseases of oral cavity and salivary glands, contains ICD-10 codes for Diseases of esophagus, stomach and duodenum, appendix, Non-infective enteritis and colitis, Other diseases of intestines, peritoneum and retroperitoneum, Diseases of liver.	14.2%
R00-R99	Symptoms, signs, and abnormal clinical and laboratory findings, not	The ICD-10 code range for Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified R00-R99 is medical classification list by the World Health Organization (WHO).ICD-10 Code range (R00-R99), Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified, contains ICD-10 codes for Symptoms and signs involving the digestive system and	8.9%

Chapter Code	ICD-10 Description	Description (Source: https://coder.aapc.com/icd-10-codes-range/154)	TPE Share %
	elsewhere classified	abdomen, subcutaneous tissue, nervous and musculoskeletal systems, genitourinary system, cognition, perception, emotional state and behavior.	
J00-J99	Diseases of the respiratory system	The ICD-10 code range for Diseases of the respiratory system J00-J99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (J00-J99), Diseases of the respiratory system, contains ICD-10 codes for Acute upper respiratory infections, Influenza and pneumonia, Other acute lower respiratory infections, Other diseases of upper respiratory tract, Chronic lower respiratory diseases, Lung diseases due to external agents, Other respiratory diseases principally affecting the interstitium.	7.7%

Policy Implications and Recommendation

Increase Government Health Sector Financing

Public health expenditure in the Bangladesh health sector is lower than in most of its South Asian neighbors. It is around 0.50% of Gross Domestic Product (GDP), and approximately 6% of the total government budget[1]. An increase in budget allocation is advocated for the health sector to be at par with its neighbors, perhaps starting with at least 2%. For prioritizing the use of additional resources, the broader objective should be to support healthcare services targeting the poor with greater availability, affordability, and accessibility of primary healthcare services, including pharmaceutical drugs. Studies on benefit incidence analysis of healthcare in Bangladesh show an overall pro-rich distribution of healthcare benefits where healthcare benefits offered by the private sector providers favor the richer socioeconomic groups[2].

Reduce Expenditure on Drugs for Households

- Out-of-pocket (OOP) expenditure is a payment made by households directly to providers to obtain healthcare goods and services. Bangladesh has an extremely high rate of OOP health expenditure. In 2020, households' OOP health expenditure was Taka 532 billion or 69% of Total Health Expenditure (THE). According to the Global Spending on Health, "In general, when a health care system relies largely on OOP payment to finance its' services, more households face catastrophic spending3."

[1] Global Health Expenditure Database (who.int)

[2] Jahangir A. M. Khan et al, 2017). 1Khan, Jahangir A. M., Ahmed, Sayem, MacLennan, Mary, Sarker, Abdur Razzaque, Sultana, Marufa and Rahman, Hafizur (2017) Benefit incidence analysis of healthcare in Bangladesh – equity matters for universal health coverage. Health Policy and Planning, 32 (3). pp. 359-365. ISSN 0268-1080

3 Reference: Global spending on health: a world in transition. Geneva: World Health Organization; 2019 (WHO/HIS/HGF/HFWorkingPaper/19.4). License: CC BY-NC-SA 3.0 IGO.

- Under the Sustainable Development Goal (SDG) 3, "Good Health and Well-Being" monitoring framework, out-of-pocket payments as a share of total household consumption exceeding 10% (lower threshold) or 25% (upper threshold) are considered catastrophic.

To reduce household burden on drug expenditure the following steps are recommended:

- Increase government spending on drugs at public health facilities, offering them at low subsidized rates and increasing the range of drugs that are presently provided.

- The state-owned pharmaceutical company, Essential Drugs Company Limited (EDCL), produces selected medicines primarily catering to government health facilities. Production constraint is the likely cause for the very limited variety and quantity that they can supply to those health centers. Investing in the increased production capacity of EDCL would reduce the reliance on more expensive drug procurement from private sector producers and distributors. The Ministry of Health and Family Welfare (MOHFW) may study the best practices from other countries (regional and global) regarding the allocation and distribution of pharmaceuticals.

- Without a doctor's prescription, due to misdiagnosis, the intake of consumption of antibiotics or other medicines can have adverse effect on a patient's health. There should be stricter government monitoring of the buying and selling of these medicines. The Government of Bangladesh may consider establishing a mechanism where it is mandatory for retail drug outlets to dispense drugs only against prescriptions other than those that are considered as over-the-counter (OTC) medicine.

- Increase government efforts in promoting rational and informed use of drugs public awareness programmes, especially among the poor and less-educated. The dangers of overuse of drugs, including antibiotics, should be conveyed.

- Public-private partnerships should be explored to design, finance, and implement health education campaigns that promote responsible medication use, prevention of diseases, and lifestyle modifications to reduce the need for pharmaceutical interventions. By promoting the rational use of drugs by both the public and private sectors can contribute towards appropriate drug use leading to enhanced efficacy, safety, and cost reduction for the patients.

Reduce the TPE of the Top Three Disease Categories

This highest drug outlays are found in the following three diseases or conditions: (i) Diseases of the musculoskeletal system and connective tissue; (ii) Diseases of the circulatory system; and (iii) Diseases of the digestive system. Their collective share of Total Pharmaceutical Expenditure (TPE) is 48%. A few policy suggestions are offered below for each of the three illnesses, with the objective of more balanced and informed use of drugs leading to better health outcomes and decreased consumption and expenditure.

❖ **Diseases of the Musculoskeletal System and Connective Tissue**

The diseases of the musculoskeletal system and connective tissue disorder are linked to a) family genetics, b) exposure to toxic chemicals, such as those found in air pollution and cigarette smoke, or c) inadequate nutrition, including lack of vitamins C and D. Preventive measures for exposure to toxins as well as eating healthy and nutritious food can reduce the number of patients for this disease. In the workplace, especially in the manufacturing and the informal business sector, the physical demands of working long, laborious hours can be physically taxing, contributing to an array of musculoskeletal (e.g., joints, shoulder) temporary or chronic pain and morbidity.

❖ **Diseases of the Circulatory System**

Circulatory system diseases are any conditions that affect the heart or blood vessels. Diseases under this category include acute rheumatic fever, chronic rheumatic heart diseases, hypertensive diseases, ischemic heart diseases, etc. There is a strong evidence base for specific dietary and physical disciplines and policies relevant to cardiovascular health. The government, community, and families can play an active role in the prevention or mitigation of this category of illness.

The government can use its fiscal, regulatory, and public awareness programme tools to bring greater awareness for improved dietary and lifestyle practices at the household and community level. This can include, for example, the promotion of low–trans-fat, low–saturated fat foods, fruits and vegetables, fish, and lean meats and concurrent restriction of high trans-fat, salt, and sugar. Adult members of families, educational institutions, and employers at the workplace can restrict the use of social media (e.g. Facebook, Tik Tok) for young people and encourage time outdoors that involves physical and recreational activities, and socialization with friends, family, and neighbors.

The government's proactive role in drug pricing, quality control, and oversight of prescription drug sales for cardiovascular illnesses is essential both for safe and appropriate use, and for ensuring equity. The poor, disadvantaged, and less informed heart patients are more vulnerable to ineffective, expensive use of heart-related drugs.

❖ **Diseases of the Digestive System**

Diseases of the gastrointestinal tract are referred to as digestive system disorders. Bacterial infections, bad eating habits, wrong diet, lack of exercise, and emotional stress are some of the important causes of these disorders. Bangladesh's access to safe drinking water is no longer a problem. Self-prescription and seeking immediate remedial relief are a few reasons for the high use of anti-acid, anti-flatulence, and anti-ulcer drugs. The propensity to consume high doses of antibiotics, leading to drug-resistant phenomena coupled with increased OOP from households is worrisome.

Bangladesh Pharmaceutical Expenditure Tracking by Diseases, 2020

I. BACKGROUND

The Bangladesh National Health Accounts (BNHA) is produced regularly by the Health Economics Unit (HEU) under the Health Services Division (HDS) of the Ministry of Health and Family Planning (MOHFW). BNHA reports on the entire health care expenditure of the country. It tracks and reports expenditure by healthcare services, providers, and financing.

BNHA estimates over the years indicate expenditure on pharmaceuticals constitute the largest share (42% in 2020) of healthcare. While BNHA provides a reliable expenditure estimate for pharmaceuticals, it does not provide further breakdown on types of drugs or reasons for purchase of them. The BNHA report provides estimates on pharmaceutical expenditure which includes establishments that are primarily engaged in the retail sale of pharmaceuticals for prescribed and non-prescribed medicine. The pharmaceutical expenditure incurred by the public sector, private (for profit) sector, NGOs or development partners are embedded within the expenditure on inpatient care, ambulatory or preventive care incurred by each of these entities.

The year 2020 was selected for tracking pharmaceutical expenditure tracking, even though it was not a typical year because of the pandemic situation. In fact, in that year the Ministry of Health and Family Welfare (MOHFW) expenditure was somewhat lower than the preceding fiscal year. The main reason for selecting that period is because of availability and accessibility of the latest Bangladesh National Health Accounts (BNHA) 2020 data. BNHA 2020 dataset data on pharmaceutical expenditure in particular and overall health expenditure for Bangladesh. The BNHA data, supplemented by data from several past studies, including an inpatient and outpatient survey conducted in 2022 has been used to distribute pharmaceutical outlays across diseases.

The decision of the Health Economics Unit (HEU) and the World Health Organization (WHO) to initiate the production of a pharmaceutical expenditure by diseases is opportunistic. A rigorous analysis of the multiple HEU datasets on hospital costing and utilization along with a modest level of data to be collected under this assignment will accomplish the overall objective of this assignment –- estimating pharmaceutical expenditure by disease and gender. Undertaking an independent study of estimating pharmaceutical spending categorized by diseases and conditions necessitates the collection of primary data on expenditure and utilization from all types of healthcare providers. This endeavor would require substantial financial resources and time.

In 2022, HEU commissioned a study to produce a Disease Specific Accounts (DSA). While the secondary and primary data collected under the DSA study was sufficient for estimating total healthcare spending by diseases, to estimate how much a patient spent on medication for a specific disease warranted collection of pharmaceuticals procured and utilized at the facility level. The additional data collected under this study, combined with DSA 2022 database, allows production and analysis of pharmaceutical expenditure by disease.

The System of Health Accounts (SHA) 2011 definitions or boundaries of different health goods and services, including pharmaceuticals, have been adhered to in this study for analysis and reporting. Pharmaceuticals items include medicinal preparations, branded and generic medicines, drugs, patent medicines, serums and vaccines, and oral contraceptives. As per SHA 2011 definition, fluids required for dialysis, as well as gases used in health care, such as oxygen, should also be included as part of pharmaceuticals when the patient or relatives purchase them directly. Because of insufficient data, this study was unable to differentiate oxygen expenditure by individual patients, and as a result, it is not considered as a component of the patients' pharmaceutical expenses.

Objective of the Study

The overall objective of the study is to provide a comprehensive as well as disaggregated pharmaceutical expenditure estimates for Bangladesh. The two key objectives of this study are: (a) estimate total expenditure on pharmaceuticals inclusive of medicine used in hospitals and outpatient centers; (b) reallocate the total pharmaceutical expenditures by diseases.

This report has four sections. Following a brief introduction, Section II presents the methodology used in designing the study based on internationally acceptable guidelines, data collection, and analytical approach. Findings of study are presented in Section III. Conclusions and policy implications are discussed in Section IV.

II. APPROACH AND METHDOLOGY

The purpose of this endeavor is to estimate total pharmaceutical expenditure by diseases as a subset of the National Health Account (NHA), following the classification outlined in the System of Health Accounts (SHA) 2011. NHA in general report pharmaceutical expenditures under its' provider classification termed as "HP.5 Retailers and other providers of medical goods". However, it (HP.5) does not include pharmaceutical spending at hospitals and outpatient centers. As per SHA 2011 guideline, pharmaceuticals consumed by patients at healthcare facilities is treated as inputs rather than services. More importantly, Bangladesh National Health Accounts (BNHA) do not report health expenditure by disease as part of its core accounts.

BNHA estimates over the years indicate expenditure on pharmaceuticals constitute the largest share (42% in 2020) of healthcare. BNHA report provides aggregated expenditure on pharmaceuticals but does not attempt to measure the pharmaceutical expenditures by diseases. There is no specific guideline on how to estimate pharmaceutical expenditures by disease or conditions, but two methods are in general used in estimating the pharmaceutical expenditures by diseases; (a) by improvising the "OECD Guidelines on the voluntary reporting of disease-specific expenditures[4]"; (b) by converting the drugs utilized by the healthcare facilities into Anatomical Therapeutic Chemical Code (ATC) classification system.

For this exercise the ATC coding approach was not pursued as this coding system primarily centers around classifying drugs according to their pharmacological and therapeutic properties, rather than

[4] Organisation for Economic Co-operation and Development (OECD) "Guidelines on the voluntary reporting of disease-specific expenditures", EU CONTRIBUTION AGREEMENT 2011 53 01, December 2013"

specific health conditions or diseases. For drugs that are used for treatment of a single disease ATC is useful, but it can be problematic in classifying drugs that are utilized for multiple diseases or conditions. As an example, take the case of commonly consumed drug paracetamol. According to the ATC classification, it is categorized as a drug for treating the "Nervous system," but it is frequently used for remission of fever as well as for pain relief. Under such circumstances, the option of using ATC code in identifying disease was not followed under this study.

This study aims to estimate the total pharmaceutical expenditure for the year 2020, and categorizing them by disease/condition, age, and gender. OECD's "Guidelines on the voluntary reporting of disease-specific expenditures" with special focus on procurement and utilization of pharmaceuticals will serve as the key tool in data collation and analysis. The guideline employs a prevalence-based methodology, employing a top-down cost attribution approach within the framework of the System of Health Accounts (SHA 2011). Embracing these guidelines will facilitate a detailed breakdown of healthcare spending based on facility and patient characteristics.

With the specific objective of estimating pharmaceutical expenditure by disease using data from multiple studies, data from the following studies were used: (i) Healthcare Facility Survey 2020 (HFS2020); (ii) Inpatient Admissions Records Survey 2020; (iii) Outpatient Survey 2022; (iv) Pharmacy Patient Survey 2022; and (v) Household Income and Expenditure Survey (HIES) 2016. A brief description of secondary data used under this study is provided below. The distribution of the healthcare facilities surveyed, and inpatient and outpatient data used in overall analysis is provided in Table 1.

(i) **Healthcare Facility Survey 2020 (HFS2020):** This was a nationally representative survey of costs and expenditures at public and private healthcare facilities. The survey allowed estimation of key cost components and inputs including expenditure on pharmaceuticals by type of facility. A total of 160 healthcare facilities were surveyed as part of a Health Economics Unit (HEU) hospital costing study. Under this study, procurement and disbursement of medicine amongst patients were collected, coded and linked with patients.

(ii) **Inpatient Admissions Records Survey 2020:** This HEU survey collected data on the characteristics and treatment of a national sample of inpatients from both public and private healthcare facilities. A total of 11,600 inpatients records were collected from public and private hospitals including NGOs. This patient data was combined with the cost data from the HFS2020 to estimate the distribution of healthcare spending by different types of inpatients, from which the expenditures on pharmaceuticals by diseases and conditions have been derived.

(iii) **Outpatient Survey 2022:** This survey of outpatients was conducted at the same facilities surveyed in the HFS2020. A total of 5,453 outpatients' data were collected from public and private hospitals including NGOs. Through an exit interview, patients were asked to share their prescription or notes from the doctor where reasons for encounter is written, and medication recommended. The survey data allowed estimating expenditure on pharmaceuticals by type of diseases and conditions.

(iv) **Pharmacy Patient Survey 2022:** It was a national survey of pharmacy customers and sales conducted by IQVIA (Bangladesh). A total of around 10,500 pharmacies patients' data were collected from a panel of pharmacy maintained by IQVIA. This data was combined with aggregate estimates of pharmaceutical market sales produced by IQVIA (Bangladesh) to estimate the distribution of pharmacy expenditures by different types of patients.

(v) **Household Income and Expenditure Survey (HIES) 2016:** This is a national household budget survey conducted by Bangladesh Bureau of Statistics (BBS). The HIES 2016 was a large-scale survey of 2,304 Primary Sampling Units (PSUs) comprising 46,080 households. It has been used in redistributing the pharmaceutical expenditure estimates across all divisions.

Table 1: Healthcare Facilities Surveyed to Collect Pharmaceutical Utilization Data

Facility Type	Sample	Inpatient	Outpatient
Medical College Hospital	11	2,242	660
Specialty Postgraduate Institute & Hospital	11	1,153	351
Dental College Hospital	1	207	50
General Hospital (not district hospital)	2	310	103
200-250 bed Hospital (not district hospital)	12	1,829	623
District Hospital	2	305	94
Infectious Disease Hospital	2	204	51
Upazila Health Complex	8	2,779	879
50-bed Hospital	1	101	32
31-bed Hospital	2	54	62
20-bed Hospital	2	54	61
Chest Hospital	6	614	81
Chest Disease Clinic	10		293
Union Health Center	3		93
Union Sub-center	8		249
Urban Dispensary	2		65
Trauma Center	1		31
Union Health & Family Welfare Center (UH&FWC)	2		62
Family Planning Clinic	3		95
Community Clinic	10		311
MCWC	7	319	217
Private and NGO Hospital/Clinic	34	1,205	894
Total	160	11,376	5,357

The financial outlay linked to disease/condition costs in Bangladesh predominantly derives from three key provider categories: (i) governmental institutions, primarily MOHFW hospitals and outpatient centers; (ii) private healthcare establishments, encompassing non-governmental facilities and private practitioners; and (iii) retail pharmaceutical outlets, commonly referred to as pharmacies, which dispense medications to households. BNHA is the most dependable data source to capture

expenditures within these three healthcare expenditure domains, sourced from both public and private financing streams.

The data analysis process for this task was conducted in three distinct phases. The initial phase involved identification and classification of all pharmaceutical expenditures for the year 2020 under the Bangladesh National Health Accounts VI (BNHA-VI), directly associated with specific diseases or conditions. These expenditures were coded in alignment with their respective disease classifications. Phase II encompassed coding of records from inpatient and outpatient cases, along with patient data from pharmacies, utilizing the International Classification of Disease (ICD) and the International Classification of Primary Care (ICPC). Following the completion of disease coding, under Phase III, further segmentation of expenditure data was followed considering disease, age, and gender categories, employing the top-down methodology proposed within the OECD guidelines.

In addition to usage of the data sets mentioned earlier, the study team visited public and private healthcare facilities for collecting additional information that BNHA or other studies provide. For example, under BNHA how much a health care facility has spent in procurement of drugs was collected, but no details on types of medicine was solicited. Such type of data was collected. The study team visited government offices in-charge of procurement of various vaccines; government expenditure data on procurement of vaccines provided by the Controller General of Accounts (CGA) as BNHA studies do not provide such information.

The estimates of pharmaceutical expenditures by diseases and conditions were carried out in several steps. In step 1, detailed data on procurement and utilization of pharmaceuticals by the healthcare providers, and additional patient data were collected to allocate drugs by disease. For government operated hospitals, estimating pharmaceutical expenditure was relatively easy as such outlays are booked under two economic codes: 3252109—Medicine and Vaccines; and 3252105—Medical and Surgical Supply. Assumption used in calculation of pharmaceutical expenditures for the Government are as follows:

a. Entire expenditure booked under ibas++ Economic Code 3252109—Medicine and Vaccines.
b. Medicine and pharmaceuticals procured under ibas++ Economic Code 3252105—Medical and Surgical Supply following MOHFW directive for various type of healthcare facilities.

    i. Medical Collage Hospitals and Specialized Hospitals -- 56%
    ii. Districts and General Hospitals – 68%
    iii. Healthcare Facilities at Upazila level and below – 73%
    iv. 100% of Medical and Surgical Supply booked under Economic Codes 3252105 for public health programs

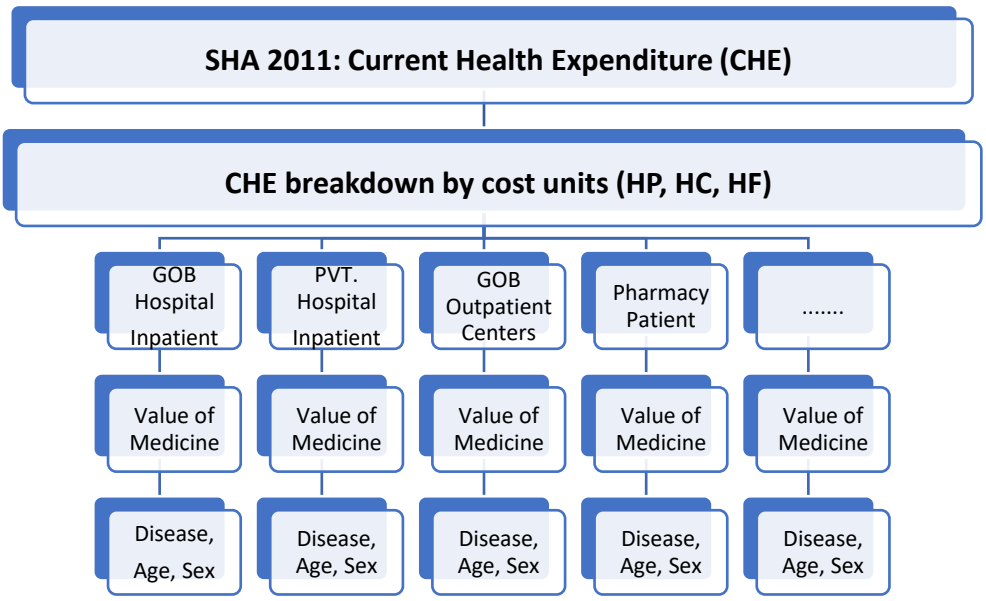
The key important piece of data for this study was drugs sold by retail drug outlets known as pharmacies, and what type of patient purchase those medicine. In step 2, all data gathered for the study were analyzed to link drug related expenditures with diseases and conditions.

The analysis of the cited cost and utilization data helped to generate a distribution key to allocate expenditure by patient. Applying the top-down cost accounting approach, healthcare expenses across

different types of healthcare facilities was systematically categorized into cost centers. These cost centers include: (i) patient services, which encompass inpatient treatment, outpatient treatment, and preventive care expenditures; (ii) ancillary services, encompassing pharmacy, laboratory, and radiology costs; and (iii) overhead and administrative support expenses. Where feasible, inpatient and outpatient costs were further segmented into medical treatment, dental treatment, and family planning services.

Upon categorization of health expenditures into the three major units as delineated above, a distribution key has been formulated for each cost unit, grounded in utilization patterns. In constructing this distribution key, six dimensions were taken into account: function, provider, financing schemes, ICD code, gender, and age group. The scale of these keys varied, ranging from a few combinations to a multitude of permutations. It is of utmost importance that these keys remain comprehensive, with fractions carefully assigned to ensure that the key collectively accounts for 100% of all care dispensed by the respective cost unit. The definitive configuration of this intricate probability map was reached through consultation with the Health Economics Unit (HEU). A schematic depiction outlining the general analysis of disease/condition costs using the top-down methodology is presented in Figure 1 below.

Figure 1: Steps for Allocating Expenditure by Disease, Age and Sex



A significant aspect of this analysis involved allocating appropriate weights to both hospitals and patients. Utilizing weights to assess the pharmaceutical expenditure facilitated national level estimation from the sample-based findings. While the number of days spent in hospitals serves is a valuable metric for a portion of hospital care, it's crucial to acknowledge that there is substantial cost disparity between a regular Ward of a hospital day and a day in an intensive care unit.

III. FINDINGS

This study marks the first attempt in Bangladesh to estimate Total Pharmaceutical Expenditure (TPE) incurred by healthcare establishments, households, NGOs, and development partners. The International Classification of Diseases, Tenth Revision, commonly known as ICD-10, is acknowledged by the World Health Organization (WHO) as a standardized guideline for categorizing and encoding diseases, conditions, and associated health issues. ICD-10 aggregates diseases and conditions into 22 chapters. Accordingly, for Bangladesh for the year 2020, TPE expenditure has been disaggregated across the 22-defined ICD-10 categories or chapters. The tables presented in this report are inclusive of those identical 22 categories and their sub-categories.

In Bangladesh, it is a common practice to present financial data in “crore Taka” as the unit of measurement rather than in “billion Taka.” Taka 100 crore is equivalent to Taka 1 billion. Pharmaceutical expenditures presented at disaggregated levels are easier to grasp in crores rather than in billions by avoiding the use of decimals. Based on this rationale, all estimates in the report are presented in “core Taka.”

In 2020, according to Bangladesh National Health Accounts (BNHA), Total Health Expenditure (THE) and Current Health Expenditure (CHE) were Taka 777 billion and Taka 719 billion respectively. THE for Bangladesh is defined as CHE plus expenditure made on gross capital formation, health education and research. Total Pharmaceutical Expenditure (TPE) in 2020 in Bangladesh is Taka 388.9 billion (Taka 38,897 crore), which is 54% of CHE. Households finance an overwhelming 94% (Taka 365 billion or Taka 36,507 crore) of TPE while the government’s share is 5.6% (Taka 21.95 billion or Taka 2,195 crore), and that of development partners 0.4% (Taka 1.49 billion or Taka 149 crore), and NGOs 0.1% (Taka 460 million or Taka 46.1 crore) – **Table 1**.

In all 22 broad (Chapter) ICD-10 disease and condition categories, households are the primary source of financing, as evident in Table 1. An analysis of the government's relative contribution across these 22 categories reveal that the government significantly supports pharmaceutical provision for neoplasms (42%) and the treatment of external causes of morbidity and mortality (40%). However, these two disease categories account for only 1.5% of the total pharmaceutical spending in 2020.

The three highest spending categories for pharmaceuticals are "Diseases of the musculoskeletal system and connective tissue" at Taka 6,772 crore, "Diseases of the circulatory system" at Taka 6,125 crore, and "Diseases of the digestive system" at Taka 5,497 crore. In these categories, government spending constitutes Taka 132 crore (2%), Taka 189 crore (3.1%), and Taka 205 crore (3.7%), respectively.

As for development partners, their financing is relatively more dominant in mitigating certain infectious and parasitic diseases, amounting to Taka 144 crore, which makes up 7.6% of the total spending in that category. It is to be noted that when reporting government expenditures on pharmaceuticals, this study consider pharmaceuticals provided to patients from government healthcare facilities as part of the government's spending, even if they are received as grants from development partners.

Table 1: Total Pharmaceutical Expenditure (TPE) by Financing Type and Diseases Classification

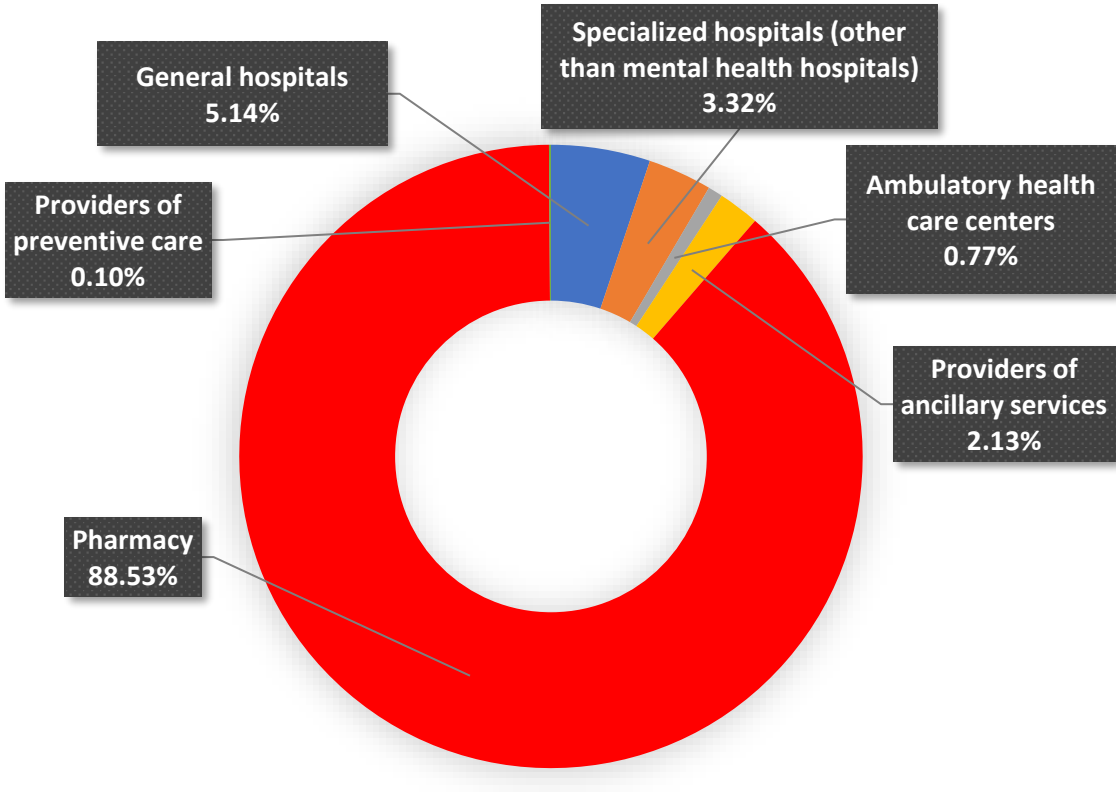
ICD-10 Description	Govt.	NGOs	Household	Dev. Partners	Total	Col.%
	Taka (Crore)					
Certain infectious and parasitic diseases	258.3	24.7	1,470.3	144.3	1,897.5	4.9%
Neoplasms	187.6	0.1	263.3	-	451.0	1.2%
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	15.3	0.3	225.4	-	241.0	0.6%
Endocrine, nutritional and metabolic diseases	73.1	0.5	1,432.9	-	1,506.5	3.9%
Mental and behavioural disorders	19.3	0.1	1,278.6	-	1,298.0	3.3%
Diseases of the nervous system	19.9	0.3	628.8	-	648.9	1.7%
Diseases of the eye and adnexa	21.0	0.0	643.4	-	664.5	1.7%
Diseases of the ear and mastoid process	20.6	0.0	530.3	-	550.9	1.4%
Diseases of the circulatory system	188.6	0.3	5,935.7	-	6,124.6	15.7%
Diseases of the respiratory system	98.2	1.4	2,871.3	-	2,970.9	7.6%
Diseases of the digestive system	205.2	1.5	5,290.4	-	5,497.1	14.1%
Diseases of the skin and subcutaneous tissue	72.6	0.4	1,454.2	-	1,527.1	3.9%
Diseases of the musculoskeletal system and connective tissue	132.3	1.0	6,638.2	-	6,771.5	17.4%
Diseases of the genitourinary system	79.3	3.5	1,891.4	-	1,974.2	5.1%
Pregnancy, childbirth and the puerperium	29.5	1.1	645.2	4.7	680.5	1.7%
Certain conditions originating in the perinatal period	2.9	0.3	12.6	-	15.8	0.0%
Congenital malformations, deformations and chrosomal abnormalities	7.1	-	137.1	-	144.2	0.4%
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	394.1	3.5	3,031.2	-	3,428.8	8.8%
Injuries, poisoning and certain other consequences of external causes	195.3	0.2	963.2	-	1,158.7	3.0%
Codes for special purposes	-	-	4.6	-	4.6	0.0%
External causes of morbidity and mortality	51.0	0.0	76.5	-	127.4	0.3%
Factors influencing health status and contact with health services	123.9	7.0	1,082.5	-	1,213.4	3.1%
Total Pharmaceutical Expenditure (TPE)	2,195.0	46.1	36,507.2	148.9	38,897.1	100%
Row %	5.6%	0.1%	93.9%	0.4%	100%	

Analysis of pharmaceutical spending by providers indicate retail drug outlets, often referred to as pharmacies, were responsible for 88.5% of pharmaceutical sales in Bangladesh in the year 2020 (**Table 2**, **Figure 2**). A more detailed breakdown based on provider type, reveals general hospitals incur 5.1% followed by Specialized hospitals 3.3% of total pharmaceutical expenditure. Drug spending through ambulatory healthcare service providers accounts for 0.8% of TPE. Share of pharmaceutical spending in providing ancillary services is estimated Taka 88 crore or 2.1% of the TPE. Additionally, a very small portion of pharmaceutical spending, 0.1%, is attributed to providers of public health programmes in the form of preventive care.

Table 2: Total Pharmaceutical Expenditure (TPE) by Providers

HP	Providers	Total (Crore Taka)	Col.%
HP.1.1	General hospitals	2,000	5.1%
HP.1.3	Specialized hospitals (other than mental health hospitals)	1,292	3.3%
HP.3.4	Ambulatory health care centers	300	0.8%
HP.4	Providers of ancillary services	828	2.1%
HP.5.1	Pharmacies	34,437	88.5%
HP.6	Providers of preventive care	40	0.1%
Total	Total Pharmaceutical Expenditure	38,897	100%

Figure 2: Share of Total Pharmaceutical Expenditure (TPE) by Providers



In order to ascertain potential disparities in pharmaceutical usage between males and females for disease groups, an analysis of pharmaceutical expenditure by sex and ICD-10 chapters was conducted. However, it's important to note that pharmaceuticals used for certain preventive care measures were excluded from this analysis due to the unavailability of sex-specific information. A breakdown of pharmaceutical uses by gender for top five group of diseases is presented in **Table 3**.

Pharmaceutical expenditure on female is higher 61% (Taka 23,581 crore) than on their male cohorts (Taka 15,103 crore; 39%) – **Table 3**. The top three pharmaceutical outlays for either gender are Diseases of the musculoskeletal system and connective tissue; Diseases of the circulatory system; and Diseases of the digestive system, respectively. Combined, these three chapters' share of total pharmaceutical expenditure is 47.5% (Taka 18,385 crore).

Table 3: Pharmaceutical Expenditure 2020 by International Disease Classification (ICD-10)

ICD-10 Description	Male		Female		Total	
	Taka (crore)	Rank	Taka (crore)	Rank	Taka (crore)	Rank
Diseases of the musculoskeletal system & connective tissue	2,441	1	4,330	1	6,771	1
Diseases of the circulatory system	2,081	3	4,037	2	6,118	2
Diseases of the digestive system	2,358	2	3,139	3	5,496	3
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	1,572	4	1,857	4	3,429	4
Diseases of the respiratory system	1,537	5	1,434	6	2,971	5
Diseases of the genitourinary system	442	11	1,533	5	1,974	6
Certain infectious and parasitic diseases	705	7	993	7	1,698	7
Diseases of the skin and subcutaneous tissue	781	6	745	10	1,527	8
Endocrine, nutritional and metabolic diseases	542	10	960	8	1,502	9
Mental and behavioural disorders	649	8	649	12	1,298	10
Factors influencing health status and contact with health services	292	12	921	9	1,213	11
Injuries, poisoning and certain other consequences of external causes	562	9	597	13	1,159	12
Pregnancy, child birth and the puerperium	-	22	680	11	680	13
Diseases of the eye and adnexa	274	13	390	14	664	14
Diseases of the nervous system	260	14	388	15	649	15
Diseases of the ear and mastoid process	222	16	329	16	551	16
Neoplasms	229	15	222	17	451	17
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism	62	18	179	18	241	18
Congenital malformations, deformations and chrosomal abnormalities	13	19	131	19	144	19
External causes of morbidity and mortality	68	17	59	20	127	20
Certain conditions originating in the perinatal period	9	20	7	21	16	21
Codes for special purposes	4	21	1	22	5	22
Total and Row %	15,103	39%	23,581	61%	38,684	

Discussion on Top Ten ICD-10 Chapters' Pharmaceutical Expenditure

Table 4 lists the top ten chapters in terms of pharmaceutical expenditure for Bangladesh in 2020. Their collective share is around 85% of the overall pharmaceutical expenditure. Table 4 to Table 13 presents, by gender, breakdown of estimates for sub-categories of diseases and conditions, as classified under ICD-10 description, for each of the ten chapters. Preceding each disease or condition a brief narrative on the chapter is presented.

Table 4: Top Ten ICD-10 Chapters and Pharmaceutical Expenditure Share

Chapter	ICD-10 Description	Rank	Share %
M00-M99	Diseases of the musculoskeletal system and connective tissue	1	17.5%
I00-I99	Diseases of the circulatory system	2	15.8%
K00-K99	Diseases of the digestive system	3	14.2%
R00-R99	Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified	4	8.9%
J00-J99	Diseases of the respiratory system	5	7.7%
N00-N99	Diseases of the genitourinary system	6	5.1%
A00-B99	Certain infectious and parasitic diseases	7	4.4%
L00-L99	Diseases of the skin and subcutaneous tissue	8	3.9%
E00-E90	Endocrine, nutritional and metabolic diseases	9	3.9%
F00-F99	Mental and behavioural disorders	10	3.4%
	Other 12 chapters combined		15.3%

Diseases of the Musculoskeletal System and Connective Tissue (ICD M00-M99)

The ICD-10 code range for Diseases of the musculoskeletal system and connective tissue M00-M99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (M00-M99), Diseases of the musculoskeletal system and connective tissue, contains ICD-10 codes for Arthropathies, Dentofacial anomalies [including malocclusion] and other disorders of jaw, Systemic connective tissue disorders, Dorsopathies, Soft tissue disorders, Osteopathies and Chondropathies, Biomechanical lesions, not elsewhere classified.

Source: https://coder.aapc.com/icd-10-codes-range/154

Conditions and morbidity relating to Diseases of the Musculoskeletal System and Connective Tissue contribute to more pharmaceutical outlay (Taka 6,771 crore, 17.5% of TPE) than any other ICD-10 category. Dorsopathies, joint disorders, arthrosis are three ailments for which drug purchase are the highest for households. Dorsopathies, belongs to group of diseases of the musculoskeletal system and connective tissue associated with degenerative diseases of the spine. Both men and women spend considerable amount, around Taka 2,35 crore on drugs to address this health challenge (**Table 5**). For joint disorders and arthrosis, Taka 1,605 crore and Taka 1,101 crore were spent on drugs respectively. Arthrosis is a non-inflammatory degenerative condition associated with aging.

Table 5: Pharmaceutical Expenditure for Diseases of the Musculoskeletal System and Connective Tissue by Gender

	Male		Female		Total	
ICD-10 Description	Taka (crore)	Rank	Taka (crore)	Rank	Taka (crore)	Rank
Infectious arthropathies	0.2	15	2.5	13	2.7	15
In-ammatory polyarthropathies	115.2	5	573.6	4	688.8	4
Arthrosis	475.5	3	625.5	3	1101.1	3
Other joint disorders	557.1	2	1047.6	2	1604.6	2
Systemic connective tissue disorders	3.2	12	0.4	14	3.6	14
Deforming dorsopathies	4.9	10	37.2	8	42.1	9
Spondylopathies	84.3	6	174.1	6	258.4	6
Other dorsopathies	843.1	1	1522.3	1	2365.4	1
Disorders of muscles	54.5	7	12.6	9	67.1	8
Disorders of synovium and tendon	2.6	14	10.8	10	13.4	10
Other soft tissue disorders	241.2	4	259.9	5	501.1	5
Disorders of bone density and structure	47.3	8	53.3	7	100.6	7
Other osteopathies	5.5	9	6.1	11	11.6	11
Chondropathies	2.8	13	3.8	12	6.6	12
Other disorders of the musculoskeletal system and connective tissue	3.7	11	0.0	15	3.7	13
Total and Row %	2,441	36%	4,330	64%	6,771	

Diseases of the Circulatory System (ICD I00-I99)

The ICD-10 code range for Diseases of the Circulatory System I00-I99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (I00-I99), Diseases of the circulatory system, contains ICD-10 codes for Acute rheumatic fever, Chronic rheumatic heart diseases, Hypertensive diseases, Ischemic heart, Pulmonary heart disease, Cerebrovascular, Other forms of heart disease.

source: https://coder.aapc.com/icd-10-codes-range/110

Pharmaceutical expenditure to attend to diseases of the circulatory system was Taka 6,118 crore in 2020 (**Table 6**). Expenditure incurred by female, Taka 4,037 crore (66%) higher than male, Taka 2,081 crore (34%). In this group of conditions and diseases, drug expenditure relating to hypertensive diseases is also high, Taka 4,730 crore. Expenditure incurred by female, Taka 3,413 crore higher than male, Taka 1,316 crore. Drug outlays by ischemic heart disease patients amounted to Taka 897 crore – Taka 563 crore male and Taka 334 crore female.

Table 6: Pharmaceutical Expenditure for Diseases of the Circulatory System by Gender

	Male		Female		Total	
ICD-10 Description	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**
Acute rheumatic fever	8.1	9	0.1	10	8.2	9
Chronic rheumatic heart diseases	10.2	8	7.1	8	17.4	8
Hypertensive diseases	1,316.2	1	3,413.3	1	4,729.5	1
Ischemic heart disease	563.6	2	333.6	2	897.2	2
Pulmonary heart disease and diseases of pulmonary circulation	12.1	6	18.6	6	30.7	6
Other forms of heart disease	11.6	7	67.5	4	79.1	4
Cerebrovascular diseases	112.0	3	149.6	3	261.6	3
Diseases of arteries, arterioles and capillaries	14.1	5	13.9	7	28.0	7
Diseases of veins, lymphatic vessels and lymph nodes, not elsewhere classified	27.9	4	31.2	5	59.0	5
Other and unspecified disorders of the circulatory system	5.3	10	2.0	9	7.3	10
Total and Row %	2,081	34%	4,037	66%	6,118	

Diseases of the Digestive System (ICD K00-K95)

The ICD-10 code range for Diseases of the digestive system K00-K95 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (K00-K95), Diseases of oral cavity and salivary glands, contains ICD-10 codes for Diseases of esophagus, stomach and duodenum, appendix, Non-infective enteritis and colitis, Other diseases of intestines, peritoneum and retroperitoneum, Diseases of liver.

Source: https://coder.aapc.com/icd-10-codes-range/133

Pharmaceutical expenditure for diseases of the digestive system was around Taka 5,496 crore (Taka 55 billion) in 2020 of which Taka 2,358 crore (43%) were incurred for male and Taka 3,139 crore (57%) for female (**Table 7**). Diseases of esophagus, stomach and duodenum (Taka 2,255 crore), other diseases of intestines (Taka 2,158 crore), diseases of oral cavity, salivary glands, and jaws (Taka 517 crore) are three morbidities that cost households more than any other illness relating to the digestive system.

Table 7: Pharmaceutical Expenditure for Diseases of the Digestive System by Gender

	Male		Female		Total	
ICD-10 Description	**Taka Crore**	**Rank**	**Taka Crore**	**Rank**	**Taka Crore**	**Rank**
Diseases of oral cavity, salivary glands and jaws	254.2	3	262.4	3	516.6	3
Diseases of esophagus, stomach and duodenum	818.9	2	1,435.7	1	2,254.6	1
Diseases of appendix	117.9	4	135.2	4	253.2	4
Hernia	3.2	9	5.2	9	8.4	9
Non-infective enteritis and colitis	36.5	7	15.2	7	51.7	7
Other diseases of intestines	1,001.5	1	1,158.2	2	2,159.7	2
Diseases of peritoneum	0.0	10	0.3	10	0.3	10
Diseases of liver	60.5	5	66.8	5	127.2	5
Diseases of gallbladder, biliary tract and pancreas	59.1	6	52.8	6	111.8	6
Other diseases of the digestive system	6.0	8	6.8	8	12.8	8
Total and Row %	2,358	43%	3,139	57%	5,496	

Symptoms, Signs and Abnormal Clinical and Laboratory Findings, nec. (ICD R00-R99)

The ICD-10 code range for Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified R00-R99 is medical classification list by the World Health Organization (WHO).ICD-10 Code range (R00-R99), Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified, contains ICD-10 codes for Symptoms and signs involving the digestive system and abdomen, subcutaneous tissue, nervous and musculoskeletal systems, genitourinary system, cognition, perception, emotional state and behavior.

Source: https://coder.aapc.com/icd-10-codes-range/224

In 2020, Taka 3,429 crore was spent on drugs to address conditions or symptoms or signs on individuals whose clinical or laboratory findings were inconclusive. Pharmaceutical outlay on General symptoms and signs, Symptoms and signs involving the circulatory and respiratory systems, and Symptoms and signs involving the digestive system and abdomen were Taka 1,780 crore, Taka 830 crore, and Taka 349 crore respectively (**Table 8**).

Table 8: Pharmaceutical Expenditure for Symptoms, signs, and abnormal clinical and laboratory findings, not elsewhere classified

	Male		Female		Total	
ICD-10 Description	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**
Symptoms and signs involving the circulatory and respiratory systems	392.1	2	437.8	2	829.8	2
Symptoms and signs involving the digestive system and abdomen	112.8	3	236.5	3	349.2	3
Symptoms and signs involving the skin and subcutaneous tissue	16.8	7	13.9	7	30.8	7
Symptoms and signs involving the nervous and musculoskeletal systems	25.3	6	77.4	5	102.7	6
Symptoms and signs involving the urinary system	83.5	4	52.2	6	135.7	5
Symptoms and signs involving cognition, perception, emotional state and behaviour	73.6	5	98.7	4	172.3	4
Symptoms and signs involving speech and voice	1.2	11	6.7	8	7.9	8
General symptoms and signs	851.7	1	929.2	1	1780.9	1
Abnormal findings on examination of blood, without diagnosis	4.1	9	2.5	9	6.6	10
Abnormal findings on examination of urine, without diagnosis	3.0	10	1.6	10	4.6	11
Abnormal findings on examination of other body fluids, substances and tissues, without diagnosis	1.2	12	0.0	12	1.2	12
Abnormal findings on diagnostic imaging and in function studies, without diagnosis	7.0	8	0.2	11	7.2	9
Total and Row %	1572.2	46%	1856.6	54%	3428.8	

Diseases of the Respiratory System (ICD J00-J99)

The ICD-10 code range for Diseases of the respiratory system J00-J99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (J00-J99), Diseases of the respiratory system, contains ICD-10 codes for Acute upper respiratory infections, Influenza and pneumonia, Other acute lower respiratory infections, Other diseases of upper respiratory tract, Chronic lower respiratory diseases, Lung diseases due to external agents, Other respiratory diseases principally affecting the interstitium.

Source: https://coder.aapc.com/icd-10-codes-range/110

In 2020, Taka 2,971 crore was spent on pharmaceutical drugs to attend to diseases of the respiratory system, with Taka 1,537 crore on male and Taka 1,434 crore on female (**Table 9**). Drug outlay to mitigate Acute respiratory infections (Taka 1,282 crore) and Chronic lower respiratory diseases (Taka 904 crore) are higher than on other diseases of the respiratory system.

Table 9: Pharmaceutical Expenditure for Diseases of Respiratory System by Gender

	Male		Female		Total	
ICD-10 Description	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**
Acute respiratory infections	725.9	1	556.3	1	1282.2	1
Influenza and pneumonia	34.4	5	48.8	5	83.2	5
Other acute lower respiratory infections	152.0	3	127.1	4	279.1	4
Other diseases of upper respiratory tract	109.9	4	259.0	3	368.9	3
Chronic lower respiratory diseases	485.5	2	418.9	2	904.3	2
Lung diseases due to external agents	0.0	10	0.1	10	0.1	10
Other respiratory diseases principally affecting thinterstitium	4.5	8	8.4	7	12.9	8
Suppurative and necrotic conditions of lower respiratory tract	12.3	6	2.5	8	14.8	7
Other diseases of pleura	1.7	9	0.9	9	2.6	9
Other diseases of the respiratory system	10.8	7	11.9	6	22.7	6
Total and Row %	1537.0	52%	1433.8	48%	2970.8	

Diseases of the Genitourinary System (ICD N00-N99)

The ICD-10 code range for Diseases of the genitourinary system N00-N99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (N00-N99), Diseases of the genitourinary system, contains ICD-10 codes for Glomerular diseases, Renal tubulo-interstitial diseases, Acute kidney failure and chronic kidney disease, Other diseases of the urinary system, kidney.

Source: https://coder.aapc.com/icd-10-codes-range/177

Bangladeshi's affected by kidney disease or ailments relating to genital and urinary organs spent around Taka 1,974 on drugs to address their problem (**Table 10**). Female spent significantly more (Taka 1,533 crore; 78%) than their male cohorts (Taka 442 crore; 22%). Pharmaceutical expenditure relating to genitourinary system are primarily for: Non-inflammatory disorders of female genital tract (Taka 730 crore); Disorders of breast; and Selected diseases of the urinary system (Taka 489 crore).

Table 10: Pharmaceutical Expenditure for Diseases of the Genitourinary System and Connective Tissue by Gender

	Male		Female		Total	
ICD-10 Description	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**
Glomerular diseases	7.6	8	4.1	8	11.8	9
Renal tubulo-interstitial diseases	8.3	7	1.6	10	9.9	10
Renal failure	62.2	3	7.6	6	69.8	5
Urolithiasis	18.0	6	20.7	5	38.7	6
Other disorders of kidney and ureter	19.5	5	4.3	7	23.8	8
Other diseases of the urinary system	163.6	1	273.3	3	436.9	3
Diseases of male genital organs	129.7	2		11	130.0	4
Disorders of breast			489.3	2	489.4	2
Inflammatory diseases of female pelvic organs	0.5	9	29.6	4	30.1	7
Noninflammatory disorders of female genital tract	24.2	4	706.5	1	730.7	1
Other disorders of the genito-urinary system	0.0	10	3.3	9	3.3	11
Total and Row %	441.5	22%	1,532.7	78%	1,974.2	

Certain Infectious and Parasitic Diseases (ICD A00-B99)

The ICD-10 code range for Certain infectious and parasitic diseases A00-B99 is medical classification list by the World Health Organization (WHO).ICD-10 Code range (A00-B99), Certain infections and parasitic disease, contains ICD-10 codes for Intestinal infectious diseases, zoonotic bacterial diseases, Other bacterial diseases, predominantly sexual mode of transmission, Other spirochetal diseases, viral diseases, Mycoses, Protozoal diseases, Helminthiases, Pediculosis, ascariasis and other infestations, Sequelae of infectious and parasitic diseases.

Source: https://coder.aapc.com/icd-10-codes-range/177

Pharmaceutical expenditure for selected infectious and parasitic diseases was Taka 1,698 crore of which Taka 705 crore was spent on male and Taka 993 crore on female (**Table 11**). The top two type of diseases in terms of drug outlay are: Mycoses (Taka 648 crore); and Intestinal infectious diseases (Taka 381 crore). Expenditure incurred by female on drugs for infectious and parasitic illnesses is higher (58% or Taka 993 crore) than their male cohort (42% or Taka 705 crore).

Table 11: Pharmaceutical Expenditure for Certain Infectious and Parasitic Diseases by Gender

	Male		Female		Total	
ICD-10 Description	Crore Tk.	Rank	Crore Tk.	Rank	Crore Tk.	Rank
Intestinal infectious diseases	160.0	2	220.9	2	381.0	2
Tuberculosis	36.5	6	56.7	5	93.1	5
Certain zoonotic bacterial diseases	0.0	19	0.0	19	0.1	20
Other bacterial diseases	3.4	13	66.8	4	70.2	7
Infections with a predominantly sexual mode of transmission	1.8	14	16.2	11	18.0	13
Other spirochetal diseases	0.6	15	2.6	16	3.2	16
Other diseases caused by chlamydiae	0.0	20	0.9	17	0.9	17
Viral and prion infections of the central nervous system	10.7	9	13.3	12	23.9	11
Arthropod-borne viral fevers and viral hemorrhagic fevers	4.2	11	4.5	14	8.7	14
Viral infections characterized by skin and mucous membrane lesions	11.6	8	27.3	8	38.8	8
Viral hepatitis	17.2	7	4.5	15	21.7	12
Other viral diseases	67.8	3	51.0	6	118.8	4
Mycoses	276.4	1	372.0	1	648.4	1
Protozoal diseases	6.2	10	18.5	10	24.6	10
Helminthiases	3.8	12	33.3	7	37.0	9
Pediculosis, acariasis and other infestations	55.9	4	24.3	9	80.2	6
Sequelae of infectious and parasitic diseases	0.1	16	5.6	13	5.8	15
Bacterial and viral infectious agents	0.1	17	0.0	20	0.1	19
Other specified infectious agents as the cause of diseases	0.1	18	0.3	18	0.3	18
Other infectious diseases	48.6	5	74.4	3	123.0	3
Total and Row %	704.6	42%	993.2	58%	1697.8	

Endocrine, Nutritional and Metabolic Diseases (ICD E00-E89)

The ICD-10 code range for Endocrine, nutritional and metabolic diseases E00-E89 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (E00-E89), Endocrine, nutritional and metabolic diseases, contains ICD-10 codes for Disorders of thyroid gland, Diabetes mellitus, Other disorders of glucose regulation and pancreatic internal secretion, Disorders of other endocrine glands, Intraoperative complications of endocrine system, Malnutrition, Other nutritional deficiencies.

Source: https://coder.aapc.com/icd-10-codes-range/56

Pharmaceutical expenditure for Endocrine, Nutritional and Metabolic Diseases was Taka 1,502 crore in 2020 (**Table 12**). For this group of ailments, more is spent on female (Taka 960 crore) than on male (Taka 542 crore). Drug outlay to contain Diabetes mellitus (Taka 1,189 crore) is the highest for this ICD-10 chapter, followed by Disorders of thyroid gland (Taka 118 crore), and Metabolic disorders (Taka 94 crore).

Table 12: Pharmaceutical Expenditure for Endocrine, Nutritional and Metabolic Diseases by Gender

	Male		Female		Total	
ICD-10 Description	Crore Tk.	Rank	Crore Tk.	Rank	Crore Tk.	Rank
Disorders of thyroid gland	17.6	3	100.1	2	117.7	2
Diabetes mellitus	473.2	1	716.2	1	1189.4	1
Other disorders of glucose regulation and pancreatic internal secretion	1.3	7	1.8	8	3.2	8
Disorders of other endocrine glands	6.7	4	31.1	5	37.8	5
Malnutrition	3.1	6	2.3	7	5.4	7
Other nutritional deficiencies	0.3	8	15.2	6	15.5	6
Obesity and other hyperalimentation	4.1	5	34.7	4	38.9	4
Metabolic disorders	35.6	2	58.8	3	94.4	3
Total and Row %	542.0	36%	960.2	64%	1502.2	

Diseases of the Skin and Subcutaneous Tissue (ICD L00-L99)

The ICD-10 code range for Diseases of the skin and subcutaneous tissue L00-L99 is medical classification list by the World Health Organization (WHO). ICD-10 Code range (L00-L99), Diseases of the skin and subcutaneous tissue, contains ICD-10 codes for Infections of the skin and subcutaneous tissue, Bullous disorders, Dermatitis and eczema, Papulosquamous disorders, Urticaria and erythema, Radiation-related disorders of the skin and subcutaneous tissue

Source: https://coder.aapc.com/icd-10-codes-range/144

Pharmaceutical expenditure for Diseases of the Skin and Subcutaneous Tissue was Taka 1,527 crore in 2022 (**Table 13**). Within this ICD-10 category, higher amount was spent on drugs to treat Dermatitis and eczema (Taka 579 crore), Disorders of skin appendages (Taka 351 crore), and Papulosquamous disorders (Taka 224 crore).

Table 13: Pharmaceutical Expenditure for Diseases of the Skin and Subcutaneous Tissue by Gender

	Male		Female		Total	
ICD-10 Description	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**	**Crore Tk.**	**Rank**
Infections of the skin and subcutaneous tissue	104.6	3	85.6	3	190.2	4
Bullous disorders	1.1	8	5.0	7	6.1	7
Dermatitis and eczema	332.7	1	246.0	2	578.7	1
Papulosquamous disorders	150.2	2	74.2	4	224.4	3
Urticaria and erythema	35.4	6	27.9	6	63.3	6
Radiation-related disorders of the skin and subcutaneous tissue	1.6	7	0.0	8	1.6	8
Disorders of skin appendages	100.7	4	250.4	1	351.1	2
Other disorders of the skin and subcutaneous tissue	54.9	5	56.4	5	111.2	5
Total and Row %	781.1	51%	745.5	49%	1526.6	

Mental, Behavioral and Neurodevelopmental Disorders (ICD F01-F99)

The ICD-10 code range for Mental, Behavioral and Neurodevelopmental disorders F01-F99 is medical classification list by the World Health Organization (WHO).ICD-10 Code range (F01-F99), Mental, Behavioral and Neurodevelopmental disorders, contains ICD-10 codes for Mental disorders due to known physiological conditions, Mental and behavioral disorders due to psychoactive substance use, Schizophrenia, schizotypal, delusional, and other non-mood psychotic disorders, Mood [affective] disorders, Anxiety, dissociative, stress-related, somatoform and other nonpsychotic mental disorders.

Source: https://coder.aapc.com/icd-10-codes-range/67

In 2020, Taka 1,298 crore was spent on drugs to treat Mental, Behavioral and Neurodevelopmental Disorders (**Table 14**). The outlay on male and female patients were almost equal. Drug expenditure on: Neurotic, stress-related and somatoform disorders (Taka 518 crore); Schizophrenia, schizotypal and delusional disorders (Taka 240 crore), and Mood [affective] disorders (Taka 200 crore) were the highest for this group of conditions and illness.

Table 14: Pharmaceutical Expenditure for Mental, Behavioral and Neurodevelopmental Disorders by Gender

	Male		Female		Total	
ICD-10 Description	Crore Tk.	Rank	Crore Tk.	Rank	Crore Tk.	Rank
Organic, including symptomatic, mental disorders	33.7	5	84.8	3	118.5	5
Mental and behavioural disorders due to psychoactive substance use	1.5	8	2.4	7	3.8	8
Schizophrenia, schizotypal and delusional disorders	165.5	2	74.1	4	239.6	2
Mood [affective] disorders	105.1	4	94.4	2	199.5	3
Neurotic, stress-related and somatoform disorders	204.7	1	313.4	1	518.1	1
Behavioural syndromes associated with psychological disturbances and physical factors	128.3	3	35.6	6	163.9	4
Disorders of adult personality and behaviour	0.0	11	1.8	9	1.8	11
Mental retardation	7.4	6	1.4	10	8.8	7
Disorders of psychological development	2.2	7	0.8	11	3.0	9
Behavioural and emotional disorders with onset usually occurring in childhood and adolescence	0.9	9	38.0	5	38.9	6
Unspecified mental disorder	0.2	10	2.0	8	2.2	10
Total and Row %	649.4	50%	648.5	50%	1298.0	

IV. CONCLUSIONS AND POLICY IMPLICATIONS

This study presents pharmaceutical expenditure estimates for Bangladesh for the year 2020. It is the first attempt to estimate total expenditure on pharmaceuticals that provides a breakdown of drugs sold by retail drug stores, and by healthcare facilities. Pharmaceutical expenditure incurred at healthcare facilities are reported as a component of inpatient and outpatient care; only medicine sold in the open market, primarily by retail drug outlets represent as pharmaceutical expenditure as guided by the System of Health Accounts 2011 edition (SHA2011). This study isolates and reports outlays of medicine used in hospitals and outpatient centers – which has not been done hitherto. In addition, the study reallocates total pharmaceutical expenditures by diseases and gender.

ICD-10 aggregates diseases and conditions into 22 chapters. Accordingly, for Bangladesh for the year 2020, TPE expenditure has been disaggregated across the 22-defined ICD-10 categories or chapters. This report is inclusive of those identical 22 categories and their sub-categories.

In 2020, according to Bangladesh National Health Accounts (BNHA), Total Health Expenditure (THE) was Taka 777 billion. Total Pharmaceutical Expenditure (TPE) in 2020 was Taka 388.9 billion (Taka 38,897 crore), which was 54% of CHE. Households finance an overwhelming 94% (Taka 365 billion or Taka 36,507 crore) of TPE while the government's share is 5.6% (Taka 21.95 billion or Taka 2,195 crore), and that of development partners 0.4% (Taka 1.49 billion or Taka 149 crore), and NGOs 0.1% (Taka 460 million or Taka 46.1 crore)

Pharmaceutical expenditure on female is higher 61% (Taka 23,581 crore) than on their male cohorts (Taka 15,103 crore; 39%) – Table 3. The three highest spending categories for pharmaceuticals are "Diseases of the musculoskeletal system and connective tissue" at Taka 6,772 crore, "Diseases of the circulatory system" at Taka 6,125 crore, and "Diseases of the digestive system" at Taka 5,497 crore. In these categories, government spending constitutes Taka 132 crore (2%), Taka 189 crore (3.1%), and Taka 205 crore (3.7%), respectively. Combined, these three chapters' share of total pharmaceutical expenditure is 47.5% (Taka 18,385 crore).

An analysis of the government's relative contribution across all 22 ICD-10 categories reveal that the government considerably support pharmaceutical provision for neoplasms (42%) and the treatment of external causes of morbidity and mortality (40%). However, these two disease categories account for only 1.5% of the total pharmaceutical spending in 2020.

Policy Recommendations

Increase Government Health Sector Financing

Public health expenditure in Bangladesh health sector is lower than most of its south Asian neighbors. It is around 0.50% of Gross Domestic product (GDP), and approximately 6% of the total government budget. A 2% increase in budget allocation is advocated for the health sector. For prioritizing the use of additional resources, the broader objective should be to support healthcare services targeting the poor. Providing them greater availability, affordability, and accessibility of primary healthcare services, including pharmaceutical drugs should be arranged. Studies on benefit incidence analysis of healthcare in Bangladesh shows an overall pro-rich distribution of healthcare benefits where healthcare benefits offered by the private sector providers favor the richer socioeconomic groups.

Increasing the national health budget has become more imperative as recent COVID 19 and Dengue epidemics have demonstrated that contingency funds should be available to mitigate such national level health needs and challenges. The adverse effects of climate change arguably are contributing to an increase in the incidence of varied non-communicable diseases, leading to greater health spending in general and expenditure on pharmaceutical drugs in particular.

Reduce Expenditure on Drugs for Households

Out-of-pocket (OOP) expenditure is a payment made by households directly to providers in obtaining healthcare goods and services. Bangladesh is one of those countries with extremely high rate of OOP health expenditure. In 2020, households OOP health expenditure was Taka 532 billion which is 69% of Total Health Expenditure (THE). According to the Global Spending on Health, “In general, when a health care system relies largely on OOP payment to finance its’ services, more households face catastrophic spending.”

Under the Sustainable Development Goal (SDG) 3, “Good Health and Well-Being,” monitoring framework, out-of-pocket payments as a share of total household consumption exceeding 10% (lower threshold) or 25% (upper threshold) is considered as catastrophic.

To reduce household burden on drug expenditure the following steps are recommended:

- In addition to offering selected drugs free of charge at public facilities, a limited number of medicine can be prescribed by the attending physician and made available at a subsidized rate. This would reduce OOP for households. A model whereby such subsidized medicine is made available to the targeted patients and not leaked out of the system because of mismanagement and corruption can be designed and pilot tested before scaling up the effort.

- In a latter section of this report, preventive care for the top three diseases are discussed. The awareness creation, which includes informed decision on drug intake and life style habits, is generally applicable to most illnesses. Such investment at the household and government level can yield long term benefits in health outcomes, and lower financial burden on drug procurement or purchase. Such effort is not limited to the Ministry of Health but other

ministries needs to involved, including NGOs, media, and the civil society. For example, harmful use of pesticides, factories or motorized vehicles emitting toxic fumes, varied economic, social, and household level activities that are detrimental to health and environment should continue to be addressed individually and collectively by the different entities.

- The state-owned pharmaceutical company, Essential Drugs Company Limited (EDCL) produce selected medicine primarily catering to government health facilities. Production constraint is the likely cause for the very limited variety and quantity that they can supply to those health centers. Investing in increased production capacity of EDCL would reduce the reliance on more expensive drug procurement from the private sector producers and distributors. It is suggested that the Ministry of Health and Family Welfare (MOHFW) study the best practices from other countries (regional and global) regarding allocation and distribution of medicines

- Without a doctor's prescription, the purchase and sale of antibiotics or similar medicines pose a serious threat to the patient's health. There should be stricter government monitoring of the buying and selling of these medicines. Establish mechanism whereby it becomes obligatory for the retail drug outlets to dispense medicine only against prescriptions other than those which are considered as over-the-counter (OTC) medicine. The prevalence of overuse or abuse of expensive antibiotics is widespread. Aside from the prescription requirement suggested, other interventions (including awareness programme) needs to be designed and implemented.

- Public-private partnerships should be explored to design, finance, and implement health education campaigns that promote responsible medication use, prevention of diseases, and lifestyle modifications to reduce the need for pharmaceutical interventions. By promoting rationale use of drugs by both the public and private sector would contribute towards appropriate drug use considering efficacy, safety and suitability for the patients and cost consideration.

Prescription for Reduction of Pharmaceutical Expenditure of Three Diseases: An Illustration

This report reveals that the highest drug outlay addresses the following three diseases or conditions: (i) Diseases of the musculoskeletal system and connective tissue; (ii) Diseases of the circulatory system; and (iii) Diseases of the digestive system. Their collective share of Total Pharmaceutical Expenditure (TPE) is 48%. A few policy suggestions are offered below for each of the three illnesses, with the objective of a more rational and informed use of drugs that can be pursued leading to better health outcomes and a reduction in its consumption and expenditure.

Diseases of the Musculoskeletal System and Connective Tissue

Examples of the Diseases of the Musculoskeletal System and Connective Tissue include: lupus, rheumatoid arthritis, marfan syndrome, and polymyositis. The disease of musculoskeletal system and connective tissue disorder is linked with family genetics but can also be caused by exposure to toxic chemicals, such as those found in air pollution and cigarette smoke or inadequate

nutrition, including lack of vitamins C and D. Preventive measures for exposure to toxins as well as eating healthy and nutrition food that meet the needs for vitamin and nutrient can reduce the number of patients for this disease. Work place, especially in the manufacturing and the informal business sector, the physical demands of working long, laborious hours can be taxing on their bodies, contributing towards an array of musculoskeletal (e.g. joints, shoulder) temporary or chronic pain and morbidity.

Diseases of the Circulatory System

Circulatory system diseases are any conditions that affects the heart or blood vessels. Diseases under this category includes: acute rheumatic fever; chronic rheumatic heart diseases; hypertensive diseases; ischemic heart diseases, blood pressure conditions, and high cholesterol. The government, community, and families can play an active role in the prevention or mitigating of this category of illness.

The government can use it fiscal, regulatory and public awareness programme tools to bring greater awareness and improved practices relating to diet and exercise at the household and community level. Adult members of families, educational institutions, and employers at the workplace can restrict use of Social Media Apps (e.g. Facebook, Tik Tok) and encourage spending time outdoors that involve physical and recreational activities, and socialization with friends, family, neighbours.

Government's proactive role in drug pricing, quality control supervision, and overseeing sale of drugs (through prescription) for cardiovascular illnesses is essential both for safety, appropriate use, and also on equity grounds. The poor, disadvantaged, and less informed heart patients are more vulnerable to ineffective, expensive use of heart-related drugs.

Diseases of the Digestive System

Diseases of the gastrointestinal tract are referred to as digestive system disorders. Examples of the diseases of the digestive system include: Vomiting Syndrome, Diarrhea, Food Poisoning, Gallstones, Gas. Bacterial infections, bad eating habits, wrong diet, lack of exercise, and emotional stress are some of the important causes of these disorders. Bangladesh's access to safe drinking water is no longer a problem. Self-prescription, seeking immediate remedial relief are a few reasons for the high use of anti-acid, anti-flatulence and anti-ulcer drugs. The propensity to consume high doses of antibiotics, leading to drug-resistant phenomena coupled with increased OOP from households is a worrisome phenomenon.

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