ESTIMATING PHARMACEUTICAL EXPENDITURE USING THE SYSTEM OF HEALTH ACCOUNTS 2011 FRAMEWORK

OCTOBER 2023

DRAFT RESOURCE

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ACRONYMS

ARV	Antiretroviral
ATC	Anatomic Therapeutic Chemical
CAMEG	National Supply Center for Essential Generic Drugs
DIS	Disease Name/Condition
EPHMRA	European Pharmaceutical Market Research Association
HC	Health Care Function
FP	Factors of Provision
FS	Funding Source
HMIS	Health Management Information Systems
INN	International Non-Proprietary Name
LHSS	Local Health System Sustainability Project
LMIC	Low- and Middle-Income Country
MSH	Management Sciences for Health
MTaPS	Medicines, Technologies, and Pharmaceutical Services Program
NGO	Nongovernmental Organization
OECD	Organization for Economic Cooperation and Development
OOP	Out-of-Pocket
PE	Pharmaceutical Expenditure
SHA 2011	System of Health Accounts 2011
TPE	Total Pharmaceutical Expenditure
USAID	United States Agency for International Development
WHO	World Health Organization

EXECUTIVE SUMMARY

Expenditure on pharmaceuticals constitutes a large proportion of expenditure on health, representing 5 percent to 50 percent of total health expenditure in low- and middle-income countries (WHO 2022). Access to accurate pharmaceutical expenditure (PE) data, and knowing how to use these data, are necessary to inform government decision-making on issues such as resource allocation and strategic purchasing. However, detailed PE data are often left out of expenditure estimates.

The objective of this resource is to document a practical approach that countries can use to track PE using the System of Health Accounts (SHA) 2011 framework (OECD, Eurostat and WHO 2017). In doing so, the document will mainly discuss the use of the classification FP.3.2.1 *Pharmaceuticals* to estimate expenditure specifically on pharmaceutical commodities used in the process of provision of health care. It also aims to increase the capacity of stakeholders to use PE data for decision-making by suggesting indicators that can be developed using PE data, and the types of policy questions those indicators can inform. This resource contributes to efforts by the World Health Organization to develop global guidance on tracking of PE.

For the purposes of this resource and in alignment with the SHA 2011 framework, the term *pharmaceuticals* refers to medicines, vaccines, and other medicinal products, and does not include medical devices or non-durable medical goods. The resource first presents context on the importance of financing for pharmaceuticals and the related importance of accurate PE estimates, discusses conceptual issues around tracking PE using a Health Accounts framework, and provides guidance for producing and then using PE estimates. The key steps for conducting PE tracking, around which the fourth section of this resource is organized, are:

- ✓ STEP 1: Planning and preparation
- ✓ STEP 2: Identifying data sources and collecting PE data
- ✓ STEP 3: Compiling and organizing PE data
- ✓ STEP 4: Mapping PE data to the SHA 2011 dimensions
- ✓ STEP 5: Analyzing and presenting PE data for decision makers

BACKGROUND AND OBJECTIVE OF THIS RESOURCE

OVERVIEW AND OBJECTIVE

Expenditure on pharmaceuticals constitutes a large proportion of expenditure on health, representing 5 percent to 50 percent of total health expenditure in low- and middle-income countries (LMICs) (WHO 2022). Access to accurate pharmaceutical expenditure (PE) data, and knowing how to use these data, are necessary to inform government, donor, and partner decisions such as those on resource allocation and strategic purchasing. However, detailed PE data are often omitted from expenditure estimates.

Though expenditure on pharmaceuticals is included in the health expenditure estimates generated using the System of Health Accounts (SHA) 2011, it is generally aggregated with service costs and is not specifically designated as expenditure on pharmaceuticals. While there is a specific reporting item, HC.RI.1, to capture total PE, LMICs do not generally estimate and use it. These countries tend to capture a subset of PE via categories under the HC.5.1 *Pharmaceuticals and other non-durable medical goods* classification or using the FP.3.2.1 *Pharmaceuticals* sub-category. They often lack capacity to collect, analyze, and use comprehensive PE data to inform decision-making.

Though some guidelines on improving the accuracy of expenditure on pharmaceuticals exist, such as guidance from the Organization for Economic Cooperation and Development (OECD) on measuring expenditure on over-the-counter drugs and OECD's more recent guidance on improving pharmaceutical data in hospitals and health care settings, detailed and comprehensive guidance on how to specifically collect PE data, what type of information to collect, and how to analyze and map that data in the LMIC context does not exist (Roubal, Astolfi, and Morgan 2012; Morgan and Xiang 2022). Furthermore, the absence of explicitly reported total pharmaceutical expenditure (TPE), despite the clearly significant proportion of health budgets allocated to pharmaceuticals, particularly as countries expand health coverage, indicates that efforts are needed to promote production and use of accurate estimates of expenditure on pharmaceuticals.

The objective of this resource is to document a practical approach that countries can use to track PE using the SHA 2011 framework. Though this resource includes guidance on how to map PE data to disease classifications, which is often a priority for decision makers, even countries that do not include the disease classification in their Health Accounts estimation can use the approach to increase the accuracy of their estimates of PE, disaggregated by other key classifications that are policy relevant, such as financing scheme or provider.

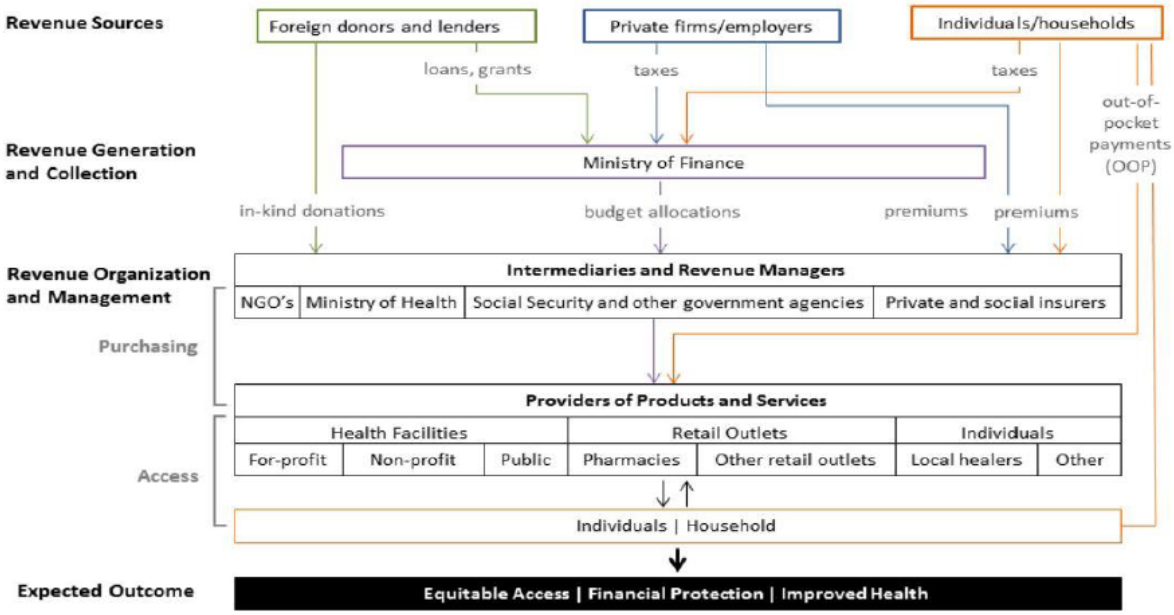
This document also aims to increase the capacity of stakeholders to apply the PE data to decision-making. The Lancet Commission on Essential Medicines Policies recommends that governments and national health systems dedicate resources to strengthening their capacity to accurately track prepaid and out-of-pocket (OOP) PEs in the public and private sectors and among significant key populations (Wirtz et al. 2017). This resource builds on previous efforts to help LMICs improve their tracking of PE, and will contribute to broader efforts to develop global guidance on PE tracking by the Health Accounts team at the World Health Organization (WHO) (Eghan et al. 2017; Morgan and Xiang 2022). This will help inform decisions related to the mobilization and allocation of pharmaceutical resources and better enable policymakers to formulate necessary policies for financing pharmaceuticals as a key strategy for achieving country health system goals. Improved PE tracking can also help countries monitor the implementation of policy decisions, such as to provide particular groups of medicines free of charge, or to change a pharmacy benefit package.

This guidance was developed based on exploratory work conducted in Benin, Burkina Faso, Indonesia, and Vietnam.[1] Given this limited number of countries, the guidance may not be universally reflective of all country's specific context for pharmaceutical financing. However, the general approach can be adapted to different country contexts. As the guidance is applied in additional contexts, the experiences of different countries can inform revisions of this resource.

IMPORTANCE OF FINANCING FOR PHARMACEUTICALS

A system for pharmaceutical financing involves all the people, structures, and functions necessary to provide, collect, and manage funds to purchase and use desired pharmaceuticals and services (MSH 2013). The key functions of a system for financing pharmaceuticals include revenue generation, pooling, and allocation of resources for strategic purchasing of medical products and services for therapeutic interventions (see the general pharmaceutical financing framework in Figure 1).

Figure 1: Pharmaceutical financing framework



Source: MSH 2013

In LMICs, access to pharmaceuticals is often challenged by inadequate funding, inefficient redistribution or pooling, and inequitable resource allocation. To optimize the use of limited resources, policymakers need to understand issues such as where financial resources for pharmaceuticals come from and whether those sources are sustainable (i.e., who pays for pharmaceuticals), whether pharmaceutical resources are being used to achieve maximum results (e.g., by looking at how much is spent relative to different populations and other countries), whether resources are allocated to maximize results (e.g., by understanding where resources go), and what type and quality of pharmaceuticals or pharmaceutical services are purchased and whom they benefit. Policymakers and health managers in LMICs often struggle to determine how much of their health expenditure is enough to allocate to pharmaceuticals,

[1] These countries were chosen based on practical considerations such as access to data or having an ongoing Health Accounts estimation, as well as for having differing pharmaceutical system contexts.

what appropriate expenditure per capita on pharmaceuticals should be, and how much PE should come from risk-pooling mechanisms versus household OOP expenses.

All of these questions can be informed by PE data together with other contextually relevant secondary data. For example, WHO's *World Health Report 2010* highlighted several additional reasons why governments and policymakers should understand the financing of pharmaceuticals. The report noted that pharmaceuticals account for 3 of the 10 leading causes of health system inefficiencies: underuse or overpricing of generic drugs; use of substandard or counterfeit drugs; and inappropriate and ineffective drug use (WHO 2012). Still other sources point out that goals of pharmaceutical policy are undermined by institutional corruption, resulting from improper financial incentives or dependency (Rodwin 2013). In this context, policymakers and budget holders need to know, among other things, how resources flow to different therapeutic classes of pharmaceuticals and which classes correspond to the largest expenditures.

There are technical, operational, human resource, and political constraints to institutionalizing a system to accurately track and use PE data for decision-making in LMICs. Health Accounts teams or steering committees do not generally include pharmacists and other health personnel who understand the intricacies of pharmaceutical sector policies, procurement, distribution, and use. **Lack of evidence from detailed PE analysis encourages the continuation of historical budgeting and opens up decisions on allocation of pharmaceutical resources to the influence of politics and individual preferences—and not to equity and need.** Promoting the use of more accurate PE data could positively disrupt policy and the status quo, as it may redefine the dynamics and provide more robust evidence for pharmaceutical decision-making.

PHARMACEUTICAL SYSTEM WORKING DEFINITIONS

WHAT CONSTITUTES PHARMACEUTICALS?

A commonly accepted definition of pharmaceuticals is "Any substance for human use that is intended to modify or explore biological, physiological systems or pathological states for the benefit of the recipient" (WHO 2007). Globally, different organizations use different terminology to refer to these products. The WHO definition of pharmaceuticals does not include medical devices, which the Global Harmonization Task Force (2012) defines as "any article, instrument, apparatus or machine that is used in the prevention, diagnosis or treatment of illness or disease or for detecting, measuring, restoring, correcting, or modifying the structure or function of the body for some health purpose." Typically, the purpose of a medical device is not achieved by pharmacological, immunological, or metabolic means (GHTF 2012).

In the SHA 2011 manual, the most comprehensive definition of "pharmaceuticals" appears under the classification HC.5.1 *Pharmaceuticals and other non-durable medical goods,* which groups pharmaceuticals together with non-durable medical goods: "…pharmaceutical products and non-durable medical goods intended for use in the diagnosis, cure, mitigation or treatment of disease. This includes medicinal preparations, branded and generic medicines, patent medicines, serums and vaccines, and oral contraceptives. Fluids required for dialysis, as well as gases used in health care, such as oxygen, should also be included when the patient or relatives purchase them directly" (OECD, Eurostat, and WHO 2017).

Given that international definitions of pharmaceuticals do not include medical devices, and that the boundaries of TPE described in the SHA 2011 manual (see page 10 for discussion of HC.RI.1) also excludes medical devices and goods, **this resource focuses only on**

expenditures on pharmaceuticals[2] (medicines, vaccines, medicinal products); it does not address inclusion of non-durable medical goods and devices such as syringes, bandages, and contraceptive devices in Health Accounts estimations. That said, country teams that wish to include medical goods and devices in their estimates can do so, and map them appropriately (for example, to FP.3.2.2 *Other health care goods*); in some cases, costs of medical goods (e.g., kits) may be included by default in PE, if their costs are bundled with those of certain pharmaceuticals.

CATEGORIES OF PHARMACEUTICALS

Pharmaceuticals can be categorized in several different ways, such as by disease condition (e.g., arthritis, hypertension, diabetes, or malaria) or by the therapeutic class of the pharmaceutical. Therapeutic class refers to a set of medications and other compounds that have similar structures, the same mechanism of action, or a related mode of action, and/or are used to treat the same diseases. As described in more detail later in this document, categorizing pharmaceuticals according to their therapeutic class can facilitate mapping to disease conditions in the SHA 2011 framework. Pharmaceuticals can also be characterized as generic or branded, and classified by whether or not they are on a country's essential medicines list, or are prescribed or obtainable over the counter (Laing et al. 2003).

DEFINITIONS OF KEY TERMINOLOGY

Table 1: Key terminology for pharmaceutical expenditure tracking

Term	Definition
Pharmaceuticals	In this resource, the term pharmaceuticals refers to medicines, vaccines, and other medicinal products, and does not include medical devices or non-durable medical goods.
HC.RI.1 Total Pharmaceutical Expenditure (TPE)	Reporting item created in the SHA 2011 framework for countries who wish to track total pharmaceutical expenditure, which captures all expenditure related to pharmaceuticals– regardless of the path of consumption.
FP.3.2.1 Pharmaceuticals	Factor of provision sub-category specifically for pharmaceutical commodities, which are defined in the SHA 2011 manual as "any chemical compound used in the diagnosis, treatment or prevention of a disease or other abnormal condition."
HC.5.1.1 Prescribed medicines + HC.5.1.2 over-the-counter drugs	Two functional sub-categories which together include all consumption of pharmaceuticals where the function and mode of provision is not specified. Includes pharmaceuticals that are purchased at a pharmacy or retail outlet but are generally not used during a visit[3].
SHA 2011 classifications	The SHA 2011 manual (OECD, Eurostat and WHO 2017) provides detailed information about the classifications used in the SHA 2011 framework. A glossary with simplified definitions can be found in *Understanding Health Accounts* (Cogswell and Dereje 2015).

CURRENT STATE OF PE TRACKING IN SHA 2011

WHICH SHA 2011 CLASSIFICATIONS CAN TRACK PE?

As shown in Figure 2, the SHA 2011 framework contains three categories that can capture total or partial PE.

[2] Traditional medicines, although used in many countries, are not included/addressed in this resource.

[3] Experts are currently in discussion on whether to include drugs purchased in pharmacies/retail outlets and then brought to a doctor to be used during treatment under the treatment function (HC.1, HC.2 etc) or whether it should be included under HC.5.1.1/HC.5.1.2 which is for pharmaceuticals that are not specified by function.

Figure 2: SHA 2011 categories that can capture partial or total PE

HC.RI.1 Total pharmaceutical expenditure (TPE)	FP.3.2.1 Pharmaceuticals	HC.5.1.1 + HC.5.1.2 Prescribed medicines + over-the-counter drugs
Reporting item created for countries who wish to track **TPE**, though examples of its use in LMIC contexts are very limited and with unclear purpose. Captures all expenditure related to pharmaceuticals (regardless of the path of consumption (also intermediate consumption). Also includes expenditure on processes related to pharmaceutical management in the medical facility and taxes. **Most comprehensive estimate of pharmaceutical expenditure**	Factor of provision sub-category specifically for **pharmaceutical commodities**, which are defined in the SHA 2011 manual as "any chemical compound used in the diagnosis, treatment or prevention of a disease or other abnormal condition." Includes expenditure on the actual pharmaceutical products but not other costs associated with pharmaceutical management and taxes (includes only the cost of the products but not the cost of the complementary distribution/usage services). **Comprehensive estimate of pharmaceutical commodities but not other associated costs**	The two functional sub-categories combined include all consumption of pharmaceuticals where the function and mode of provision is not specified. Includes pharmaceuticals that are purchased at a pharmacy or retail outlet but are generally not used during a curative or preventive visit. Generally excludes pharmaceuticals mapped to other functional categories, such as those consumed in hospitals and health care settings, and pharmaceuticals such as vaccines and contraceptives mapped to HC.6 *Preventive care* **Not a comprehensive estimate of pharmaceutical expenditure, since includes expenditure at retail outlets only**

To measure TPE, it is important to understand that consumption of pharmaceuticals may follow different paths. The functional classifications HC.5.1.1 *Prescribed medicines* and HC.5.1.2 *Over-the-counter drugs* account for purchase of pharmaceuticals (with unspecified function) by consumers in retail pharmacies, drugstores, supermarkets, internet, and so forth. As such, these classifications capture only PEs made outside of medical settings/services, and thus the sum of HC.5.1.1+HC.5.1.2 does not represent TPE. They do not capture the intermediate consumption of pharmaceuticals provided during patient care (HC.1 *Curative care*, HC.2 *Rehabilitative care*, HC.3 *Long-term care, HC.4 Ancillary services,* and HC.6 *Preventive care*), since, in alignment with the SHA 2011 framework, these costs are captured according to their specific function. Thus, TPE must be obtained by adding all these HC classifications: the explicitly reported PEs that are final consumption (HC.5.1.1 + HC.5.1.2) and the intermediate pharmaceutical consumption that occurs during patient care (HC.1, HC.2, HC.3, HC.4, HC.6) including expenditure on labor and other costs related to that. In the SHA framework, this is reported under the classification HC.RI.1 *Total pharmaceutical expenditure*.

Countries using HC.RI.1 to estimate TPE may use different approaches to determine intermediate consumption for pharmaceuticals. A recent OECD document shares four general approaches and their associated data sources for estimating PE in hospital and health care settings (Morgan and Xiang 2022). The most practical approach involves using the factors of provision (FP) classification that tracks all inputs (labor, materials, services, etc.) used to provide health care goods and services under various categories. FP.3 *Materials and services used* consists of the total value of goods and services to provide health care. The FP.3 classification has several sub-categories: one is the FP.3.2 *Health care goods,* which is further broken down to FP.3.2.1 *Pharmaceuticals*. This lower-level sub-category allows countries to accurately track the cost of pharmaceutical inputs by capturing expenditures related to final consumption (as mapped to HC.5.1.1+HC.5.1.2) and intermediate consumption (mapped to other functions). This sub-category was created specifically due to the policy importance of spending on pharmaceuticals (OECD, Eurostat and WHO 2017, pg. 217). Like HC.RI.1, FP.3.2.1 captures PE regardless of the mode of provision but is usually limited to the cost of the commodities. So, in theory, all pharmaceutical commodity expenditures, regardless of which function (HC) they fall under, should be captured under FP.3.2.1.

Notably, as mentioned earlier, the estimate for FP.3.2.1 will only include expenditure related to final consumption of pharmaceutical commodities and not expenditure on other costs related to pharmaceutical management (e.g., human resources and other costs for regulatory oversight and supply chain management or taxes), though this will depend on the data source and how the expenditure values are estimated. Costs related to governance, central purchasing of pharmaceuticals, and so forth are classified under health system governance and administration (HC.7). Also, as with other expenditure estimates, this one should include only pharmaceuticals consumed within the estimation period, and not pharmaceuticals acquired to increase stocks and stored for future use, or those that are exported or destroyed (OECD, Eurostat and WHO 2017).

This resource will mainly discuss the use of the classification FP.3.2.1 *Pharmaceuticals* to estimate expenditure on pharmaceutical commodities. Use of this classification will automatically include pharmaceuticals classified under HC.5.1.1 and HC.5.1.2, as well as, for example, vaccines and contraceptives classified under HC.6 *Preventive care*, but it will not include other costs that could be included in an estimate of TPE (HC.RI.1), such as processes related to pharmaceutical management in the medical facility and other maintenance expenditures and taxes in pharmacies.[4]

BRIEF SUMMARY OF DESK REVIEW OF HEALTH ACCOUNTS REPORTS

A review of 38 country and state SHA 2011 Health Accounts reports[5] published between 2012 and 2019 was done to inform the development of this resource (LHSS 2020). The review aimed to understand gaps in measuring and reporting PE data. It focused on determining whether countries produced or reported a PE estimate and, if so, which classifications they used to reach the estimate. It found that countries did not explicitly report comprehensive TPE estimates. A category for pharmaceutical inputs (FP.3.2.1), when used in the Health Accounts estimation, included mainly household expenditure at pharmacies and not expenditures on pharmaceuticals by governments or donors.

As discussed in the previous section, estimates of TPE can be produced using the Health Accounts category HC.RI.1 *Total pharmaceutical expenditure* reporting item. A possible proxy for expenditure on pharmaceutical commodities is under the FP classification, where the FP.3.2.1 *Pharmaceuticals* sub-category includes, in theory, all pharmaceutical commodities. (These two classifications are explained below; the latter includes only the cost of pharmaceutical products and not the associated indirect costs.) At the minimum, countries can report expenditure of pharmaceuticals captured via retail pharmacies or other outlets, in HC.5.1.1 and HC.5.1.2.

Of the 36 countries and states analyzed for this desk review, none used the reporting item HC.RI.1 to track TPE. While most countries do have estimates for HC.5.1.1 + HC.5.1.2, this value is not (and should not be) described as an estimate of TPE, since it generally only

[4] Readers interested in learning more about pharmaceutical management functions can consult Managing Drug Supply (MDS)-3: Managing Access to Medicines and Health Technologies. https://msh.org/resources/mds-3-managing-access-to-medicines-and-health-technologies/

[5] Countries and states were Bangladesh, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Republic of Congo, Cote d'Ivoire, DRC, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guyana, India (Haryana State), Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Nigeria (Lagos state), Nigeria (Rivers state), Nigeria, Niger, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Sudan, Tanzania, Togo, Trinidad and Tobago, Uganda, Vietnam, Zambia, and Zimbabwe.

includes expenditure on pharmaceuticals that is consumed outside of health care settings/services, e.g., retail pharmacies or other outlets. Only two-thirds of countries analyzed used the FP classification in their Health Accounts estimation, and just under half of the countries/states reporting their expenditure by FP were able to disaggregate the data enough to report on PE (FP.3.2.1). But again, the FP.3.2.1 expenditures came primarily from household expenditure (FS.RI.1.3 *Households*), and not PE by governments or donors and were overestimated because household expenditure on pharmaceuticals include indirect costs in pharmacies such as labor and maintenance, and perhaps even services expenditure. The household estimates were likely derived from household surveys on OOP expenditure and did not have adequate detail for mapping to disease conditions. Therefore, overall, the reports reviewed did not present comprehensive estimates (or proxies) for FP.3.2.1 and TPE. When estimates for FP.3.2.1 were calculated as a percentage of current health expenditure, PE estimates tended to fall below one-third of current health expenditure, likely because only retail purchases of pharmaceuticals were reported (and not consumption through other pathways).

The absence of a reported value for TPE may be because there is a lack of demand for the data, a lack of understanding of its potential usefulness or a process to analyze and use it, and/or recognition that a TPE estimate derived from retail pharmacies only would be incomplete and therefore not worth citing. Regardless of the cause, **the absence of explicitly-reported TPE, despite the clearly substantial proportion of health budgets allocated to pharmaceuticals, particularly as countries expand health coverage, indicates that efforts are needed to promote production and use of accurate estimates of expenditure on pharmaceuticals**.

NEED FOR PRACTICAL GUIDANCE ON TRACKING PE TO PRODUCE MORE ACCURATE ESTIMATES

Through the desk review and authors' experience in conducting Health Accounts exercises, several areas were identified where countries may benefit from clear, practical guidance to promote increased accuracy of PE estimates. This resource provides that practical guidance, specifically clarification around which SHA 2011 classifications can be used to estimate PE, how to identify data sources and collect PE data to arrive at an estimate of pharmaceutical expenditure with increased accuracy, how to handle large volumes of complex PE data from varying sources, how to map them to SHA classifications, and importantly, how to analyze and present the data to inform policy and program decisions.

CONCEPTUAL ISSUES IN TRACKING PHARMACEUTICAL EXPENDITURE IN THE SHA 2011 FRAMEWORK

BOUNDARIES OF PE AND SUGGESTED MEASUREMENT PROXIES

A Health Accounts exercise that tracks PE should align with the SHA 2011 boundaries for TPE, as defined for HC.RI.1 *Total pharmaceutical expenditure* (see earlier section on which SHA 2011 classifications can capture pharmaceutical spending). As has been noted, this guidance focuses on expenditure on pharmaceutical commodities (FP.3.2.1) and does not include pharmaceuticals-related costs, such as pharmaceutical management at health facilities, regulation and selection of medicines, or system-level procurement and distribution, that are captured under different factors of provision such as staff salaries. However, in some cases, TPE may include the costs of procurement and distribution, for example, when the price of pharmaceuticals sold at pharmacies reflects these costs. Future efforts to improve the accuracy of PE data should determine which 'management' costs should be captured in TPE, and how. Further, the quality of pharmaceuticals is also not reflected in the expenditure data or addressed here, though is recognized as a major concern, particularly where procurement practices prioritize lowest-cost items regardless of quality standards, as countries strive to achieve health coverage targets.

With respect to time boundaries for PE, Health Accounts guidance indicates that expenditure on imports should be recorded when a service is delivered. Whether or not this is possible depends on the source that is used for PE data; obtaining near real-time data on consumption may not be possible, especially where procurement or distribution data are used. However, as per the SHA 2011 manual, goods such as medicines to be stored for future use should not be included in a current expenditure account.

LINKING PE TRACKING TO SHA 2011 FRAMEWORK AND CLASSIFICATIONS

CUSTOMIZING THE SHA 2011 FRAMEWORK TO TRACK PE

When preparing to track PE, a Health Accounts team will need to determine the best way to customize the exercise. This typically entails selecting which SHA 2011 classifications to include, re-naming them to reflect the country's health financing landscape, and/or creating sub-categories for the level of data disaggregation. Table 2 presents considerations for customizing a Health Accounts study that tracks PE. When determining the level of customization, Health Accounts teams should consider the level of detail that will be available in the pharmaceutical data and the level of disaggregation of the results that will be necessary to describe the pharmaceutical financing landscape and to answer key policy questions.

Table 2: Customizing SHA 2011 classifications to track PE

SHA 2011 classification	Classification name	Customization considerations for pharmaceuticals
FP	Factors of provision	Customize with sub-category under FP.3.2.1 to capture relevant therapeutic classes (e.g., antimalarials, anti-hypertensives, ARVs)
DIS	Disease/health condition	Customize DIS categories according to prevalent disease conditions that the Health Accounts team wants to capture
n/a	Branded versus generic	Add a new classification, to differentiate branded versus generic medicines (or any other categorization that is policy relevant)

Note: ARV=antiretroviral, DIS=disease name/condition

To track PE and facilitate mapping to disease condition, the Health Accounts team could add additional sub-categories for the FP.3.2.1 category according to a therapeutic classification, as described in more detail in the next section of this document. These sub-categories should align with the therapeutic classes of the various pharmaceuticals used in-country. The Anatomical Therapeutic Chemical (ATC) classification system has 94 groupings at ATC level 2, all of which could, in theory, be added under FP.3.2.1. Other classification systems also exist, such as the European Pharmaceutical Market Research Association or unique country-developed systems); the team should work with the system that their country already uses (EPHMRA N.d.). See italicized FP.3.2.1 sub-categories below for examples that are currently used in the Health Accounts Production Tool. These sub-categories can be further detailed by inserting additional categories, such as all vaccines by name under FP.3.2.1.4. Depending on the choice of sub-classifications under FP.3.2.1, some pharmaceuticals may fall into more than one group (or no group at all) and would require distribution keys or mapping to FP.3.2.1.n.e.c.

- FP.3 Materials and services used
  - FP.3.1 Health care services
  - FP.3.2 Health care goods
    - *FP.3.2.1 Pharmaceuticals*
      - *FP.3.2.1.1.ARV*
      - *FP.3.2.1.2 Tuberculosis drugs*
      - *FP.3.2.1.3 Antimalarial medicines*
        - *FP.3.2.1.3.1 ACT*
        - *FP.3.2.1.3.1 Other antimalarial medicines*
      - *FP.3.2.1.4 Vaccines*
      - *FP.3.2.1.5 Contraceptives*
      - *FP.3.2.1.n.e.c. Other pharmaceuticals (not elsewhere classified)*
    - FP.3.2.2 Other health care goods
      - FP.3.2.2.5 Condoms
      - FP.3.2.2.6 Intrauterine devices (IUDs)
  - FP.3.3 Non-health care services
  - FP.3.4 Non-health care goods

Depending on policy priorities, Health Accounts teams can also consider adding a completely new classification to categorize expenditure on pharmaceuticals—for example, to specify whether a pharmaceutical is on the country's essential medicines list or not, or whether it is generic or branded. Some countries may wish to distinguish between pharmaceuticals that are imported versus manufactured locally. If the data will be collected and compiled in Excel or a similar software, the team may also consider including fields in the spreadsheet that can be analyzed within the spreadsheet and do not necessarily need to be incorporated into the Health Accounts mapping.

DISEASE-SPECIFIC PE TRACKING

ATC CLASSIFICATION SYSTEM FOR MAPPING TO DISEASE CONDITIONS

To facilitate mapping of PE data to SHA 2011 disease conditions, pharmaceuticals can be assigned to their respective therapeutic classes, since these classes can generally be linked to SHA 2011 disease conditions. As mentioned earlier, this document provides an overview of the

use of the ATC system in tracking pharmaceutical expenditure, but countries can use whichever classification system suits their needs or is already in use in their pharmaceutical system.

The ATC system, developed and managed by the WHO Collaborating Center for Drug Statistics Methodology, has 14 main (first-level) anatomical or pharmacological classifications, as shown in Table 3. A second level of the code describes the pharmacological or therapeutic sub-class, while the third and fourth levels describe the chemical, pharmacological, or therapeutic sub-class of each. Using the ATC code as a reference for each pharmaceutical can help the team identify the therapeutic class, which will indicate the associated disease condition for which the pharmaceutical is used. The therapeutic class assigned to a pharmaceutical for disease mapping generally requires ATC level 2 (or in some cases level 3) and will vary by pharmaceutical type. An example of selected pharmaceuticals and therapeutic classifications (based on the exploratory study in Burkina Faso) can be seen in the accompanying example from the Burkina Faso database in Table A-1 in Annex A.

The complete classification of the anti-diabetic metformin illustrates the structure of the code:

Table 3: First level of ATC classification codes (WHO Center for Drug Statistics and Methodology)

Level	Main Classification	
A	Alimentary tract and metabolism	
B	Blood and blood forming organs	
C	Cardiovascular system	
D	Dermatologicals	
G	Genitourinary system and sex hormones	
H	Systemic hormonal preparations, contraceptives	
J	Anti-infectives for systemic use	
L	Antineoplastic and immunomodulating agents	
M	Musculo-skeletal system	
N	Nervous system	
P	Antiparasitic products	
R	Respiratory system	
S	Sensory organs	
V	Various	
A	Alimentary tract and metabolism	(1st level anatomical main class)
A10	Drugs used in diabetes	(2nd level therapeutic sub-class)
A10B	Blood glucose-lowering drugs	(3rd level pharmacological sub-class)
A10BA	Biguanides	(4th level chemical sub-class)
A10BA02	Metformin	(5th level chemical substance)

Thus, in the ATC system, all plain metformin preparations are given the code A10BA02. For the purpose of mapping PE data to disease condition, the second-level (drugs used in diabetes) would be a sufficient level to designate as the therapeutic class, unless a specific policy consideration requires comparing expenditure on different types of pharmaceuticals used in diabetes, which would require the use of a higher-level sub-class. The mapping of therapeutic groups (generally similar to ATC level 2) to disease derived from the Burkina Faso pilot is presented in Table A-2 in Annex A.

Challenges of using ATC or other classification system

Teams should note that some pharmaceuticals, depending on their formulation or strength or indication, can fall into multiple ATC groups, in which case it might make sense to keep them

separate from the groupings or to understand use in the country context to determine how it should be mapped to disease condition. Some pharmaceuticals are also more easily mapped directly to disease, as discussed later, in the section on mapping to disease condition. Some ATC groupings are used for multiple disease conditions, which will require discussion and analysis by a pharmacist together with the Health Accounts team to determine how to distribute the spending. In some cases, if a type of pharmaceutical such as anti-inflammatory medicines or antibiotics is used in the treatment of so many disease conditions that its distribution across diseases becomes prohibitive, the team may choose to map to unspecified disease (DIS.n.e.c.).

LIMITATIONS IN TRACKING PE DATA

There are some possible limitations to the proposed overall approach to tracking PE, some related to the approach itself and others to assumptions that must be made.

- **Estimating consumption**. PE data may be obtained from data sources that reflect expenditure on pharmaceuticals procured or distributed in the given year (but not *consumed* in that year). In such cases, the PE estimate may not accurately reflect PE in the timeframe specified for the Health Accounts estimation. Such discrepancies may be minimized as countries roll out universal health coverage programs and third-party payers demand more detailed data for reimbursement of pharmaceuticals. A stock analysis (if data are available) can also provide insight into actual consumption within a given timeframe.
- **Adjusting expenditure for markups.** As discussed in Step 2A, expenditure values may need to be adjusted to account for markups in the valuation of the pharmaceutical. While these margins are highly regulated and standardized in some countries, like Burkina Faso, in other countries the margins might vary, and this may introduce uncertainty into the estimations. Furthermore, if costs for pharmaceutical commodities reflect markups that cover costs for salaries or services which cannot be separated, this will result in an overestimation of expenditure on pharmaceutical commodities.
- **Estimating associated pharmaceutical management costs**. The methodology described above focuses on the costs of pharmaceutical commodities, and does not address how to include costs of pharmaceutical management, taxes etc. Therefore, the estimate of expenditure under FP.3.2.1 will not be TPE, as some pharmaceutical-related costs will be missing.
- **Making assumptions for mapping**. Mapping pharmaceuticals to specific health functions, providers, and disease conditions can require several assumptions that should be considered carefully, with input from a pharmaceutical expert, to minimize distortion of results.
    - Some pharmaceuticals have very specific uses, for example ARVs for HIV treatment or injectable contraceptives for family planning. For pharmaceuticals that are used for a variety of health issues, such as non-steroidal anti-inflammatories, mapping to Health Accounts classifications will require the use of assumptions related to standard treatment guidelines (to identify the variety of disease conditions to map to) and to burden of disease (to determine how much expenditure to apportion to each disease condition) to develop keys that distribute the expenditure across diseases. For such pharmaceuticals, distribution by disease will be an estimate with potential for some error.

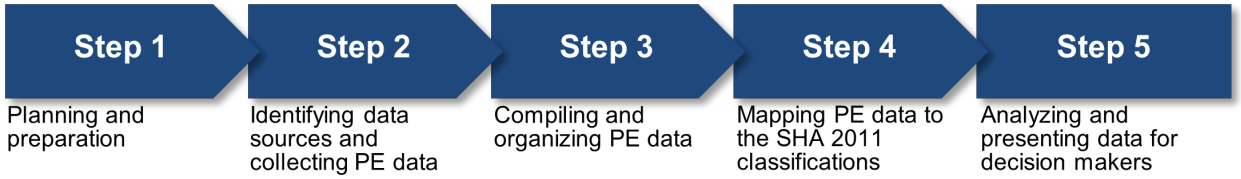
- Mapping to function can present challenges if PE data are obtained from specific providers. For example, where hospitals provide both inpatient and outpatient care, it is difficult to distinguish which pharmaceuticals a hospital uses for which type of care.

The approach outlined in this resource captures only the 'formal' market and not the informal ways in which people obtain pharmaceuticals. Furthermore, PE tracking will generally not compile or present information on quality of pharmaceuticals. Similarly, reduced OOP expenditure on pharmaceuticals, while considered a positive outcome in relation to financial risk protection, may not reflect a positive outcome for health if the pharmaceuticals are not used appropriately.

STEP-BY-STEP PROCESS FOR COLLECTING AND ANALYZING PHARMACEUTICAL EXPENDITURE DATA

This section gives step-by-step guidance on how to identify data sources, collect and organize the PE data using a 'bottom-up' approach, and map the data to SHA 2011 classifications. These steps were developed based on piloting of an early version of this resource, and should generally be adaptable to a variety of country contexts (LHSS 2021).

Figure 3: Steps for collecting and analyzing pharmaceutical expenditure data



STEP 1: PLANNING AND PREPARATION

The first step for Health Accounts teams should be to understand pharmaceutical policy priorities and advocate to stakeholders the benefit of using the SHA 2011 framework to help inform these policy priorities. An understanding of pharmaceutical policy priorities will help determine a feasible approach for the PE tracking exercise.

The approach for tracking PE described in this resource is a 'bottom-up' approach to data collection, which is generally needed to collect and analyze detailed PE data that can lead to more accurate estimates. Using this approach will require making assumptions for mapping expenditure to provider, function, and/or disease condition, based on standard treatment guidelines or the national formulary.

While mapping to these classifications can prove useful for policymakers, the assumptions required to map detailed expenditure (for a variety of medicines and formulations) to these classifications could introduce some inaccuracy in the estimates. An alternative 'top-down' approach to expenditure data collection could use aggregate spending estimates for PE (such as those obtained from government budgets or from a household survey), and would also distribute spending according to assumptions, often using "distribution keys." Assumptions required to map top-down aggregate PE data obtained from a government budget may be based, for example, on service utilization information, and will be different from assumptions needed for mapping more detailed bottom-up data. Depending on policy priorities and resources available, teams may choose to use a combination of a top-down and bottom-up approach; for example, top-down for some data sources (such as a line item for PE in a government budget) and bottom-up for others (such as for detailed expenditure on government-procured pharmaceuticals that can be obtained from a central medical store).

Tracking PE using a bottom-up approach can require considerable effort and specialized pharmaceutical expertise. Countries should carefully consider the pros and cons for collecting and mapping bottom-up data to different classifications by looking at the policy relevance and demand for the data (Is it needed to inform pharmaceutical policy priorities?) and the resources required to map the data (Do we have the necessary time and expertise? Is there an appetite for allocating additional resources to the Health Accounts team?). For example, in a context where resources for Health Accounts are limited and policy priorities are related to resource mobilization, the team can collect less detailed PE data (top-down, for example), and map it only to the health financing classifications such as financing source, agent, and scheme, to get

more accurate estimates of pharmaceutical expenditure disaggregated by financing classifications. If policy priorities are related to resource allocation, for example, and indicate a need for PE data disaggregated by disease condition, teams should ensure the availability of the necessary resources and expertise required to collect more detailed PE data and to map the data to the disease classification.

Table 4, below, summarizes, for different policy priorities, the classifications that can be mapped, and the pros and cons related to effort and expertise required to map the PE when using the bottom-up approach to data collection. This table can be used as a basis for discussion between policymakers and Health Accounts team leads to determine what type of PE tracking is appropriate. Further discussion of these considerations is provided below the table, along with discussion on stakeholder buy-in and political will for tracking PE.

Table 4: Summary of pros and cons for different policy priorities and levels of classification of PE data

Country Policy Priorities (also see Table 7)	Health Accounts Classifications to Map PE Data to Address Policy Priorities	Overall Pros/Cons Related to Resources, Expertise and Policy Priorities	Additional Details on Resources and Expertise Required	
			Level of Effort: Type of Data and Mapping Required	Pharmaceutical Expertise Required
Resource mobilization Sources of finance and health coverage	'A' Financing classifications (Financing source, Financing agent, Financing scheme) + Provision classification (Factors of provision) (together referred to below as 'A')	**Pros**: Overall accurate estimate of TPE and financing classifications, with manageable levels of effort. **Cons**: Lack of detail to compare spending at different levels of health system, by function, or across different disease conditions. Further spending analysis not possible without more detailed data collection.	Least level of resources required by team: Minimal detail in data collection (only total PE from each data source – e.g., government, health insurance, donor) Mapping is straightforward and should not require assumptions or distribution keys	Understanding of flow of pharmaceuticals in health system, to identify data sources and collect data within boundaries of estimation.
Resource mobilization Sources of finance and health coverage Resource allocation Equity Financial protection	A + Provider + Function	**Pros**: Expenditure estimates can provide data to inform additional policy areas; detailed PE data allows for further spending analysis (80:20 analysis, branded vs generic, etc; see Table 7). **Cons**: Resources required may be prohibitive, and assumptions for mapping PE may lead to some inaccuracy in estimates by function and provider.	Medium level of resources required by team: Need full detail in data collection (see parameters in Table 5) Mapping of provider/function will likely require broad assumptions and distribution keys.	Understanding flow of pharmaceuticals + standard treatment guidelines and national formulary (to determine how to map specific pharmaceuticals to provider and function).

Country Policy Priorities (also see Table 7)	Health Accounts Classifications to Map PE Data to Address Policy Priorities	Overall Pros/Cons Related to Resources, Expertise and Policy Priorities	Additional Details on Resources and Expertise Required	
			Level of Effort: Type of Data and Mapping Required	Pharmaceutical Expertise Required
Resource mobilization Sources of finance and health coverage Resource allocation Equity Financial protection Efficiency of spending Priority-setting	A + Provider + Function + Disease condition	**Pros**: Expenditure tracks the entire fund flow of health spending, Expenditure estimates can provide data to inform additional policy areas; detailed PE data allows for further spending analysis (80:20, branded vs generic, etc.; see Table 7). **Cons**: Resources required may be prohibitive, and assumptions for mapping PE may lead to some inaccuracy in estimates by disease; may necessitate mapping substantial pharmaceutical expenditure to unspecified disease condition (DIS.n.e.c.).	Maximum level of resources required by team: Need full detail in data collection (see variables in Table 5) Mapping of provider, function and disease will require extensive assumptions and distribution keys.	Understanding flow of pharmaceuticals + standard treatment guidelines and national formulary (to determine how to map pharmaceuticals to provider, function, and disease).

Policy priorities. *What are the priority policy issues related to pharmaceutical financing? Will the PE data that the team is planning to collect help inform these policy issues for decision makers? If not, is it worth the effort?* PE tracking does not need to be an automatic component of the Health Accounts estimation each year. Rather, the decision on whether to conduct PE as part of the Health Accounts estimation should be driven by a request from stakeholders because, for example, a pharmaceutical policy-related issue has come to the fore and policymakers need evidence to make a decision. Understanding, for example, policymakers' interest in issues such as sustainability, equity, benefit package design, and so forth will help the team determine which classifications are essential in the final PE estimates, and this will inform their approach to data collection and mapping. Step 5 in this resource has more detailed information on policy questions and related indicators that PE data can help inform.

Resources. *Does the team have the time and resources needed to compile and analyze the PE data?* The level of effort to collect the data can be several days, or more if data needs to be collected from different regions and data sources in the country. Once collected, the time required for cleaning, compiling, and analyzing the data will depend on the number of rows of data and the classifications to which the team wishes to map the data (see Table 4). Teams should note that after the first year of tracking PE, the level of effort may be reduced, since the team will already have identified data sources, and, if it is mapping to disease conditions, will have linked, for example, ATC groupings to SHA 2011 disease conditions. The team could also use the ATC classification issued by the European Pharmaceutical Market Research Association (EPHMRA) to link disease to SHA 2011 disease condition. For teams not planning to map to disease conditions, the level of effort will be considerably less, since this is often the most time-intensive part of the mapping.

- In Burkina Faso, the process of data compilation and analysis, including application of distribution keys, was repetitive, time consuming, and required a high level of proficiency in Excel. Data from all sources in Burkina Faso filled more than 120,000 rows in Excel (prior to removing double-counted expenditures). Mapping of data sources and data collection took approximately 30 days, while data organization and mapping to SHA 2011 classifications (including disease condition) took 40–50 days.

- In Indonesia, the total number of rows of PE data was in the millions and required manipulation using Stata, which allowed the team to incorporate the detailed PE data.

Expertise. *Does the Health Accounts team have someone with the pharmaceutical expertise needed to collect, compile, and analyze the data?* To identify the appropriate data sources, the team will need, either as a member or an external consultant, an expert who understands the health system, pharmaceutical system, and pharmaceutical financing flows. For mapping to provider, function and disease condition, the expertise of a pharmacist who is familiar with the country's standard treatment guidelines and national formulary, and who understands how and where different medicines are used, will also be critical for mapping the data.

Stakeholder Buy-In and Political Will. *Does the team have the ability to access the necessary data, given political and other constraints to accessing what may be sensitive data?* Given the possible sensitivity of PE data, and the resources that may be required to conduct PE tracking, teams should also consider the importance of stakeholder buy-in. Data on PE can be difficult to access due to its volume and complexity and to its politically sensitive nature. When there is strong demand for PE data, it is sensible to identify champions within the government who can facilitate data collection. In addition, a Health Accounts team member who has networks with key actors in the pharmaceutical system can help identify data sources and facilitate access to the data. Even with pharmaceutical expertise and networks on the team, the team may face challenges related to the interest and incentives of the actors involved. To minimize such disruption, the team should hold an initial workshop to orient all stakeholders to the exercise, answer their questions, and obtain buy-in at the start. As part of this workshop, the team should clarify in detail the type of data that will be requested from the various agencies and departments (such as the agency that manages the social health insurance scheme and the drug administration that regulates pharmaceuticals). The stakeholder meeting can also be an opportunity for the Health Accounts team to map pharmaceutical sector stakeholders. The Health Accounts team lead or other senior officials may need to facilitate the data collection effort through engagement with the various stakeholders, particularly those that may be hesitant to share data.

Once teams have completed this first step, they will have a clear direction for the PE tracking exercise: which policy priorities the data can inform, which classifications are needed to inform these priorities, the pharmaceutical expertise the team requires, and the resources needed to collect and map the data.

STEP 2: IDENTIFYING DATA SOURCES AND COLLECTING PE DATA

Step 2 walks the Health Accounts team through how to map the pharmaceutical supply chain, how to identify and select appropriate data sources, and how to collect detailed data on PE.

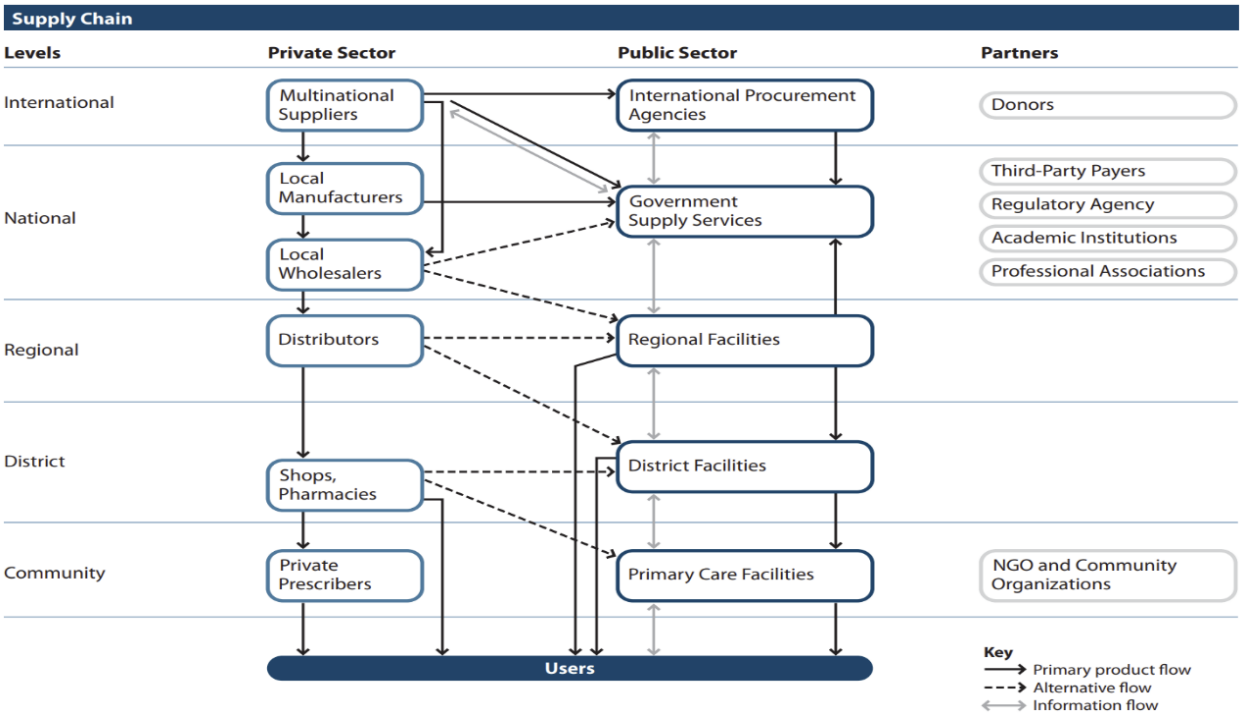
STEP 2A: MAPPING THE PHARMACEUTICAL SUPPLY CHAIN FLOW IN-COUNTRY

Understanding the pharmaceutical supply chain. To develop an understanding of the pharmaceutical system and therefore build a framework for collecting data on PE, teams should first identify an existing graphic or document that describes the flow of pharmaceuticals in-country (a graphic similar to the one depicted in Figure 4 generally already exists in a country's pharmaceutical strategy or similar document), and then use this as a guide to identify the potential pharmaceutical data sources from the government, donors, and private sector. Together with an understanding of the financial flows for pharmaceuticals (Figure 1) the team can identify secondary data sources for PE data. The graphic in Figure 4 does not explicitly mention financing schemes, such as insurance schemes, but such a scheme would fall under 'third-party payers.' The data sources can be documented in a simplified table format or a more in-depth report describing all the players, the data sources, the units, regulation around the data, and data accessibility. Data sources identified in Indonesia are described in Box 1.

Box 1. Data Sources in Indonesia

In Indonesia, the Health Accounts team conducted a landscaping study to map pharmaceutical expenditure data sources prior to the pharmaceutical expenditure data collection. This data source mapping was conducted through interviews and workshops with key stakeholders such as the Directorate General of Pharmacy and Medical Devices, the National Food and Drug Agency (Badan Pengawas Obat dan Makanan; BPOM), the Ministry of Industries, the National Population and Family Planning Agency (Badan Kependudukan dan Keluarga Berencana Nasional; BKKBN), the Government Procurement Policy Agency (Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah; LKPP), the National Health Insurance Agency (BPJS-Kesehatan), IQVIA, the Association of Indonesian Pharmaceutical Entrepreneurs (Gabungan Pengusaha Farmasi Indonesia; GPFI), the International Pharmaceutical Manufacturers Group (IPMG) and the Association of Medical Equipment and Laboratory Companies (Gakeslab).

Figure 4: Illustrative example of the general flow of pharmaceuticals in the public and private sector



Source: MSH 2012

As an example, Burkina Faso imports almost all of its pharmaceuticals (around 99 percent). The supply of pharmaceuticals is provided to the population by both the public and private sectors. The public supply system in Burkina Faso is mainly organized around the National Supply Center for Essential Generic Drugs (CAMEG), which is overseen by, but autonomous from, the Ministry of Health. The private sector supply is provided by private wholesalers. The private supply chain relies on private wholesale distributors who supply private health facilities and pharmaceutical dispensaries which, in turn, supply private drug stores. The overall system has three levels:

- The central level, characterized by CAMEG, private wholesalers, and a few central departments.
- These correspond to the international procurement agencies, government supply services, and private wholesalers in Figure 4.
- The regional level, represented by the regional agencies of CAMEG, private wholesalers, and regional directorates of health.
- These correspond to regional distributors and regional facilities in Figure 4.
- The peripheral level, represented by: i) district distribution depots and pharmaceutical dispensaries; ii) hospital depots as well as non-governmental organizations (NGOs) and associations; iii) public depots of generic essential drugs, depots of approved and non-approved health facilities, community-based health worker kits, and private warehouses.
- These correspond to private prescribers and primary care facilities in Figure 4.

Based on how the pharmaceutical system is organized, data sources selected for Burkina Faso included i) import data obtained from the National Medicines Regulatory Authority (NMRA)/Agence Nationale de Regulatory Pharmaceutique (for pharmaceuticals consumed via private sector outlets); ii) data from the Ministry of Health (for pharmaceuticals consumed via government health programs such as the HIV/AIDS and tuberculosis programs); and iii) data from CAMEG for pharmaceuticals consumed via public hospitals and district pharmacies.

In Vietnam, the team analyzed the financing flow of pharmaceuticals in the public sector, rather than mapping the flow of all products. The exploration identified two main financing schemes—the social health insurance scheme, which is managed by Vietnam Social Security, and provision of pharmaceuticals free of charge through national target programs. Given the magnitude of data in the social health insurance scheme alone, the team decided to focus on public sector expenditure only, and to include private sector data in future years.

Comparing potential data sources

There are advantages and disadvantages to each data source that may facilitate or hinder data collection and organization, and which may affect the accuracy of the final estimate. These are summarized in Table 5. This table can guide the team in determining final data sources, with the overarching aim that the sources selected cover all PE in the country.

Table 5: Advantages and disadvantages of data sources for PE

Type of data source	Advantages	Disadvantages
Import data	• Few suppliers • Centralized data • Data already organized with key variables (Table 6) • Possibility of a single data source (e.g., pharmaceutical regulatory authority or customs/excise unit) • Comprehensive data and the possibility for Health Accounts teams to have access to the same information each year	• Not actual consumption data • Stock problems (sometimes used over several years) • Data may not contain all needed variables to identify provider, disease, etc. • Cannot differentiate residents' versus non-residents' consumption • Depending on regulations, calculating markups may be complicated
Local manufacturers	• Few suppliers • Complements import data	• Private and economically sensitive data • Still far from actual use (may need adjustment for final consumption)
Donations from NGOs and donors	• May only cover specific diseases and classes of drugs • May only cover specific populations (refugees)	• Difficult to access • Possible double counting between NGOs, donors, and government • Difficulty in costing in-kind donations
Wholesalers or distributors at regional or district level (for public or private pharmacies)	• Data closer to actual consumption than import data, though will include non-residents • Relatively few suppliers • Possibility of separating data by health sector/disease or by health program	• Private and sensitive data • Still far from actual use (margin adjustment for the final consumption)
Hospital and primary health care facility (public) pharmacies and private pharmacies	• Data closer to actual consumption • Possibility of separating data by health sector/disease or by health program • Distribution by financing source, scheme, service, and provider more likely	• Public and private data sources may be mixed • Lots of suppliers • Private pharmacists not willing to share their data • Various data storage systems • Time consuming to collect private pharmacies' data • May not reflect resident consumption

Type of data source	Advantages	Disadvantages
Health insurance scheme data	• Data close to actual use • Can have data on reimbursement but also share of OOP • Data on patients and providers available • Data by sector and by group of population • Usually resident consumption • Data available by provider, services and disease	• Not always available • Private insurance unlikely to share data • Large volume of data • Possible double counting with private and public PE data
National drug procurement unit (public sector)	• Strong source of public sector expenditure data	• Still far from actual use, may need adjustment for final consumption • Does not include private sector data

Adjusting secondary data to account for price markups

To facilitate efficient data collection, secondary data from importers and wholesalers may be the best choice. However, since Health Accounts estimations focus on expenditure related to final consumption, the estimates must be adjusted to account for markups along the supply chain using approved or recommended historical or current markup estimates.

In the case of Burkina Faso, the various markups for pharmacies and sales to end-consumers were applied to estimate the final consumption figure on pharmaceuticals sold at pharmacies. For example, to estimate final prices of public sector pharmaceuticals to consumers, district distribution depots apply an average markup of 7.5 percent. In the public sector, these markups are regulated by official documents from the Ministry of Health. For the private sector, wholesalers apply an average of 16 percent markup to private pharmacies and private pharmacies apply an average resale markup of 32 percent to end consumers.

While these markups are highly regulated and standardized in some countries like Burkina Faso, in other country contexts the markups might vary. A pharmaceutical expert can advise the team on how to estimate these markups and apply them to the expenditure data.

STEP 2B: COLLECT PE DATA USING KEY VARIABLES

Data collection should include variables that describe the characteristics of the pharmaceuticals (such as dosage, form, pack size, and price), as well as variables to estimate the volume of consumption. Table 6 shows key PE variables that should be collected from the identified secondary data sources. These are standard variables that are generally available in documentation of PE. Some of these variables are essential for assigning a pharmaceutical to its therapeutic class (and therefore to disease condition) and to the other classifications; others are details that can be retained in the database but may not be necessary for mapping the data to Health Accounts classifications. For example, a pharmaceutical for which the route of administration is intravenous may suggest the medicine is administered in the context of a health care visit, while the formulation can sometimes provide indication of the disease condition for which a medicine is used.

Teams can add to this table as needed; for example, listing additional parameters such as generic versus branded medicines. Note that Table 6 does not include variables that would provide information on provider or financing scheme, as such information is generally not part of expenditure information on pharmaceuticals. Information on provider or financing scheme is

often linked to nature of the data source, or may need to be deduced from other country information (such as the essential medicines list or national formulary).

Table 6: Key variables needed for PE data collection

Type of variable	Variables
Variables that characterize pharmaceuticals	International Non-proprietary Name (INN)
	Dosage
	Packaging size
	Package size unit
	Dosage form
	Route of administration
	Amount of each basic active ingredient
	Dosage unit of measure
	Unit of measure for the amount of basic ingredient (to indicate the concentration in a liquid)
	WHO ATC* code at the substance level (ATC5 level)
	Total price or price per unit
Variables used to estimate consumption	Total number of packages or units consumed during the year (or a proxy** for consumption)

** In the absence of WHO ATC code, WHO-defined daily dose can be used to estimate consumption.*
*** Ideally, PE data will reflect actual consumption of pharmaceuticals in a given timeframe. Obtaining data on consumption may not be possible, especially when secondary data sources are used, in which case the closest proxy measures that are feasible to collect should be used.*

STEP 2C: TRIANGULATE THE DATA

The term triangulation refers to the practice of using multiple sources of data or multiple approaches to estimate and analyze the data to enhance the credibility of the TPE estimate. Triangulation aligns multiple perspectives and leads to a more comprehensive understanding of the PE flow in the health system. Health Accounts practitioners are encouraged to work with the pharmacist on the team to evaluate the quality of all data sources and triangulate the data as much as possible.

In Burkina Faso, for public expenditure on pharmaceuticals at government pharmacies, the team compared data from district pharmacies and the regional medical stores to triangulate information on government pharmaceutical spending. In Indonesia, IQVIA data was a secondary data source for triangulation of private sector PE.

STEP 3: COMPILING AND ORGANIZING PE DATA

Once data are collected, to facilitate straightforward data mapping and coding, data should be organized into a standardized structure that includes key variables (such as INN, dosage, therapeutic class, and expenditure) as well as columns to include SHA classifications/descriptions, any needed adjustment values, and so forth. This is best done in a flat-file database—one that has records (expenditures) stored in rows, and entries for each of the fields in the columns. All PE data should be organized into the same format (with the same fields for each entry).

FORMATTING AND ORGANIZING/COMPILING PE DATA

The PE data formatting and organization should generally keep as many variables as possible from the original data set, to facilitate mapping. Table 7 shows a list of fields that should be included as part of the PE data compiling and mapping process, along with the type (for purposes of formatting the Excel sheet) and description of the data. The fields include those for Health Accounts classification (number as well as description), fields describing data source, detailed information about the pharmaceutical, and fields for multipliers (designated as ''adjustment') that can be used as needed (for distribution keys, for example, or for a markup of the expenditure amount).[6] Additional fields (such as age or gender) can be included if data are available. The compilation of PE data in this database may in itself be a valuable source of information, and can be sorted and analyzed in a variety of ways, even before SHA 2011 classifications are added in.

Table 7: Fields recommended for compiling of PE data

Code	Abbrev.	Type	Description
SOURCE1	SOURCE1	alpha	Identification of the information source for the data (health program, private pharmacy, government pharmacy)
NUMBER	NUMBER	alpha	Serial number of the entry, simply signifying the identification assigned to it
Drug Class	CLASS	alpha	Therapeutic classification based on ATC level 2 or 3 (or whichever classification team decides to use); can also be blank if mapping pharmaceutical straight to disease
Designation / INN	INN	alpha	Designation refers to international nonproprietary name
Year	FY	alpha	Year refers to the years covered by the Health Accounts estimation
SOURCE2	SOURCE2	alpha	Identification of the unit from which data were collected
Source YEAR	YEAR	alpha	Calendar year for which the data in the entry are available at source and used for producing Health Accounts
Initial value	VI	numeric	Original value of the expenditure in the entry in national monetary terms or other currency
Adjustment 1	AD1	numeric	This number is a multiplier, whose default setting is 1. Can be used for markups or to adjust for final consumption
Adjustment 2	AD2	numeric	This number is a multiplier, whose default setting is 1. Can be used for markups or to adjust for final consumption
Adjustment 3	AD3	numeric	This number is a multiplier, whose default setting is 1. Can be used for markups or to adjust for final consumption
Final Value	VF	numeric	Final value of the expenditure in the entry in national currency
SHA2011-FS	FS	number	Adopted classification for financing sources
SHA2011-FSRI	FSRI	number	Adopted classification for institutional units providing revenues to financing schemes
SHA2011-HF	HF	number	Adopted classification for financing schemes
SHA2011-FA	FA	number	Adopted classification for financing agents
SHA2011-HP	HP	number	Adopted classification of health care providers
SHA2011-HC	HC	number	Adopted classification of health care functions
SHA2011-FP	FP	number	Adopted classification of factor of provision
SHA2011-DIS	DIS	number	Adopted classification of disease condition
Health regions	HR	alpha	Health (or administrative) regions (also called sub-national level or SNL)

[6] The details of valuation of pharmaceuticals are not addressed in this report but can be found in the MDS-3.

Code	Abbrev.	Type	Description
ACTIVE	ACTIVE	number	Active or inactive entry: indicates whether or not the amount will be taken into account when producing the Health Accounts tables (use for double counting)
FS-Name	FS-N	alpha	Entry of the description of the FS code. For example, if the FS code is "112," corresponding FS-N will be "Regional and municipal government revenue"
FSRI-Name	FSRI-N	alpha	Entry of the description of the FS.RI code.
HF-Name	HF-N	alpha	Entry of the description of the HF code
FA-Name	FA-N	alpha	Entry of the description of the FA code
HP-Name	HP-N	alpha	Entry of the description of the HP code
HC-Name	HC-N	alpha	Entry of the description of the HC code
DIS-Name	DIS-N	alpha	Entry of the description of the DIS code
FP-Name	FP-N	alpha	Entry of the description of the FP code
FS-Agr	FS-Agr	alpha	Entry of the description from higher level of the international classification
FSRI-Agr	FSRI-Agr	alpha	Entry of the description from higher level of the international classification
HF-Agr	HF-Agr	alpha	Entry of the description from higher level of the international classification.
FA-Agr	FA-Agr	alpha	Entry of the description from higher level of the international classification
HP-Agr	HP-Agr	alpha	Entry of the description from higher level of the international classification
HC-Agr	HC-Agr	alpha	Entry of the description from higher level of the international classification
DIS-Agr	DIS-Agr	alpha	Entry of the description from higher level of the international classification
FP-Agr	FP-Agr	alpha	Entry of the description from higher level of the international classification

ANALYZING FACTORS OUTSIDE OF THE SHA 2011 FRAMEWORK

The SHA 2011 framework includes classifications related to financing, consumption, and provision of health goods and services. As mentioned earlier, additional customized classifications that are not part of the SHA 2011 framework may be useful for decision-making related to financing of pharmaceuticals.

For example, comparing expenditure on pharmaceuticals, depending on whether they are on a country's essential medicines list and/or referenced in standard treatment guidelines, may provide insight into the level of adherence to national medicines policies. In such cases, the additional variables should be considered during data collection, and these additional classifications can be added as additional columns in the data collection template. When data are fully mapped using software such as Microsoft Excel, expenditure amounts can then be disaggregated according to these additional classifications.

Which additional details are useful for decision-making will vary for different countries, based on their policy priorities. For example, in countries that wish to increase efficiency of spending by using generic medicines, a breakdown of spending by generic versus branded pharmaceuticals may be useful.

APPROACH FOR COMPILING DATA INTO STANDARD FORMAT

The Health Accounts team should compile the PE data collected from different sources separately (or somehow keep track of the source for each set of data, such as by having one table/sheet for each data source), as the data source itself will be critical information for mapping certain classifications (such as those on financing). Through an iterative process, the team should organize the data into an Excel table including information for the first eight fields from Table 7. For the countries where this approach was tested, the team used MS Excel to organize the data and for data analysis. Due to the large volume of data in Indonesia, the team used Stata for the data analysis.

Organizing the data according to the fields in Table 7 should follow these general steps:

- Ensure that information for the first eight fields (*SOURCE1* through *Initial Value*) is in the database.
- Clean the data. Check for double entries, combine rows where information is identical and expenditure can be summed, convert branded medicines to the INN.
- Determine what kinds of adjustments to the data are needed and add multipliers in the 'Adjustments' rows. This may be a markup for private sector data, or a multiplier that adjusts the total value to be closer to actual consumption.
- *(If mapping to disease condition)* Complete the field *Drug Class* to designate the therapeutic class for each pharmaceutical. This field should be completed using the guidance on ATC classifications in the earlier 'ATC Classification' section of this resource, or whatever system is used in-country.

STEP 4: MAPPING PE DATA TO THE SHA 2011 DIMENSIONS

INCORPORATING AND MAPPING PE DATA – BY CLASSIFICATION

Mapping the SHA 2011 classifications related to financing (financing schemes and financing agents, and their revenues) for data on pharmaceuticals should follow general SHA 2011 guidance for mapping financing flows. Typically, the data sources and associated financing flows can be used to guide the mapping for classifications HF, FA, FS, and FS.RI. Data may be mapped differently depending on the data source. For example, expenditure data obtained from a regulatory agency that is associated with household OOP expenditure in private pharmacies would be mapped as Households (FS.RI.1.3), while PE data collected from and reflecting products paid for via government would be mapped to FS.RI.1.1 (Government).

Mapping of some key SHA 2011 classifications requires some specific considerations for pharmaceutical data; these are summarized below by classification, with additional detail provided according to different possible data sources.

Function (HC)

Many countries currently map PE data to the HC.5.1.1 and HC.5.1.2 sub-categories. This classification is meant to capture goods for which the function and mode of provision is not explicitly specified, and generally applies to goods obtained independently and not consumed during a health care contact. Expenditure on pharmaceuticals that occurs during a health care contact (for example, inpatient or even outpatient curative visits, preventive care) is included in the relevant categories such as HC.1.1 and HC.1.2 for inpatient and outpatient respectively, or HC.6 for preventive care, aggregated with expenditure on services. However, if a hospital

pharmacy dispenses prescribed medication to an outpatient, the expenditure should be considered under HC.5.

While currently under expert discussion, current SHA 2011 guidance recommends that, when possible, goods should be included in the purpose to which they pertain. With detailed information on pharmaceuticals (names and formulations), efforts should be made to classify pharmaceuticals according to their specific function, which is most likely to fall under HC.1 *Curative care*, or HC.6 *Preventive care*. For pharmaceuticals without a clear function, or where mapping the function is difficult, data are generally mapped to HC.5 *Medical goods* (non-specified by function), which leads to overestimation of the value for HC.5 and underestimation of services expenditure.

At times, reviewing how the services expenditure was mapped to function can guide the team on how to map the specific PE that has been 'extracted' from the services expenditure data. Alternatively, Health Accounts teams with guidance from a pharmacist can make assumptions about function based on the common use of the medicine as per standard treatment guidelines or the national formulary. Sometimes the data source can provide insight into appropriate mapping when options are limited; for example, in a simplified and practical approach in Burkina Faso, hospital expenditure data on pharmaceuticals that were identified (with the help of a pharmacist) as clearly being used for inpatient care (based on the country's essential medicines list and standard treatment guidelines) were mapped accordingly. Then, the remaining expenditures were mapped as outpatient care. Similarly, data from a health center or unit was mapped to outpatient or preventive care (and not inpatient care).

The function of pharmaceuticals that are part of specific **health programs** is often self-evident to Health Accounts teams who are familiar with the health system. For example, vaccines and contraceptives are mapped under HC.6 *Preventive care,* while ARVs and anti-malarial medications are generally mapped under HC.1 *Curative care* (unless purchased at a pharmacy, in which case the function would be HC.5.1.1 or HC.5.1.2). Mapping of function can sometimes follow how the health program data are organized; expenditure data may be disaggregated by provider type (hospital versus ambulatory care), which can help inform mapping of function. Where possible, care should be taken to distinguish medications that are used for inpatient curative care versus outpatient curative care. For example, anti-malarial medications are used in both settings and may necessitate a distribution key to map across more than one function.

Private sector **import data** consists of pharmaceuticals that are used for various functions including prevention, inpatient curative care, outpatient curative care, and those pharmaceuticals that are obtained outside of a service contact at pharmacies or retailers. Mapping to function can be challenging and will depend on the country context. In Burkina Faso, the team used a distribution key developed based on household survey data (on OOP spending on pharmaceuticals) to map the function. If the team wishes to distinguish between prescribed (HC.5.1.1 *Prescribed medicines*) and over-the-counter medicines (HC.5.1.2 *Over-the-counter (OTC) medicines*), the database of the national drug regulatory authority and/or in standard treatment guidelines or essential medicines lists will have this distinction; if not, a pharmacist can be consulted to map these.

Provider (HP)

Similar to the HC classification, expenditure data on pharmaceuticals that are obtained outside of a health care contact is generally mapped to HP.5 *Retailers and other providers of medical goods.* The HP.5.1 *Pharmacies* classification is often used for goods that are classified under HC.5.1 and are not associated with a specific function—and therefore are associated with pharmacies and not a different provider type. Goods that are consumed during a health care

contact are traditionally not specifically designated as pharmaceuticals and are integrated with other expenditure data for health care services and therefore are mapped to the appropriate provider (e.g., hospital or ambulatory care, or even preventive care). It should be noted that when patients are asked to purchase pharmaceuticals and bring them to an inpatient or outpatient visit, the provider will be HP.5 but the function will generally be HC.1.1 or HC.1.2.

Aligning with guidance above for HC, more detailed data on PE that is mapped to HC.5 classifications, often to HP.5.1 *Pharmacie*s, can also be mapped to hospitals, health centers, or providers of preventive care, as appropriate. For PE data that are mapped to other functions, such as preventive or curative care, this can be mapped to the appropriate provider (guided, for example, by how the services expenditure was mapped). Often, the source from which the data were obtained will guide the mapping of the provider classification. For data where the source does not help in mapping the provider, an understanding of the pharmaceutical's use (according to standard treatment guidelines or the national formulary) can guide assumptions on mapping for provider. See further details according to the data source, below.

For **health program data**, the organization of the program's service delivery as well as the treatment guidelines of the drug can guide the mapping of provider. For example, first-line malaria treatment that is provided in health centers could be mapped accordingly, whereas drugs to treat severe malaria that requires hospitalization would be mapped to hospitals.

For **import data,** the function mapping will often guide the mapping of provider. For example, pharmaceuticals used for preventive care will generally be mapped to providers of preventive care or other providers that are known to administer those pharmaceuticals. Assumptions can also guide mapping of provider; in Benin, the team applied provider distribution keys from the public sector PE data to the private sector import data.

Factors of provision (FP)

Expenditure data on pharmaceuticals can be mapped to the classification FP.3.2.1 *Pharmaceuticals*. In the absence of detailed expenditure data on pharmaceuticals, countries have often resorted to mapping expenditures linked to HC.5.1 and HP.5.1 to FP.3.2.1, since the proportion of costs associated with salaries, services and taxes is not available. All other expenditure on pharmaceuticals that was mapped to other functions/providers and was not explicitly apparent as expenditure on pharmaceuticals would have been mapped to other FP categories. In the current approach, where teams are obtaining and mapping PE data that are more detailed and are specified as expenditure on pharmaceuticals, expenditures can be mapped to FP.3.2.1 and its designated sub-categories. As discussed earlier, the expenditure classified as FP.3.2.1 can provide an estimate for expenditure on pharmaceutical commodities only (since it will generally not include costs associated with pharmaceutical management) and should therefore not be equivalent to TPE.

As described in the section on customizing SHA 2011, FP.3.2.1 can be customized to include the list of drugs by therapeutic classifications for pharmaceuticals, as well as additional sub-classifications as needed. Pharmaceuticals that have not been assigned to a specific ATC can be mapped to FP.3.2.1.n.e.c. (unless they are directly mapped to disease), while those mapped to multiple ATC groups will require a distribution key.

Pharmaceuticals from health programs mapped to FP.3.2.1 are likely to reflect the cost of the pharmaceutical itself, and not the associated costs of pharmaceutical management, which will be captured under other factors of provision. Private sector import data may reflect other costs associated with procuring and distributing the drugs, if the expenditure amount is that of the final

sale cost, which includes markups for associated management costs. These details should be noted as caveats when citing a value of FP.3.2.1 as PE.

Disease condition (DIS)

The disease classification for PE can be especially useful to policymakers, for example, to determine if spending on national health programs is aligned with country priorities, or to inform pharmacy benefit package design for different disease conditions. An excerpt from a table that presents a list of pharmaceuticals and their associated expenditure, by disease condition, is presented in Table A-1 in Annex A. Table A-3 is an example of a table that could be created once pharmaceuticals are mapped to disease condition

For countries that do not use the disease classification in their Health Accounts estimations, mapping PE data will be more straightforward and less time intensive.

In Health Accounts exercises that do not specifically track PE, many health program expenditures on pharmaceuticals are mapped to the correct disease, even if not recognized as specific to pharmaceuticals, as they are generally aggregated with expenditure on specific health services. As a result, while the overall expenditure by disease condition may have been somewhat accurate for health programs, the amount spent specifically on pharmaceuticals (i.e., in the FP.3.2.1 classification) would be grossly underestimated. In contrast, this resource suggests using a 'bottom-up' approach, in which PEs are mapped to disease either through aligning with the health program, through an available ICD-10 code, or by grouping pharmaceuticals into therapeutic classifications that can usually (but not always) be linked to one or more disease conditions. This will allow for more accurate quantification of expenditure on pharmaceuticals by disease condition.

Aligning to health program. Priority health programs include, for example, HIV/AIDS programs or immunization programs. In most cases, PE that occurs as part of one of these programs can easily be mapped to one of the SHA 2011 disease conditions. Pharmaceuticals that are part of a specific health program but are used to treat related secondary morbidities should be mapped to the primary morbidity. For example, those financed through the HIV/AIDS program but used for treating opportunistic infections related to HIV/AIDS would be mapped under DIS.1.1.1.3.*Other opportunistic infections due to AIDS*.

Using existing ICD-10 codes. Sometimes, PE data will already have ICD-10 codes assigned to each of the pharmaceuticals. An example of this is health insurance data, where data on pharmaceuticals can be quite detailed. In these cases, because the SHA 2011 manual has a crosswalk between ICD-10 codes and WHO Global Burden of Disease category, mapping of disease will be straightforward. The disease conditions in the SHA 2011 are closely adapted from the Global Burden of Disease classification.

Grouping by ATC classification. In the absence of an assigned ICD code or alignment with a health program, pharmaceuticals (for which expenditure data are obtained) should first be assigned to a therapeutic class, as per the guidance in the earlier section on compiling data in the expenditure database. This information on ATC (or other classification) level should be documented in the appropriate field (Drug Class) in the expenditure database. In many cases, this therapeutic class can easily be linked to one of the SHA 2011 disease conditions, which can then be mapped accordingly. An example of the mapping of therapeutic class to disease derived from the Burkina Faso exercise is presented in Table A-2 in Annex A. Some countries may have their pharmaceuticals already assigned to ATC (as is the case in Benin) or their own therapeutic grouping of medicines that is different from the ATC; in these cases, the pharmacist on the team can be consulted for how to link those groupings to disease. In Benin, where the

disease condition for which the pharmaceuticals are used was described in the country's essential medicines list, national formulary or standard treatment guidelines (such as ARVs for HIV/AIDS), grouping into the ATC classification could be skipped and they could be mapped directly to disease.

Similarly, some medicines are best mapped directly to disease since information is lost by assigning the ATC classification. For example, in the case of the medicines used for respiratory diseases, the drug name allows for distinction between the communicable (Dis.1.4 *Respiratory infection*) and non-communicable (DIS.4.5 *Respiratory disease*) respiratory diseases, which are different disease conditions in the SHA 2011 framework. If the drugs had been mapped to ATC level 2, then all drugs would end up being mapped to DIS.4.5 *Respiratory disease*.

Some pharmaceuticals are used for more than one disease condition and/or can be mapped to different ATC classifications. In such cases, especially when the expenditure is small, the effort required to determine distribution keys for mapping to disease may not be justified. In these cases, the pharmaceuticals can be mapped to DIS.n.e.c. For example, in Burkina Faso, nearly 35 percent of the TPE was mapped to DIS.n.e.c.; in future years, the team will aim to reduce this percentage to obtain improved disease distributions. If the team chooses, they can review their country's standard treatment guidelines, essential medicines list, or national formulary to understand which pharmaceuticals are used for each of the disease conditions in the SHA 2011 framework. This information, together with information on service utilization and unit costs, can be used to develop a distribution key to distribute the expenditure across the relevant diseases. Auditing prescriptions with diagnosed diseases is another approach that can provide accurate information on the disease classifications.

CREATING AND APPLYING DISTRIBUTION KEYS

Mapping of PE data may require Health Accounts teams to develop a number of distribution keys, or allocation assumptions. These include:

Distribution key for therapeutic classifications of pharmaceuticals in FP.3.2.1 sub-categories. Some pharmaceuticals, sometimes depending on their formulation or strength or indication, may have more than one ATC code and therefore fall into more than one therapeutic class. For example, as per the WHO, the commonly used acetylsalicylic acid (aspirin) has the ATC code A01AD05 as a drug for local oral treatment, B01AC06 as a platelet inhibitor against blood clotting, and N02BA01 as analgesic (pain) and antipyretic fever relief. Whenever this occurs, the Health Accounts team, with help from a pharmacist, should determine whether or not to distribute the expenditure across the various therapeutic classes, guided by the magnitude of expenditure. If the expenditure is significant, a distribution key could be created to distribute expenditure among the relevant therapeutic classes and sub-classes that are defined as part of FP.3.2.1. If the in-country context dictates that the particular pharmaceutical is used mainly for one type of treatment, then all expenditure can be assigned to that one therapeutic class.

Distribution key for mapping diseases. Pharmaceuticals assigned to a specific therapeutic class may be used for the same disease condition, but this is not always the case. For example, paracetamol falls into the therapeutic class of analgesics and is used in the treatment of numerous disease conditions, including malaria and certain non-communicable diseases. For mapping of such pharmaceuticals, the team should use in-country standard treatment guidelines or the national formulary to determine the list of disease conditions which the pharmaceutical is used for. To determine how to then *apportion* expenditure across this list of disease conditions, service utilization data from the health management information system

(HMIS) can provide information on the relative burden of disease. Together, these two pieces of information can be used to develop a distribution key that allocates expenditure across the relevant disease conditions. If HMIS data are unavailable or of poor quality, disease prevalence data can also be used (in conjunction with the information from standard treatment guidelines) to calculate a distribution key. However, the effort required to develop distribution keys should be considered against its potential benefit. In Benin and Burkina Faso, the teams chose to assign pharmaceuticals that were used for multiple disease conditions to DIS.n.e.c.

Other distribution keys. As in any other Health Accounts mapping exercise, the Health Accounts team should use distribution keys where appropriate. For example, in Vietnam, the distribution of PE by provider from the social health insurance scheme was applied to the total OOP expenditure on pharmaceuticals, since it was assumed that the pattern of spending by provider was similar for the two. In Burkina Faso, the team used distribution keys that had been developed at the hospital level for services costs to split pharmaceuticals used for inpatient versus outpatient care curative care.

ADDRESSING DOUBLE COUNTING

The Health Accounts team needs to consider double counting using the same approach employed for general Health Accounts data. Given the largely bottom-up approach of using private sector import data, the risk of double counting is minimal, but the team should consider all possibilities carefully. For example, in Burkina Faso, import data for pharmaceuticals included products destined for government facilities via the central procurement agency as well as products destined for private pharmacies. Since the team collected data separately from government pharmacies (for reasons related to ease of mapping certain classifications), these expenditures had to be removed from the import data. Fortunately, the import data specified the ultimate destination (government agency versus private sector) of the various pharmaceuticals. In cases where the team is combining a bottom-up approach (such as using secondary data on pharmaceutical imports) with a top-down approach (using line items from a government budget), the possibility for double counting must be examined and addressed.

STEP 5: ANALYZING AND PRESENTING PE DATA FOR DECISION MAKERS

This step is critical to ensuring that the data produced as part of a Health Accounts estimation is analyzed and packaged in a way that meets the needs of decision makers and can be used for improved evidence-based decision-making.

USING PE FOR ADVOCACY, POLICY, AND PROGRAMMING

PE data represents a key input for advocacy, policy, and programming at the national level. Despite its value in informing decisions, it has often been underutilized in many contexts, as previous Health Accounts exercises have not generally provided full transparency into PE in the health system. Policy themes related to PE that may be relevant for leaders include consideration of sustainability (domestic- versus donor-financed pharmaceuticals, which provides insight into how much governments will have to pay for pharmaceuticals as donor funding phases out), universal health coverage (levels of OOP spending on pharmaceuticals and what that reveals about the risk for catastrophic spending), equity (spending by region and disease incidence for geographic and need equity), and efficiency (spending on generics versus branded medicines where possible; promoting rational use of medicines and improving adherence to national treatment guidelines).

As described in Step 1 of how to track PE, prior to beginning a PE tracking exercise, the team leading the exercise should consult with policymakers and other pharmaceutical system stakeholders to prioritize the specific policy-related questions they hope to answer. This will help guide the exercise, starting from data collection onward. Depending on the specific policy questions pursued, a PE tracking exercise may focus on a variety of indicators (Eghan et al. 2017). Table 8 presents several policy questions that may be relevant to government decision makers, and related indicators that can help inform those questions.

Table 8: Policy questions and related PE tracking indicators

Policy area	Policy questions	Suggested PE indicator(s)
Resource mobilization, sources of finance and coverage	• How are pharmaceuticals prioritized in health spending compared to other spending categories such as administrative costs? • How does TPE per capita compare to the Lancet Commission's per capita estimates for financing a basic package of essential medicines (Wirtz et al. 2017)? • What are the sources of financing for pharmaceuticals, and is the financing sustainable? • What proportion of PE is channeled through a social health insurance scheme?	• TPE • TPE as percentage of total health expenditure and current health expenditure • TPE per capita • TPE by funding source (FS)
Resource allocation, equity, financial protection	• Do households bear the burden of paying for pharmaceuticals, and what does this mean for financial protection? • Does PE by health program area align with government priorities for health? • Is PE equitably distributed across different geographies? • How sustainable is PE for different priority health conditions?	• OOP expenditure on pharmaceuticals as percentage of TPE (if possible, by income quintile, though this breakdown is rare) • Proportion of OOP expenditure that is for pharmaceuticals • Proportion of TPE by provider type, geographic division, disease, financing scheme, funding source • Proportion of TPE by age, gender, income (though this breakdown is rare) • Proportion of TPE by funding source and disease condition (FS X DIS)
Efficiency* and rational use of medicines	• Which specific pharmaceuticals account for the highest volume of expenditure? Are there opportunities for greater efficiency? • Are generic medicines with appropriate quality but lower cost being used where possible? • Do expenditure patterns align with standard treatment guidelines and national formularies? • Is spending on certain drugs or therapeutic groups excessive, or out of line with expected costs? • How does expenditure on over-the-counter drugs compare to prescribed drugs?	• Proportion/identity of pharmaceuticals contributing 80% of TPE (Pareto analysis) • Expenditure on generic vs. branded pharmaceuticals, and as percentage of TPE, by sector • Percentage of total public sector PE on pharmaceuticals from the country's essential medicines list • Expenditure on vital, essential, non-essential pharmaceuticals, as percentage of TPE, by sector • Expenditure on prescription versus over-the-counter pharmaceuticals

** The efficiency measures listed here are not captured within the SHA 2011 framework, so if countries or policymakers wish to explore these indicators, they should ensure that data are available and structure data collection, organization, and mapping accordingly.*

In Burkina Faso, a Pareto analysis (commonly used in pharmaceutical management, also referred to as 80:20 analysis) was performed on the PE data, which revealed that 6 percent of the pharmaceuticals included in the Health Accounts estimation accounted for 80 percent of the TPE. Such an analysis provides valuable information for pharmaceutical decision makers, as further examination of the pharmaceuticals contributing to the high cost may reveal opportunities to improve efficiency. In Vietnam, policymakers were interested in PE by the social

health insurance scheme—and how per capita spending compared among the different provinces—to assess geographic equity.

Development of policy briefs – approach and high-level guidance

PE data can serve as an evidence base for government officials to evaluate the sustainability of financing for pharmaceuticals, to improve the allocation for pharmaceuticals, to hold decision makers accountable to their commitments, to understand the extent of financial protection, and for still other reasons. A country's specific policy priorities can guide the Health Accounts team on which details would be most useful. The policy questions and associated indicators (Table 8 in the preceding section) can be presented in a policy brief, to promote the use of the data in decision-making. Sometimes, the team may wish to incorporate other data in the analysis. For example:

- In Benin, a Pareto analysis identified which pharmaceuticals were contributing 80 percent of the spending on pharmaceuticals. By presenting this in a policy brief, the government has the information to examine more closely the medicines driving the spending, to assess whether these medicines are necessary, appropriate for treatment, and so forth.
- In Vietnam, social health insurance spending on pharmaceuticals was presented by province; by using province-level population data from the census, the team was able to produce estimates for per capita spending on pharmaceuticals by province and therefore consider geographic equity.

As mentioned earlier, any packaging of data for decision-making should use a participatory approach—working with decision makers even before data collection begins, to understand what their needs are and to aim to collect and analyze data in a way that will be most useful to them. Once data are collected and mapped, Health Accounts teams should prepare preliminary graphs of the data, and in a workshop setting obtain feedback on the utility of the data as presented. The Health Accounts team can then use feedback from the decision makers to adjust the graphs and accompanying policy analysis accordingly.

CONCLUSION AND WAY FORWARD

This resource presents an emerging methodology for applying the SHA 2011 framework to track PE, which countries will adapt and use as part their health resource tracking. Lessons from future attempts at tracking PE should be used to further refine this methodology. Countries may wish to share their estimates of PE with the Health Accounts team at WHO (however it has been calculated) for compilation of results and comparison across countries.

The PE data and resources available in countries will vary widely and therefore Health Accounts teams will need to determine which parts of this methodology are feasible in their country context, and how they can provide useful data for decision makers. Some teams may wish to start by collecting and analyzing a portion of PE data as a first step to understand the process, and can build on this in subsequent estimations, increasing the volume of data and the accuracy with which it is mapped with each iteration. For example, in Vietnam, due to the challenges in accessing data, the Health Accounts team opted to start by collecting and analyzing mainly the PE data from the social health insurance scheme.

As more countries attempt to track PE, their lessons can be used to develop more sophisticated guidance on how to produce PE data that inform policy priorities for pharmaceutical decision makers. The ultimate aim would be that countries that find PE data useful will institutionalize PE data tracking as part of their Health Accounts estimation.

To build on this methodology and to further increase the accuracy of PE data, Health Accounts and pharmaceutical experts should consider developing more detailed guidance on:

- How PE incurred as part of government-funded services in LMICs can be extracted and captured as part of TPE (HC.RI.1)
- How teams can use HC.RI.1 to capture all expenditure on pharmaceuticals
- How to provide more general guidance or crosswalks to link specific drugs to therapeutic groups, and/or therapeutic groups to disease conditions

Efforts to improve PE tracking should also consider institutionalizing the process. Institutionalizing the tracking of PE data is generally defined as the annual production and use of these data as part of decision-making in health and for pharmaceuticals. Standard guidance for policymakers on institutionalizing Health Accounts suggests that they request and use the data routinely, establish standards for data collection and analysis, and institute data reporting requirements for the various groups that provide data for the Health Accounts estimation (Cogswell and Dereje 2015). This guidance is also relevant for PE data. Decision makers from departments such as procurement agencies, third-party payers or drug regulatory agencies who value having accurate PE estimates can champion the cause of accurate PE estimates.

As with any Health Accounts data, processes for collecting and analyzing data will evolve and improve over time. In some countries, PE tracking can provide an impetus for improving databases that exist for compiling spending on pharmaceuticals. For example, in Vietnam, a database was created to track sales of all pharmaceuticals in private sector pharmacies across the country, but pharmacies rarely enter data into this database. If there is interest in obtaining more accurate estimates of OOP spending at private pharmacies, this database presents an opportunity for the government to enforce the collection of these detailed data that can be used as a data source in future Health Accounts estimations. As countries advance efforts to increase the accuracy of their PE data, strategies to institutionalize PE tracking will promote not only the production of more accurate estimates, but the routine use of data for decision-making.

REFERENCES

Cogswell, Heather, and Tesfaye Dereje. 2015. *Understanding Health Accounts: A Primer for Policymakers*. Bethesda, Maryland: Health Finance and Governance Project, Abt Associates. https://www.abtassociates.com/insights/publications/report/understanding-health-accounts-primer-for-policymakers

Eghan, Kwesi, Sameh Saleeb, Shiou-Chu, Judy Wang, Helena Walkowiak, and M Embrey. 2017. "Identifying Indicators for Tracking Pharmaceutical Expenditure in Low- and Middle-Income Countries." *Submitted to the US Agency for International Development by the Systems for Improved Access to Pharmaceuticals and Services (SIAPS) Program: Management Sciences for Health.*

European Pharmaceutical Market Research Association (EPHMRA). N.d. "Anatomical Classification." https://www.ephmra.org/anatomical-classification. Accessed October 1, 2022.

Global Harmonization Task Force (GHTF). 2012. *Definition of the Terms 'Medical Device' and 'In Vitro Diagnostic, Medical Device.* https://www.imdrf.org/sites/default/files/docs/ghtf/final/sg1/technical-docs/ghtf-sg1-n071-2012-definition-of-terms-120516.pdf

Laing, Richard, Brenda Waning, Andy Gray, Nathan Ford, and Ellen 't Hoen. 2003. "25 Years of the WHO Essential medicines List: Progress and Challenges." *The Lancet* 361 (9370): 1723–29. https://doi.org/10.1016/S0140-6736(03)13375-2

Local Health System Sustainability Project (LHSS). 2020. *Internal Document: Desk Review of Pharmaceutical Expenditure in Health Accounts Estimates.* Rockville, Maryland: Abt Associates.

Local Health System Sustainability Project (LHSS) under the USAID Integrated Health Systems IDIQ and The Medicines, Technologies and Pharmaceutical Services Program. 2021. *Estimating Pharmaceutical Expenditure Using SHA 2011 Framework: Draft Resource*. Rockville, Maryland: Abt Associates.

Management Sciences for Health (MSH). 2012. *MDS-3: Managing Access to Medicines and Health Technologies.* Arlington, Virginia: Management Sciences for Health. https://msh.org/resources/mds-3-managing-access-to-medicines-and-health-technologies/

2013. *Center for Pharmaceutical Management: Strategy for Pharmaceutical Financing.* Arlington, Virginia: Management Sciences for Health.

Morgan, David and Fan Xiang. 2022. "Improving Data on Pharmaceutical Expenditure in Hospitals and Other Health Care Settings." *OECD Health Working Papers.* https://doi.org/10.1787/6c0d64a2-en

Rodwin, Marc A. 2013. "Introduction: Institutional Corruption and the Pharmaceutical Policy." *The Journal of Law, Medicine and Ethics* 41 (3): 544-52. https://doi.org/10.1111/jlme.12062

Roubal, Tomas, Roberto Astolfi, and David Morgan. 2012. *Guidelines to Measure Expenditure on Over-The-Counter (OTC) Drugs.* https://www.oecd.org/els/health-systems/OTCExpenditure.pdf

Organization for Economic Co-Operation and Development (OECD), Eurostat and World Health Organization (WHO). 2017. *A System of Health Accounts 2011, Revised Edition.* Paris: OECD Publishing. https://doi.org/10.1787/9789264270985-en

Wirtz, Veronika J, Hans V Hogerzeil, Andrew L Gray, Maryam Bigdeli, Corenelis P de Joncheere, Margaret A Ewan, Martha Gyansa-Lutterodt, Sun Jing, Vera L Luiza, Regina M Mbindyo, et al. 2017. "Essential Medicines for Universal Health Coverage." *The Lancet* 389 (10067): 403-476. https://doi.org/10.1016/S0140-6736(16)31599-9

World Health Organization (WHO). 2012. *The World Health Report 2010 - Health Systems Financing: The Path to Universal Coverage, Chapter 4.* https://www.who.int/publications/i/item/9789241564021

2022. *Global Spending on Health: Rising to the Pandemic's Challenges.* https://www.who.int/publications/i/item/9789240064911

World Health Organization Collaborating Centre for Drug Statistics Methodology and Norwegian Institute of Public Health. 2023. *List of DDDs Combined Products.* https://www.whocc.no/ddd/list_of_ddds_combined_products/

World Health Organization, United Nations Development Programme, United Nations Population Fund, World Bank, and United Nations Children's Fund (UNICEF). 2007. *A Model Quality Assurance System for Procurement Agencies: Recommendations for Quality Assurance Systems Focusing on Prequalification of Products and Manufacturers, Purchasing, Storage and Distribution of Pharmaceutical Products*. https://apps.who.int/iris/handle/10665/69721

ANNEX A: PHARMACEUTICAL EXPENDITURE DATA FROM BURKINA FASO

This annex shows examples of data collected from Burkina Faso as part of exploratory work to develop this resource.

Table A-1 shows a small selection of the PE database, which contains select fields mentioned in Table 6. The fields in this table display drug names and which therapeutic class and disease condition the drug is linked to.

Table A-1: PE data from Burkina Faso

Drug designation	Therapeutic class	HA-Disease	Principal form	Dosage	Presentation	Total expenditure
Nifedipine	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	10 mg	B/30	97,081
Levonorgestrel + Ethinylestradiol	Hormonal contraceptives	DIS.2.3- Contraceptive management	Tablet	(150+30) µg + (40+200) µg	B/21	256,084
Spironolactone + Altizide	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Breakable tablet	(25+15) mg	B/20	766,352
Spironolactone	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Breakable tablet	50 mg	B/30	1,449,650
Methyldopa	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	500 mg	B/30	2,441,311
Amlodipine	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	10 mg	B/30	2,313,719
Amlodipine + Atenolol	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	(5+50) mg	B/3X10	266,404
Amlodipine Besilate	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	5MG	B/3X10	107,576
Amlodipine Mesilate Monohydrate	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	10MG		2,269,587
Amlodipine + Perindopril	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	(10+ 10) mg	B/3X10 tab	678,908
Losartan Potassium	Antihypertensive	DIS.4.3.1- Hypertensive diseases	Tablet	25 mg	B/3*10	259,664
Artemether + Lumefantrine	Antimalarial	DIS.1.3- Malaria	Tablet	(40+240) mg	B/6	3,299,494
Artemether	Antimalarial	DIS.1.3- Malaria	Injectable solution	80MG/ML	B/10 AMP	245,352
Artemether	Antimalarial	DIS.1.3- Malaria	Injectable solution	80MG/ML	B/10 AMP	1,472,109
Gentamicin	Antibacterial (Aminoglycoside)	DIS.4.8- Sense organ disorders	Eye drops	0,3 %	FL/5ML	182,977
Azathioprine	Immunosuppressant	DIS.4.1- Neoplasms		50 mg	B/100	373,892
Sodium cromoglycate	Antiallergics	DIS.4.8- Sense organ disorders	Eye drops	2%	FL/5 ml	4,722,840

Table A-2 shows the list of therapeutic classes assigned to PE data from Burkina Faso, and the associated SHA 2011 disease condition for each therapeutic class. The association of therapeutic class and disease condition may be similar in other countries, though this will depend in part of the standard treatment guidelines.

Table A-2: Mapping of therapeutic class to disease condition derived from Burkina Faso PE tracking exercise

Therapeutic class	DIS code	Disease condition
Amino acids	DIS.3	Nutritional deficiencies
Urinary alkalizers	DIS.4.7	Diseases of the genito-urinary system
Analgesic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Ancillary services	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Androgen, anabolic	DIS.4.7	Diseases of the genito-urinary system
local anesthetic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Anesthetics general	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Analgesic, antipyretic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Anthelmintic	DIS.1.6	Neglected tropical disease
Anthelmintics /intestinal worm infections	DIS.4.6	Diseases of the digestive system
Anti-edematous	DIS.4.3.n.e.c.	Other and unspecified cardiovascular diseases (n.e.c.)
Antacid	DIS.4.6	Diseases of the digestive system
Anti-acne	DIS.4.8	Sense organ disorders
Platelet aggregation inhibitor	DIS.4.3.n.e.c.	Other and unspecified cardiovascular diseases (n.e.c.)
Hypo-allergenic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Anti-alopecia	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antianemic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antianginal	DIS.4.3.n.e.c.	Other and unspecified cardiovascular diseases (n.e.c.)
Antiasthenic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antibacterial	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Combination)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (carbapenems)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Cephalosporin)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Cyclin)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (imidazole)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (lincosamide)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Macrolide)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Penicillin)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Phenicol)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Quinolone)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antibacterial (Rifamycins)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)

Therapeutic class	DIS code	Disease condition
Antibacterial (Sulphonamide)	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Anticancer	DIS.4.1	Neoplasms
Anticholinergic	DIS.4.4.3	Neurological conditions
Anticoagulant	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Anticolinesterase - Antimyasthenic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antidiarrheals	DIS.4.6	Diseases of the digestive system
Antidiarrheal	DIS.4.6	Diseases of the digestive system
Morphine antidote	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antiemetic	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antiflatulent	DIS.4.6	Diseases of the digestive system
Antifungal	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antiglaucoma	DIS.4.8	Sense organ disorders
Antigout	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Antihaemorage	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Antihemorrhoidal	DIS.4.6	Diseases of the digestive system
H1 antihistamine	DIS.4.5	Respiratory diseases
Antihypertensive	DIS.4.3.1	Hypertensive diseases
Anti-inflammatory	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Anti-migraine	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antinemic	DIS.4.7	Diseases of the genito-urinary system
Antioediments	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antioxidant	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antimalarial	DIS.1.3	Malaria
Pest control	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antiparkinsonian	DIS.4.4.3	Neurological conditions
Antirheumatisms	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Intestinal antiseptic	DIS.4.6	Diseases of the digestive system
Urinary antiseptic	DIS.4.7	Diseases of the genito-urinary system
Antiseptic, analgesic	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Antiseptic, disinfectant	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antispasmodic	DIS.4.6	Diseases of the digestive system
Antithyroid	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antitumor	DIS.4.1	Neoplasms

Therapeutic class	DIS code	Disease condition
Antitussive	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Antiulcer	DIS.4.6	Diseases of the digestive system
Antivertiginous	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Antiviral	DIS.1.1.2	STDs Other than HIV/AIDS
Antiviral (ARV)	DIS.1.1.1.1	HIV/AIDS
Chronic kidney failure	DIS.4.7	Diseases of the genito-urinary system
Nutritional supplement	DIS.3	Nutritional deficiencies
Contraceptive management/FP	DIS.2.3	Contraceptive management (family planning)
Corticosteroids, dermatological preparations	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Device - Routine - GAVI	DIS.1.7	Vaccine preventable diseases
Device - Routine - Non GAVI	DIS.1.7	Vaccine preventable diseases
Device - Supplementary - GAVI	DIS.1.7	Vaccine preventable diseases
Medical device	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Medical device/HIV	DIS.1.1.1.1	HIV/AIDS
Medical Device/Reproductive Health	DIS.2.1	Maternal conditions
Drinking-water disinfection	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Drugs for constipation	DIS.4.6	Diseases of the digestive system
Drugs for peptic ulcer and gastro-esophageal reflux disease	DIS.4.6	Diseases of the digestive system
Equipment	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Lymphatic filariasis	DIS.1.6.1	Lymphatic filariasis
Gastrointestinal disorders/Belladonna	DIS.4.6	Diseases of the digestive system
Menopausal Gonadotropin	DIS.4.7	Diseases of the genito-urinary system
Homeopathy	DIS.1.4	Respiratory infections
Pituitary and hypothalamic hormone	DIS.2.1	Maternal conditions
Hormones (treatment of infertility)	DIS.2.3	Contraceptive management (family planning)
Prostate hypertrophy	DIS.4.7	Diseases of the genito-urinary system
Hypolipidemic	DIS.4.3.n.e.c.	Other and unspecified cardiovascular diseases (n.e.c.)
Immune sera and immunoglobulins	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)
Immunoglobin antiD	DIS.2.1	Maternal conditions
Immuno-modulator	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Immunosuppressant	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Emergency/FP kits	DIS.2.3	Contraceptive management (family planning)

Therapeutic class	DIS code	Disease condition
Emergency kits/Reproductive health	DIS.2.1	Maternal conditions
Artificial tear	DIS.4.8	Sense organ disorders
Purifying lotion	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Malaria	DIS.1.3	Malaria
Medical-technical equipment/Reproductive health	DIS.2.1	Maternal conditions
Thyroid medication	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Medicine for asthma and COPD	DIS.4.5	Respiratory diseases
Chronic kidney disease medication	DIS.4.7	Diseases of the genito-urinary system
Diabetes medication	DIS.4.2.1	Diabetes
Medicines of the cardiovascular system	DIS.4.3.n.e.c.	Other and unspecified cardiovascular diseases (n.e.c.)
Minerals	DIS.3	Nutritional deficiencies
Neglected tropical disease	DIS.1.6	Neglected tropical disease
Mucolytic - expectorant	DIS.1.4	Respiratory infections
Musculo-skeletal system	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Mydriatic, cholinergic cycloplegic	DIS.4.8	Sense organ disorders
muscle relaxant	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Nutrition	DIS.3	Nutritional deficiencies
Onchocerciasis	DIS.1.6.2	Onchocerciasis
Malaria	DIS.1.3	Malaria
Paracetamol	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Contrast agent	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Propulsives	DIS.4.6	Diseases of the digestive system
Skin protector	DIS.4.8	Sense organ disorders
Psychotropics	DIS.4.4.n.e.c.	Unspecified mental and behavioral disorders and neurological conditions (n.e.c.)
Rhinitis and sinusitis	DIS.1.4	Respiratory infections
Reproductive health	DIS.2.1	Maternal conditions
scabicide	DIS.1.6	Neglected tropical disease
Schistosomiasis	DIS.1.6	Neglected tropical disease
Alcoholic withdrawal	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Smoking cessation	DIS.4.n.e.c.	Other and unspecified noncommunicable diseases (n.e.c.)
Solutions and electrolytes	DIS.n.e.c.	Other and unspecified diseases/conditions (n.e.c.)
Narcotics and psychotropics	DIS.4.4.n.e.c.	Unspecified mental and behavioral disorders and neurological conditions (n.e.c.)
Mineral supplement	DIS.3	Nutritional deficiencies

Therapeutic class	DIS code	Disease condition
Throat treatment	DIS.4.9	Oral diseases
Adjunctive treatment of binocular vision disorders	DIS.4.8	Sense organ disorders
Cataract treatment	DIS.4.8	Sense organ disorders
Treatment of dyspepsia, antiflatulence	DIS.4.8	Sense organ disorders
Psoriasis treatment/Dermatology	DIS.4.8	Sense organ disorders
Gastrointestinal disorder	DIS.4.6	Diseases of the digestive system
Acid-related disorder	DIS.4.6	Diseases of the digestive system
Erectile dysfunction	DIS.4.7	Diseases of the genito-urinary system
Gastrointestinal disorders	DIS.4.6	Diseases of the digestive system
Cerebrovascular disorders	DIS.4.3.n.e.c.	Other and unspecified cardiovascular diseases (n.e.c.)
Utero-relaxant	DIS.2.1	Maternal conditions
Vaccinated	DIS.1.7	Vaccine preventable diseases
Vaccine - Routine	DIS.1.7	Vaccine preventable diseases
Vaccine - Supplementary	DIS.1.7	Vaccine preventable diseases
Vitamin	DIS.3	Nutritional deficiencies
Antiviral-other1	DIS.1.n.e.c.	Other and unspecified infectious and parasitic diseases (n.e.c.)

Table A-3 is an example of a table that could be created once pharmaceuticals are mapped to disease condition, enabling the Health Accounts team to not only estimate expenditure per pharmaceutical, but also per disease condition. For instance, the estimated PE on lymphatic filariasis would be the sum of expenditure on Albendazole, Ivermectin, and Praziquantel. Similar sub-totals are possible for other diseases. Note that in Burkina Faso, the team chose to include some medical goods and devices, such as insecticide-treated nets and diagnostic test kits.

Table A-3:Sample results table containing specific PE by disease condition

Disease name (DIS)	Drug name	Total expenditure (FCFA)
Lymphatic Filariasis	Albendazole	21,349,980
	Ivermectin	3,743,552,250
	Praziquantel	1,433,929,380
Malaria	Artemether + Lumefantrine	4,255,546,389
	Artesunate injectable	2,660,804,416
	Artesunate suppository	8,381,890
	Long-lasting insecticide-treated nets	55,000,000
	Rapid diagnostic tests	3,749,018,750
	Sulfadoxine-pyrimethamine	579,859,783
	Sulphadoxine-pyrimethamine and amodiaquine	1,524,432,925
Mental (psychiatric) disorders	Buprenorphine 0.4mg	41,612
	Fentanyl	9,073,385
	Midozalam	145,622
	Morphine	7,682,128
	Naloxone 0.4 mg/ml	327,980
	Neostigmine 0.5 mg/ml	128,404
	Noradrenaline 2 mg/ml	179,075
Vaccine preventable diseases	BCG-20	45,401,161
	Bivalent oral polio vaccine	386,600,751
	DTP-Hep B-Hib	1,404,938,495
	Inactivated polio vaccine	429,535,221
	Measles and rubella	1,967,505,711
	Meningitis A Conj-10 pediatric	359,730,736
	PCV13-4	4,865,395,997
	Rotavirus vaccination	4,635,119,996
	Tetanus toxoid	141,959,502
	Yellow fever	811,636,899
Unspecified NCD (n.e.c.)	Praziquantel	525,107,232
	Tetracycline hydrochloride	1,517