Background Research and Landscaping Analysis on Global Health Commodity Procurement

Report prepared by AfRx Consulting (Daniel Rosen and David Tordrup) for the Center for Global Development's Working Group on the Future of Global Health Procurement

May 2018

Contents

List of Figures and Tables

List of abbreviations and acronyms

CGD	Center for Global Development
LIC	Low Income Country
LMIC	Lower-Middle Income Country
UMIC	Upper-Middle Income Country
NGO	Non-Governmental Organization
PEPFAR	President's Emergency Plan for AIDS Relief
SIAPS	System for Improved Access to Pharmaceuticals and Services
TB	Tuberculosis
USAID	United States Agency for International Development
WHO	World Health Organization
API	Active Pharmaceutical Ingredient
HS	Harmonized Commodity Description and Coding Systems

Executive Summary

Today health commodity procurement consumes a large share of public and private spending on health in low-income countries (LICs), lower-middle income countries (LMICs) and upper-middle income countries (UMICs), accounting for an average of 23%, 20% and 16% of total health care expenditure respectively for each grouping, though with large variations between countries.[1]

As countries move towards Universal Health Coverage, spending on commodities will be critical, and data on such spending, within and across countries, valuable in tracking progress and understanding what does and does not work. According to the WHO's report on Health Systems Financing: The path to Universal Coverage, medicines account for the first three of the "Ten leading sources of inefficiency" in health systems.[2]

1. Medicines: Underuse of generics and higher than necessary prices for medicines
2. Medicines: Use of substandard and counterfeit medications
3. Medicines: Ineffective or inappropriate usage

In addition, medicines make up the largest proportion of direct or out-of-pocket (OOP) spending on healthcare treatment. As a result, increased cost of medicines in both public and private sectors can be a key catalyst for Financial Catastrophe and Impoverishment in countries with high OOP expenditure on health commodities. This includes some LICs and, as we will show, many LMICs.

Figure 1 Direct payments made at public and private facilities in 39 countries
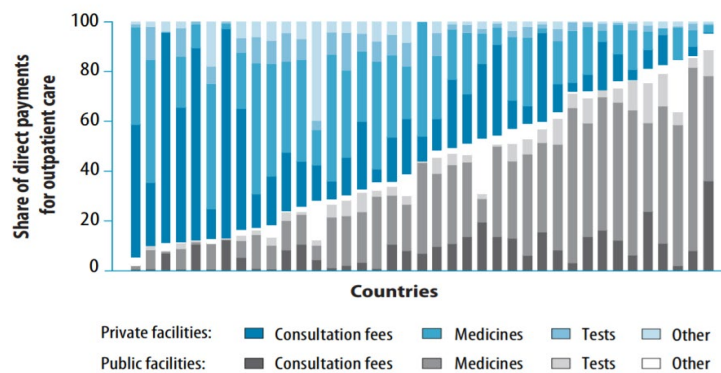
Source: Evans, D. and Etienne, C. (2010). Health systems financing and the path to universal coverage. Bulletin of the World Health Organization, 88(6), pp.402-402.

In an analysis using the WHO National Health Account data, AfRx Consulting found a positive correlation between OOP spending as a proportion of total healthcare spending and the national proportion of private health commodity procurement.

---

[1] Based on Healthcare Commodity Market sizings created by AfRx compared against WHO National Health Account figures for total spend for 52 countries. This figure is based on spending at the point of procurement and does not include the additional costs associated with supply chain mark-ups. As such the total cost of healthcare commodities to health systems should be considered as higher still.

[2] Evans, D. and Etienne, C. (2010). Health systems financing and the path to universal coverage. Bulletin of the World Health Organization, 88(6), pp.402-402.

A goal of the international healthcare community is to help countries rationalize health commodity procurement. Furthermore, the community seeks to optimise allocation of the procured commodities to maximise access, treatment outcomes and economic efficiency. The background and research component of this report is not tasked with finding the precise solutions to these issues. Rather, the aim is to describe the current state of health commodity markets in low- and middle-income countries to inform the CGD Working Group on the Future of Global Health Procurement. Please also note that this report represents the results and findings of the background research conducted by AfRx Consulting and not the final conclusions of the CGD Working Group on the Future of Global Health Commodity Procurement.

National level analyses and datasets of health commodities in LICs and LMICs are hard to find; the authors are not aware of many other studies that have attempted this kind of analysis to combine national level health commodity datasets across countries. This would not have been possible without funding to purchase data from IMS Health and their co-operation in this exercise, which is greatly appreciated.

These issues in health commodity procurement will be explored throughout this report, which is broken into four main sections: macro level trends; the impact of changing disease burdens on procurement; a review of relative procurement performance against international reference pricing; and an assessment on the state of innovation diffusion in developing countries. Bearing in mind that there are large levels of variance between countries, the key messages from each of these sections are as follows.

Analysis 1 - Macro level trends in health commodity procurement

- Governments are failing to grow their provision of healthcare commodities fast enough to match demand. As countries transition and donors gradually withdraw their support, the private sector in LMICs takes over the role as the primary procurer of health commodities.
- Ultimately, countries experiencing transition from aid will require effective procurement and low health commodity prices to achieve UHC.
- Procurement fragmentation and brand preferences in the private sector result in higher prices at the point of procurement and for patients.
- Data availability and data quality is currently insufficient for the performing of tasks relating to regulatory, scientific evaluation, health economics, pricing and reimbursement, procurement monitoring and evaluation. While the donor areas of HIV, Malaria, TB and FP are reasonably well-understood there is much less data in NCD therapy areas.

Analysis 2 - Changing disease burdens are reflected in changing health commodity consumption

- There are significant differences in the consumption of health commodities between LICs and MICs. Most of these are to be expected with a transition from HIV and malaria to hypertension, diabetes and cancer. However, there are still big differences in country level spending between countries of a similar income level in the sample.

- HIV is the biggest spending area for the lower income countries in Africa, whose health commodity procurement is dominated by areas considered high-priority by donors as well as by antibiotics.
- The classes of medicines purchased in LICs are often older molecules, reflecting the weak diffusion of innovation.
- In MICs, the public sector seems to play a significant role in the purchase of cancer health commodities for some countries Meanwhile, the public sector represents a smaller proportion of the overall total health commodity market as a whole.
- The NCD needs of LICs and the poorer segments of the population in LMICs / UMICs are most likely very underserved, especially by the public sector.

Analysis 3 - Procurement Prices Relative to International Reference Prices

- There was no correlation between the income level of countries and the performance of their public sector procurement mechanisms as measured by price. The main differences between country procurement performance as measured by price achieved were in volumes and centralised versus decentralised procurement structure.
- There was a statistically significant correlation for some molecules between price and volume, this suggests that pooled procurement remains an effective mechanism to reduce prices. [3]
- As shown in Analysis 3, as countries get richer they tend to move away from centrally planned procurement systems towards decentralised framework agreements with direct delivery, usually by the private sector. These countries tend to pay higher prices for health commodities compared to those with centralized procurement systems. Facilities and regions with their own budgets don't behave homogenously, this can result in more branded medicines being procured and a larger number of suppliers, reducing economies of scale.
- Offsetting the higher prices seen in decentralised systems are savings made in distribution and the efficient use of medicines. One hypothesis is that health facilities and regions with their own budgets buy what they need, there is a "payment-on-delivery" incentive structure, with less waste and diversion compared to a centrally planned procurement system that relies on elaborate forecasts.
- Fragmentation and brand preferences in the private sector result in higher prices at the point of procurement and for patients. Based on the data collected, private sector mean procurement prices are on average ~180% higher than in the public sector. Even when comparing the lowest priced available product in each market, procurement prices were 78% higher in the private sector. However, one possible caveat to this analysis, among others, is that governments avoid the costs associated with running a supply chain that are often hidden from view, such as warehousing, distribution, wastage and corruption.
- LIC and LMIC countries that procured less in volume and value terms tend to be more reliant on imports and did not always get very favourable prices.
- Government departments for mid-sized and large countries have a strong preference for buying locally manufactured medicines. Despite countries like India having consistently lower priced health commodities this is not necessarily going to

---

[3] This has been further explored by Pierre Dubois and colleagues at the University of Toulouse.

translate into Indian medicine uptake across the world as protectionist policies favour local manufacturers.

Analysis 4 - An Assessment of the State of Health Commodity Innovation Diffusion in Developing Countries

- Over 50% of original branded health commodities sold in LMICs and UMICs, in value terms, are over 20 years old from the date of first international launch and are now off-patent. Despite being significantly more expensive than generic alternatives they continue to be used in these markets. The reasons that original brands continue to be used are connected with brand preferences, pharmaceutical industry driven continual medical education and the fear of sub-standard generic medicines in countries with weak regulatory frameworks.
- Innovation diffusion is a big problem in lower income countries. Lower-income countries may miss-out on entire generations of progress in medical commodities, even in therapy areas that are directly relevant to their epidemiological profile.
- There is more to innovation diffusion and access than patent pooling and voluntary licencing. Even when products go generic there is no guarantee they will make it to new markets. The expectation that generic companies will make the investments to take newer medicines to smaller LICs and LMICs that are not already established markets does not always materialise. These investments include health professional training, diagnostics, disease awareness and regulatory activities required to launch a new treatment.

1 Introduction and Background

In 2017, CGD launched a new working group on the Future of Global Health Procurement. The objective of the group is to consider how the global health community can ensure the medium- to long-term relevance, efficiency, quality, affordability, and security of global health procurement. As countries grow richer and lose aid eligibility, and disease burdens and population profiles shift, the landscape of global health is set to change dramatically over the next 10-20 years. CGD, along with partners, is conducting a series of background research projects to inform the working group's deliberations.

This report is based on the findings of the background and research exercise undertaken for the Centre for Global Development's Working Group on the Future of Global Health Procurement by AfRx Consulting Ltd. The focus of this work was to attempt to inform the global health community with answers to the following questions;

- What is the relative market size for commodity procurement of the government, private, and donor/NGO sectors in LICs, LMICs and UMICs?
- How do prices in these different sectors vary?
- How does the composition of what countries buy change over time as they become richer?
- What is the breakdown of pharmaceutical markets between originator products, branded generics, unbranded generics, etc. across low- and middle-income countries?
- How does the diffusion of innovation vary across low- and middle-income countries?

1.1 Definitions and scope of analysis

To help navigate these early results, we offer a few basic definitions to frame the scope of the analysis.

Table 1 Scope and working definitions

Term/Scope	Definitions given the purpose and scope of our analyses
Health commodities included	Pharmaceuticals, hospital consumables, diagnostic devices, long-lasting insecticide-treated nets, biologics including vaccines.[1] In Analysis 3, a basket of 39 tracer products was used to compare medicines prices between countries – see Annex
Countries in Analysis 1 18 LICs 25 LMICs 9 UMICs Country names included in Figure 3: Proportion of Health Commodities Procured by Sector for Latest Available Year	• Countries with a population > 10 million are included. • Countries with GNI per capita < $7,000 are included, and classified per the World Bank's income group categories for 2015.[2] This threshold was chosen with the goal of having South Africa—an upper-middle-income country that receives about $50 million in donor commodity support annually—meet the inclusion criteria.[3] • Syria, Somalia, North Korea, and other countries are excluded due to lack of available GNI and other macroeconomic data.

Term/Scope	Definitions given the purpose and scope of our analyses
	• The 52 countries in this analysis (including Mexico and China) had a combined population of 5.15 billion in 2015.
Countries in Analysis 2 **Zambia** **Ghana** **Senegal** **Kerala State** **Tunisia** **Philippines** **Serbia** **South Africa**	• Country selection was based on data availability for countries with GNI per capita < $7,000. • Database covers both the public and private sectors and should be able to view the two sectors separately. Senegal and Kerala are exceptions to this where it is only possible to view total value and volume in the private sector, however it was possible to access government records on procurement pricing for a basket of goods. • Database should cover at least 70% of the total pharmaceutical market in value terms • Data should be available in both value terms in US$ and in standard unit volumes, with the exception of Ghana • It should be possible to break value and volume sales into therapy areas either by ATC code or linking each individual molecule to a therapy area, as was the case in Ghana.
Countries in Analysis 3 **Brazil, Colombia, Indonesia, Jordan, Kerala, Kyrgyzstan, Lao, Peru, Philippines, Senegal, Serbia, South Africa, Thailand, Tunisia, Ghana, Zambia**	• Country selection was based on data availability for countries that publish figures, or were willing to participate in country pricing comparison. • Online databases where sales are published at an invoice level including price, volume and manufacturers this data was extracted for the basket of health commodities. • Respondent questionnaires were sent out to 40 countries from which we received 8 positive responses to complete the data request and two instances where the local representative helped us to access an online platform. • IMS Health public and private data.

Term/Scope	Definitions given the purpose and scope of our analyses
Countries in Analysis 4 **French West Africa (combined),** **India, Philippines, South Africa,** **Serbia, Thailand, Romania,** **Malaysia, Brazil, Mexico, Turkey** **and the USA**	• Countries selected according to relative size and wealth to represent a spectrum of developing countries. • IMS data required to have over 90% market coverage (this can exclude the public sector if it is not available as innovative products are unlikely to be exclusively present in the public sector) • Over 90% accuracy in the data audit according to the IMS MIDAS evaluation. • Coverage of both the retail and hospital channels for medicine distribution. • One exception was made to these criteria as the Fr. W. Africa database is a retail panel database, but as the only database with countries from sub-Saharan Africa (excluding South Africa) on MIDAS it was kept in.
Timeframe	Analyses 1 and 3 are focussed on **2015**. Due to a lack of regularly available figures on public-private sector split, procurement, and market share of local manufacturers, some data points have been extrapolated from historical data points. For export data, we used an average of 2014-2016 data to account for year-on-year fluctuations. Analysis 2 is based on the last three years of available data for each database. In most cases this means data from 2015-2017. Analysis 4 is based on data from 2017 extracted at the end of the year / early 2018.
Price levels	The price level of international trade data (INCO) is usually either Cost Insurance Freight (CIF) or Freight on Board (FOB). This means that prices are usually close to the manufacturer sale price or tender price, with a mark-up for the cost of freight and insurance. When commodity prices include a mark-up for distribution or even a retail mark-up, a flat percentage is removed to attempt to normalise this to a common procurement price level. • Ex-factory price • Customs Insurance Freight (CIF) or Freight on Board (FOB) price / Procurement price • Wholesaler / CMS price • Pharmacy / Hospital / Clinic price

Term/Scope	Definitions given the purpose and scope of our analyses
Health commodity procurement channel	**Government sector health commodity procurement includes:** • Central medical stores, ministries of health • Regional medical stores, state/group of hospitals • Social security programs **Private sector health commodity procurement includes:** • Large hospitals or pharmacy chains (group purchasing organizations) • Private wholesalers and retailers • Private distributors (e.g., Eurapharma and Laborex across French West Africa) • Government hospitals, clinics, pharmacies purchasing directly from domestic private sector distributors* **Donor health commodity procurement includes:** • Integrated procurement within government systems • Multi-country NGO global tenders (e.g. through Gavi and PAHO)

*One of the issues raised in consultation is the line between public and private sector with respect to procurement, the following explanation hopes to clarify this. If a public or government hospital buys health commodities from a private sector distributor this is considered to be a private sector transaction. However, if a public sector hospital buys from a private distributor under a framework agreement that has been negotiated centrally, regionally or as part of a buying group alongside other public hospitals that would constitute public sector procurement, for the sake of this analysis. This means that a country does not need to operate a centralised procurement system to be considered to engage in the public procurement of medicines.

1.2 Data Sources

A discussion on the different sources of health commodity data available, the value of such data and the respective strengths and weaknesses of different datasets are covered in depth in an accompanying blog [link]. The key sources of data are explained below and then covered in more depth in the methodology section of each analysis

- **Analysis 1: Macro level trends in health commodity procurement** – UN Comtrade Data, Secondary research and Donor / NGO health commodity procurement data.
- **Analysis 2: Changing disease burdens are reflected in changing health commodity consumption –** IMS Health ATC 3 level data for Zambia, Senegal, Kerala, Philippines, South Africa and Serbia. Import records taken directly from the Ghanaian GCNET system.
- **Analysis 3: Procurement Prices Relative to International Reference Prices –** Price and volume data from individual country respondents, MSH pricing data published online, online pricing and volume data for the Philippines, Indonesia and Jordan
- **Analysis 4: An Assessment of the State of Health Commodity Innovation Diffusion in Developing Countries –** IMS Health data from the MIDAS database by licensing status (LIC) for twelve countries including Fr. W. Africa, India, Philippines, Tunisia, Serbia, Thailand, South Africa, Romania, Mexico, Brazil, Malaysia, Turkey and for comparison the USA.

Table 2 Caveats to the data and findings

Issue identified	Explanation
Data anonymisation	The use of IMS Health and counties' data for this study was contingent on not compromising the anonymity of the countries in the dataset. All country data is grouped to avoid revealing sensitive information at an individual country level.
Small sample sizes	There are a limited number of countries with sufficient data coverage of both public and private sectors at each income level. It is necessary to work with the best available. This logic often drives country and analysis selection.
Price levels	To compare private distributor prices with public tender / procurement prices, certain price points in the dataset have been adjusted for distributor mark-ups and predicted average discounts, respectively.
Standard units rather than DDDs	When looking at volumes the ideal unit to compare across therapy areas is defined daily doses (DDDs). However, due to limitations in available data, we have had to use standard units. This can lead to distortions in the volume figures.
IMS Health's data isn't infallible	IMS Health is the gold standard in health commodity data, but the data is only as good as its source. In addition, pricing is typically done at list pricing for distributor sales. This means that prices often include mark-ups for importation, tax and wholesale while excluding discounts. To counter these factors it was necessary to make some assumptions on average mark-up and discounting for each country, which will not perfectly capture in-market price dynamics.
Manufacturer quality analysis caveat	It is difficult to assess the quality of a manufacturer's products without testing the actual products. The best available proxy was to look at whether companies had received internationally acknowledged quality standards, but this was insufficient for a rigorous assessment of medicine quality.
Diagnostics, medical devices and vaccines	IMS Health's data does not completely capture vaccines, medical devices or diagnostic devices for the countries in scope. In addition, public sources of data and requested data responses had far fewer results for medical devices than pharmaceuticals

2 Mapping the Macro-Level Health Commodity Landscape (Analysis 1)

2.1 Objectives

The aim of this analysis is to look at relative spending (as % of health commodity procurement and GDP) and absolute spending on commodities in different countries/income levels, including split between different sources of funding (eg, public payers/private payers/donors). The aim of understanding these elements is to provide a high level picture of the health commodity procurement landscape that goes beyond the traditional donor and public health areas.

2.2 Methodology

Currently there is no global database which encompasses the global consumption of health commodities split by public, private, and NGO sectors. Thus, when approaching this exercise it was necessary to consider other available sources of data.

The methodology for this analysis is broken into three main components. The first is market sizing, which entails estimating the total health commodity market size for each country in scope. Secondly, the authors collated the available sources of data on Donor and NGO procurement of healthcare commodities to estimate spend for each country. Lastly, the markets were split into public vs. private led procurement determined predominantly through desk research. In some instances the research involved reaching out to stakeholders in the respective countries.

2.2.1 Market Sizing

Health commodities in this analysis are defined as pharmaceuticals, biologics, medical devices, contraceptive hormones, vaccines and hospital consumables.[4] LLINs were not included in this analysis due to the absence of specific codes in the Harmonized Commodity Description and Coding Systems (HS) for international trade. Veterinary medicines were deemed to be out of scope. API values are not included in this analysis, though local manufacturing levels are accounted for using estimations as a proportion of the total market size, see Annex.

The methodology used to estimate the total value of a low income health commodity market is as follows. First extract data from UN Comtrade (https://comtrade.un.org/db/dqBasicQuery.aspx) and aggregate the exports of every country to the recipient country using the trade codes listed in the footer. Then minus from this the value the re-exports of said commodities for each country. Trade data tends to

---

[4] These commodities relate to the HS codes – 300210, 300220, 300290, 300310, 300320, 300331, 300339, 300340, 300390, 300410, 300420, 300431, 300432, 300439, 300440, 300450, 300490, 300510, 300590, 300610, 300620, 300630, 300640, 300650, 300660, 300670, 300691, 300692, 300680, 901811, 901812, 901813, 901814, 901819, 901820, 901831, 901832, 901839, 901841, 901849, 901850, 901890, 901910, 901920, 902000, 902110, 902121, 902129, 902131, 902139, 902140, 902150, 902190, 902212, 902213, 902214, 902221, 902230, 902290, 401410, 841920, 940290

fluctuate over time, so an average across three years (2014 – 2016) was taken to estimate consumption for 2015.

This methodology is recommended to estimate the value of a health commodity market over using import records. This is because the port systems of LICs and LMICs are less reliable than those of the countries exporting medicines. However, there are exceptions to this assumption. South Africa appears to under-report the export of health commodities to neighbouring Southern African countries. Equally, there are often issues with the inter-country trade of health commodities in Latin America and the Caribbean that also need to be considered. In addition, there will be some inter-country trading between developing countries that is undeclared but this analysis assumes that this is on a small enough scale to be ignored.

To this international trade value, the analysis then added a factor to account for the value of local manufacturing in each country. This figure is usually based on secondary research but in some instances there are published estimates of total market sizes for health commodities that serve as a benchmark so the proportion of local manufacturing can be calculated from UN Comtrade and the total market size.

An example of how this works. The average value of pharmaceuticals exported to Nigeria between 2014-2016 was $977 million. The Nigerian local manufacturing industry is estimated to account for 30% of the total market in value terms. As a result, the total estimated value of the market in 2015 was $1.395 billion. This methodology is not an exact science. However, in this data constrained environment, it produces the best approximations for market sizes. It is the same or a very similar methodology to that employed by Business Monitor International, IMS Health World Review and the life science industry for low income markets where better data sources do not exist.

The price level of international trade data (INCO) is usually either Cost Insurance Freight (CIF) or Freight on Board (FOB). This means that prices are usually close to the manufacturer sale price or tender price, with a mark-up for the cost of freight and insurance, this price level does not include taxes such as VAT or Customs duty. The value of local manufacturing is calculated at the same level.

For hormonal contraceptives and condoms, data was taken from the RH Supplies Dashboard that covers health commodity consumption by private, public and NGO sectors.[5] This corresponds to the trade data codes 300660 and 401410 that were removed from the total market sizing values to avoid double counting.

2.2.2 Donor health commodity procurement

In certain instances, donor health commodity procurement is available from each respective donor organisation. However, simply aggregating this data to estimate the total procurement value does not yield credible results, since this methodology often results in double counting. This is due to the structure of the purchase programmes; e.g. some purchases pass through large international buying platforms like the Global Fund. Instead, it helps to first think along programmatic lines and source data by therapeutic area.

---

[5] Data extracted from https://www.rhsupplies.org/activities-resources/commodity-gap-analysis/2016/dashboard/ (06/11/2017)

PEPFAR's Country Operational Plans were the primary source for estimating HIV spend on commodities by country for the countries with a high prevalence of the disease, these reports include Global Fund spending as well as government spend on HIV commodities for the countries with the highest HIV burdens. Reproductive health and family planning commodities were based on the RH Interchange created by UNFPA. This database also contains much of the spending by UNDP on these commodities. Malaria was based on the combined purchasing of the President's Malaria Initiative, through their country operational plans, and the Global Fund's PQR database. Vaccines and other products were taken from UNICEF's global procurement summary, which includes GAVI purchasing. Lastly, data was again taken from the Global Fund's PQR database to estimate TB medicine spending but this does not include all spend by the Stop TB Alliance that did not appear to publish details of their procurement activity to a country level. While some GDF spend on TB was captured through the PQR database it does not capture all global spend, so the data collected for tuberculosis was probably the weakest of the main donor therapy areas.

The current estimate of Donors / NGOs spend on healthcare commodities is approximately $6 billion. Through the aggregation of data from these various sources, it was possible to track ~$4.8bn of this spend to a country level. This estimate includes $0.2bn of spend by PMI on insecticide treated be nets that was not in scope in this analysis, due to not having an HS code.

2.2.3 Public vs. Donor / NGO vs. Private Split

This analysis assumes that donor medicines are being delivered to patients through public supply chains and health channels in all cases. This is not true in practice as some Donors and NGOs run or utilise parallel supply chains, such as USAID in Ghana. However, for this analysis, donor funded commodities are included as a component of the overall public supply of medicines.

The figures for splitting the market between public and private sectors is based on secondary data sources. The data is presented as either the ratio between public and private sectors or the absolute value of public procurement. In the latter instances, private sector expenditure is inferred from the total market size.

The majority of health commodity splits were derived from WHO Pharmaceutical Profiles, PEPFAR Country Operational Plans, Industry Publications, primary interviewing, IMS Health Channel Estimates and USAID's SIAPS reports. A full list of public / private sources with the year of most recently available data is available in Annex: Secondary Sources for Public : Private Procurement Split.

The accuracy of these estimates will vary according to the age of the source, the methodology used and the definition of public and private sectors. Importantly, the definition used in this analysis counts any instance of a national level tenders or framework agreements that public facilities are able to draw down medicines from as public sector procurement. Public sector procurement does not have to run through a Central Medical Store or central buying system to be counted, though identifying the precise spend that occurs through these decentralised procurement systems is more challenging. As a result countries with large social security programs under wide-reaching government-imposed price controls, which reimburse health commodity costs incurred by individuals (e.g., Algeria), may be under-represented for public sector procurement as a proportion of total spend.

Estimates for public to private split of health commodities in OECD countries were taken from the WHO's "Health at a Glance 2015" OECD Indicators.

Table 3 Analysis 1 - Main data sources

Source Title	Year	Author/Source	Usage
Used			
UN Comtrade health commodity exports	2015	UN Comtrade	Value estimation
Industry reports on local manufacturing market share (e.g., Bangladesh)	Various	Various	Value estimation
UNIDO Pharmaceutical Sector Profiles (e.g., Kenya)	Various	UNIDO	Value estimation
WHO Pharmaceutical Country Profile (e.g., Bolivia)	2010-2011	WHO	Procurement segmentation
WHO National Health Account reports	Various	WHO	Procurement segmentation
PEPFAR Country Operational Planning reports (e.g., Zimbabwe)	2016, 2017	PEPFAR	Donor value quantification
Systems for Improved Access to Pharmaceuticals and Services (SIAPS) reports (e.g., Angola)	2014	SIAPS	Procurement segmentation
Global Fund PQR database	2006-2015	Global Fund	Donor value quantification
GAVI disbursement database	2001-2016	GAVI	Donor value quantification
President's Malaria Initiative (PMI) Country Operational Planning budgets	2017	USAID (U.S. Global Malaria Coordinator)	Donor value quantification
Other reports on health commodity procurement or public : private split (e.g., Afghanistan)	Various	Various	Procurement segmentation
Reproductive Health Supplies Dashboard Estimates of NGO Spend on RH commodities by country	2014	Reproductive Health Supplies Coalition	Procurement segmentation
IMS Health country data	2014-2017	IMS Health	Various
IMS Health Sales Channel Estimates (MIDAS)	2017	IMS Health	Procurement segmentation
Interviews results from LIC & LMIC procurement departments in Central Medical Stores and Ministries of Health	2017	CGD and partners	Country deep dives

2.3 Results

Results suggest that the overall market for health commodities in the 18 LICs was $4.4 billion in 2015; the market in the 25 LMICs was estimated just over $45 billion for that same year. It is worth noting that the LMIC category includes India ($16 billion), Egypt ($4.8 billion) and Indonesia ($4.7 billion), which together make up over half of the total. The market in the 9 upper-middle-income countries, where data was available is estimated at $147.2 billion. This includes China, which alone consumed ~$106 billion in pharmaceuticals in 2015, of which we estimate that 40% were procured through government tenders that public hospitals were then able to pull down from under framework agreements.

Figure 2 Aggregated Split of National Health Commodity Procurement by Sector in Value Terms
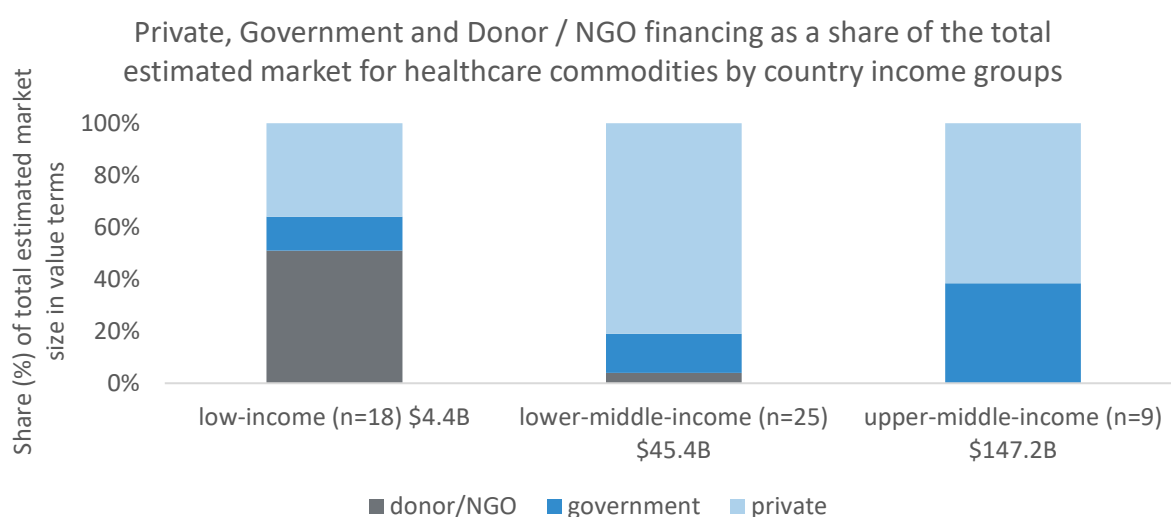
Source: UN Comtrade, AfRx Consulting secondary research. Data sources and definitions listed in Annex Section 1.

To put the findings for low- and middle-income countries into further context, OECD countries consumed around $800 billion worth of pharmaceuticals in 2013, accounting for about 20 percent of total health spending. Of this, about 60 percent, on average, is financed by the public sector if all countries are weighted equally.

To our knowledge, the most recent assessment of these trends predating this work is from the WHO World Medicines Situation 2011 report. WHO's estimates of total pharmaceutical expenditure are based on National Health Accounts data from 161 countries from 2006. These estimates suggest that about two-thirds of pharmaceutical expenditures are financed by private sources in MICs, while the share in LICs is more than three-quarters. These findings are not directly comparable to ours given sample differences as well as other possible reasons: (i) donor funding spiked after 2006 and is especially concentrated in LICs with a high HIV burden; (ii) the WHO analysis only differentiates between public and private sources and does not include donor/NGO funding; and (iii) India, where roughly 90 percent of the market is privately financed, was a LIC in 2006 but is classified as an LMIC in our analysis for 2015.[4]

It is important to note that while these commodities are critical in dealing with healthcare conditions of global importance, $6bn is modest relative to the national health commodity consumption in these same countries. In the 42 LIC and LMIC countries we examined in

this analysis, which had a combined population of 3.3 billion out of the 3.6 billion living in all LICs and LMICs, we were able to identify $4.05bn in donor commodity spend to a country level compared to $49.8 billion spent on health commodity procurement overall in 2015, accounting for 8% of total spend. Though as we will show, some LICs are much more dependent on donor assistance than other countries. In addition many of these commodities are also already being purchased through centralised mechanisms designed to reap the benefits of transnational price : volume arrangements.

This analysis showed that Sub-Saharan African countries on average receive a greater proportion of donor assistance. The region had a total spend of $8.0 billion on health commodities in 2015 for the 23 sub-Saharan African countries in scope, excluding South Africa for this analysis, of which donor funds accounted for ~40% of health commodity spend.

Data on countries that are largely donor dependent was gathered from PEPFAR, PMI, Global Fund, UNICEF, UNFPA, UNDP and Stop TB. Table 4 shows the main areas of health commodity spend in lower income countries and shows the importance of HIV, Vaccines and Malaria spend in eight markets. Malaria spend in this instance does include spend on LLINs and ITNs though these haven't been captured in the overall market sizing analysis.

Table 4 Health Commodity Market Structure for Eight LICs in US$ Millions (2015) - Democratic Republic of Congo (DRC), Haiti, Malawi, Mozambique, Tanzania, Rwanda, Uganda and Zimbabwe

	PEPFAR	Global Fund	Local Government	RH Supplies Interchange	PMI	Stop TB	UNICEF / GAVI	Private Sector	Unaccounted / Other	Total
Commodities	277	710	241	60	72	22	333	344	20	**2,056**
%	*13%*	*35%*	*12%*	*3%*	*4%*	*1%*	*16%*	*17%*	*1%*	

Commodities	PEPFAR	Global Fund	Local Government	RH Supplies Interchange	PMI	Stop TB	UNICEF / GAVI	Private Sector	Unaccounted / Other	Total
ARVs	179	537	35	-	-	-	-	-	0	**751**
Condoms	10	9	0	21	-	-	-	-	1	**41**
Lab reagents	13	73	2	-	-	-	-	-	10	**97**
Rapid test kits	27	56	4	-	-	-	-	-	3	**89**
Viral load commodities	28	11	0	-	-	-	-	-	0	**39**
VMMC kits	18	2	0	-	-	-	-	-	1	**21**
UNICEF (mostly vaccines)	-	-	-	-	-	-	333	-	-	**333**
Malaria	-	161		-	72	-	-	-	-	**233**
TB	-	8	6	-	-	22	-	-	-	**36**
Contraceptives	-	5	-	39	-	-		-	-	**44**
Other Commodities	10	26	194	-	-	-	-	363	4	**573**

NB: The hyphen (-) refers to a value being unknown or impossible to quantify, rather than representing a zero. RH Supplies Interchange procurement mostly by USAID and UNFPA. Country figures for TB are based on the WHO's national TB country budgets, divided by a Donor Global TB Funding : TB Health Commodity ratio of 25%.
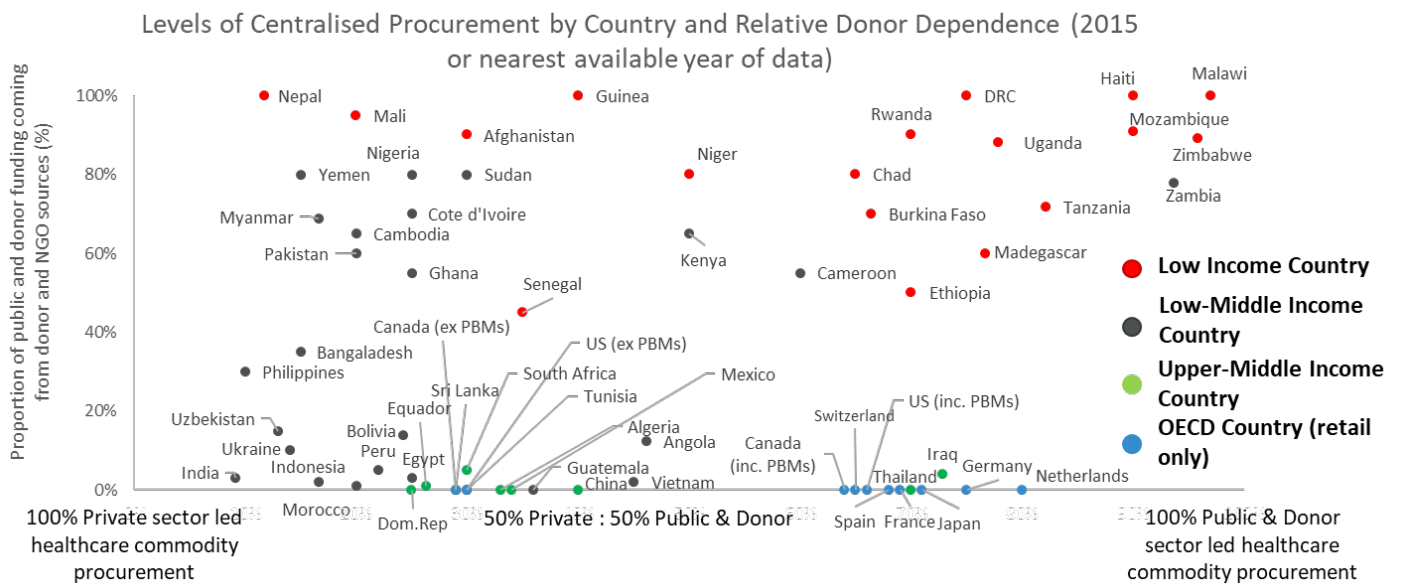
Looking at this analysis of consumption in these highly donor dependent countries what is striking is how little is being spent on non-donor prioritised areas. Only $573 million or 28% of spend appears to be going to non-donor priority commodities, and even here the private sector is likely to also be supplying a significant amount of malaria medicines and contraceptives, even if we cannot quantify it. In value terms, the small size of the private sector in these countries and relatively small government spending indicates that, most likely, therapy areas such as non-communicable diseases are going to be underserved. This isn't a criticism, more a comment on the impact of donor led health prioritisation in a resource constrained environment.

These results indicate that a commodities transition is occurring from a predominantly public consolidated and donor-funded procurement landscape in LICs to a predominantly privately financed system in MICs. In some ways this points to the priorities ditch hypothesis—a concept explained here—applied to health commodities.

Figure 3 shows the 52 LIC, LMIC and UMIC countries with suitable data and where they sit currently in terms of the proportion of the national health commodity procurement. The proportion of spend that is both public and donor sector driven versus private sector driven is on the X-axis. Then, assuming all donor commodities as flowing through the public health channels, the Y-axis shows the proportion of the public and Donor sector that is funded by aid.

In addition to the 52 low- and middle-income countries, this analysis also includes some large OECD countries for reference. Though the public / private split for these is only based on pharmaceutical purchasing and does not include the hospital procurement channels, that usually account for 20% of total pharmaceutical consumption in developed countries. The hospital channels in OECD countries can be assumed to typically be more public sector funded than the retail channels.

Figure 3 Proportion of Health Commodities Procured by Sector for Latest Available Year

Levels of Centralised Procurement by Country and Relative Donor Dependence (2015 or nearest available year of data)

This analysis shows that most LIC countries receive large amounts of donor health commodity support (generally anglophone Southern and East African countries with high prevalence of HIV), and sit in the top right hand quadrant. This indicates high levels of public health commodity procurement, but this is almost completely financed by the donors.

The richer LMIC countries usually appear further left on Figure 3, reflecting the growing importance of private sector procurement as wealth increases. As countries move closer to the upper middle income status, they receive less and less donor support appearing in the bottom left quadrant as the private sector accounts for a much higher proportion of spend. Lastly, as countries reach UMIC and eventually HIC status, the proportion of public funding for health commodities seems to increase. However, this analysis is a snapshot based on the latest available year of data and does not imply any form of path dependency or that this path of transition is guaranteed.

The two exceptions to this final point are Canada and the US where a large proportion of healthcare is being driven through private insurance. This still represents a consolidated form of procurement. To illustrate this further, Figure 3 also shows Canada and the US including the private health insurance component (PBMs). This analysis does not imply that just because procurement is private sector driven it is intrinsically better or worse, however in LICs and LMICs where levels of private health insurance are very low, high levels of private procurement , in most cases, probably reflect high levels of OOP spend on health commodities. Private sector procurement in LICs and LMICs also does tend to be extremely fragmented which is not good from a procurement perspective as it results in higher prices, though not in all cases, for example in French West Africa the private sector is quite consolidate.

The analysis in Figure 3 is looking at public vs. private sector procurement as a proxy for how consolidated procurement in a country is. If it were possible to measure the level of consolidation or fragmentation in the private sector of each of these countries that would be an interesting additional layer that would say more about where the opportunities to reform procurement and pool spending power in the private sector is greatest. Sadly due to data constraints this is not possible, though the IFC has done some work on categorising supply chains into restricted by law or regulation, mostly fragmented, initial consolidation, moderate consolidation and consolidated.[6]

---

[6] International Finance Corporation (2017). *Private Sector Pharmaceutical Distribution and Retailing in Emerging Markets.*

Figure 4 Illustration of consolidation of pharmaceutical distributors and retail pharmacy chains

	Restricted by Law or Regulation	Mostly Fragmented	Initial Consolidation	Moderate Consolidation	Consolidated
Category					
Description	Retail Pharmacy or Wholesaler/Distributor consolidation is restricted by national law or regulation	Thousands of Wholesalers/ Distributors with no clear set of market leaders	Initial stage of market consolidation with 1+ retail pharmacy chain growing beyond 5 stores	National or city-level Retail Pharmacy chains exist	50%+of the retail pharmacy market is consolidated into an oligopoly
Example Countries	• Cambodia • Cameroon • Coted'Ivoire • Uganda • Egypt • Morocco • Turkey • Vietnam	• Malawi • Mozambique • Nigeria • Sudan • Guatemala • Kazakhstan • Nigeria	• Ghana • Algeria • India	• South Africa • Latin America- Brazil, Peru, Mexico, Chile • China	• Mali (Distributors) • US • UK • Philippines

2.4 Key Findings

2.4.1 Governments are failing to keep up with the demand for health commodities

As developing countries get richer, older and more populous their governments are failing to grow the provision of publicly procured health commodities fast enough to keep up with the expanding demand for health services. Based on case studies such as the example from Kenya in Figure 3, the Ministries of Health and devolved governance structures are prioritising salaries and infrastructure over health commodity expenditure. The result of this is that health commodity costs are transferred to patients, predominantly in the form of out-of-pocket payments.[7]

From a policy perspective this would suggest that greater spend on health commodities by the public sector could increase access, lower the number of families being pushed into poverty through health cost shocks and yield price savings from procuring greater volumes. However, money for this would need to come from somewhere and funding is still going to be required for healthcare professionals. Ultimately, countries experiencing a transition away from donor aid will require effective procurement and low health commodity prices to achieving UHC.

Looking at Kenya as an example country with a relatively good public procurement mechanism (KEMSA) we can see that of the total government budget only KES10.6bn (8%)

---

[7] Evans, D. and Etienne, C. (2010). Health systems financing and the path to universal coverage. Bulletin of the World Health Organization, 88(6), pp.402-402.

of total government health spending[8] was on health commodity procurement. At a national level in Kenya health commodity procurement accounted for 21% of total healthcare expenditure.[9] Consequently Kenyan government expenditure only accounted for 15% of total health commodity expenditure. It is likely that the semi-autonomous government agencies (mainly tertiary and teaching hospitals) would also spend some of their grant allocations on medicines and under development funding there is an additional KES4.5bn for medical equipment. However, the gap between government funding for commodities and the total market size will be made up by donor funded commodities (~$250mn or 30% of total) and out-of-pocket payments by patients, as only 11% of the population is covered by the National Hospital Insurance Fund (NHIF).[10]

One of the key recommendations in the analysis was, "Although it may be difficult to accomplish in the short run, counties must strategize how to bring down the allocation to personnel emoluments to the recommended 50 to 60 percent of their recurrent budgets." This is down from the spend of 70% of the recurring budget.[5]

Figure 5 Example of National Health Budget Attributed by Spend
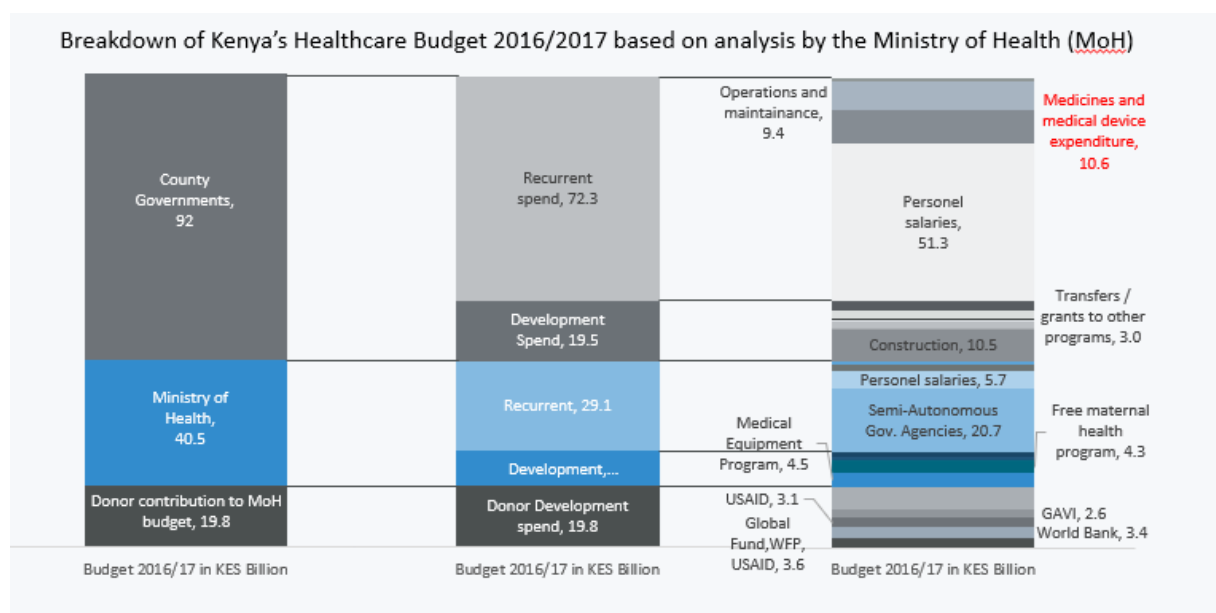
The assertion that governments are typically prioritising salaries over health commodities is not based on a full budget analysis across all in-scope countries and the respective budgets of LICs and LMICs could be scrutinised further. However, there are multiple examples of how healthcare spend at the national and sub-national levels is favouring salaries and infrastructure over the provision of commodities.

It is not guaranteed that every country will go through this evolution from donor dependency to private sector led procurement, then back to government led procurement implied in Figure 3. If countries were to allocate more resources to health commodity

---

[8] National and County Health Budget Analysis FY 2016/17 – Ministry of Health
[9] Based on Healthcare Commodity Market sizings created by AfRx compared against WHO National Health Account figures for Total Healthcare Expenditure in 2015
[10] USAID Case Study: Kenya National Hospital Insurance Fund (NHIF) Premium Collection for the Informal Sector (2014)

procurement during transition from lower income status to middle income it seems entirely possible that they could remain public sector funded. The ideal is for governments to take on more of the financing responsibility for health commodities to reduce the levels of OOP spend and the associated financial catastrophe for individuals. A country being public sector finance led does not necessarily mean the government must run forecasting, a CMS and state owned trucks. Decentralised financial systems, framework contracts and strong regulations can be used, potentially more effectively, to pool demand.

One country that seems to be at least partially successful in maintaining levels of public spending on health commodities so far is Ethiopia, which despite falling levels of donor dependence the government is spending a significant amount on health commodities, see Figure 3.

2.4.2 Recognising the importance of the private sector in low- and middle-income countries

As countries transition and donors gradually withdraw their support, the private sector in Lower-Middle Income Countries, in particular, is stepping in to fill the gap in health commodity provision and taking over the role as the primary procurer of health commodities. Governments tend to provide a greater proportion of health commodities once more when countries reach Upper-Middle Income status.

Bearing this finding in mind it is worth noting that there are currently few initiatives targeted at improving the private sector supply of healthcare commodities in developing countries and LMICs in particular. The private sector alone is responsible for the procurement and supply chain of upwards of 80% of all health commodities in low- and middle-income countries. Thus, there is a need to understand how to address the current levels of fragmentation in the health commodity supply chains and how to leverage the reach and expertise of the private sector for the public good through PPP arrangements. The skills to manage and regulate the private health commodity sector is recognised as a potential capacity gap in LICs and LMICs.

Ongoing or previous initiatives include DfID's Private Sector Innovation Programme for Health (PSP4H), which has looked to create a pooling mechanism for pharmacies, with limited results. This has since been taken over by Management Science for Health (MSH) that has launched a commercial group purchasing organisation (GPO) in Kenya called MedSource. How successful this will be remains to be seen but there also needs to be consolidation in procurement at the point of importation to reduce private sector fragmentation, and consolidation of wholesaling at a regional level, not just in-country pooled procurement at the retail level.

Countries have looked at capping prices or distributor and retailer mark-ups, but the large mark-ups fund provision in many low- and middle-income countries. Reducing these means finding alternative sources of funding or efficiencies for the supply chain, or else shortages are likely in the harder to reach (more expensive to reach) rural areas.

An example of how co-operation between the public and private sectors can work is illustrated in a report on the CENAME, the main health commodity procurement agency in Cameroon by USAID. This report outlines the structure of the countries pharmaceutical market. In addition, it explains how a partnership between public and private sectors that has

enabled the public sector to procure a basket of 30 medicines, which it sells directly to the private sector distributors for a small profit margin –

"The private pharmaceutical sector contains two subsectors: (a) the private for-profit, which represents approximately 40 percent of the pharmaceutical market in Cameroon and includes distributor wholesalers such as LABOREX, BIOPHARM, UCPHARM, PHARMACAM, and SDPP, and approximately 400 private pharmacies; and (b) the private non-profit, which includes faith-based Catholic, Reformed, and Islamic organizations and NGOs. The for-profit private sector was not considered in this study. However, it should be noted that the pharmaceutical sector in Cameroon is an excellent model of cooperation between the public and private sectors, thanks to the partnership between international backers and CENAME, which in turn maintains good commercial relations with faith-based HFs, NGOs, and private distributor wholesalers. For CENAME's sales in 2007, [private] faith-based hospitals alone represented over 18 percent of the purchases."

3 Changing disease burdens are reflected in changing health commodity consumption (Analysis 2)

3.1 Objectives

In the previous analysis, we found that countries in different income groups tend to procure and fund health commodities in different ways. This analysis provides an assessment of how the composition of commodities procured varies among countries at different stages of development.

This analysis aims to provide background information on the types of products purchased by different countries to comment on how health commodity procurement changes over time/as countries become wealthier. To address the question of whether there is evidence increasing wealth leading to structural changes in commodity consumption, Analysis 2 uses data on the actual consumption of medicines by a selection of countries of differing developmental levels and the sample covers the past three years.

3.2 Methodology
3.2.1 Country selection and data acquisition

The first challenge associated with analysing the trends in health commodity consumption for developing countries was identifying robust datasets to analyse. Hence, it was important to establish a set of criteria to identify countries with sufficient data availability. As covered in this blog [insert link] the availability of health commodity expenditure data is very limited in low and low-middle income countries. The available data tended to be focussed around pharmaceuticals rather than medical devices. As follows, this is the focus of the analysis. For the selection of countries, the criteria were defined as;

- Country should have a lower GNI / capita than South Africa in 2015 (the wealthiest country to still be receiving donor assistance in health commodity procurement)
- Databases must cover both the public and private sectors (as defined in Table 1: Scope and Working Definitions) and be able to view the two separately from each other.
- Databases must cover both the retail and hospital segments of the health commodity markets
- Database should cover at least 70% of the total pharmaceutical market in value terms
- Data must be available in both value terms in US$ terms and in standard unit volumes
- It must be possible to break value and volume sales into therapy areas either by ATC code or linking each individual molecule to a generalised therapy area

Only six countries met these criteria fully; Zambia, Ghana, South Africa, Tunisia, Serbia and the Philippines. Uganda was included initially, but data quality issues led to it being deemed currently inadmissible. This data was all purchased from the local offices of IMS Health territories, except for Ghana, whose data was provided by the Ghanaian FDA from the GC Net import system.

The sample was supplemented with IMS Health data on the private sectors of Senegal and Kerala State in India. The latter two were added despite lacking full data on their respective public sectors. The rationale being that the private sector in and of itself would add value to the analysis, since it makes up a large proportion of the total health commodity procurement.[11],[12] As for the public sector, it was possible to obtain information on the public commodity procurement prices for Senegal and Kerala State through direct interactions with government procurement departments, though not comprehensive summaries of public procurement.

Processing of Data from Ghana's GC Net System

Data from IMS Health already comes processed into a format that is suitable for therapy area analysis. This is called the Anatomical Therapeutic Classification (ATC) system and it is used to organise medicines into groups according to chemical similarities or commonalities in the physiological mechanism of action.

The Ghanaian import data from the GC Net system is not organised by therapy area or ATC code. Nor is it available in any cleaned format. To make sense of the data for this analysis it was necessary to identify the highest value commodity imports in the database and search for these key molecules and brand names within the overall database. This was done using a "string" lookup methodology with a Macro written with VBA in Microsoft Excel. With this methodology and the top 400 molecules and brand names it was possible to categorise approximately 90% of the Ghanaian import data by value into therapy areas. Due to constraints around time and budget it was impossible for this analysis to process the data by volume, as this would require a more refined methodology.

Even with a significant budget to acquire data, only a few countries were eligible for the analysis in terms of quality and quantity of the data. As a result, the countries examined in this analysis are not selected according to their wealth level or budgetary size. Rather, they are included because their data is of high enough quality to be admissible for our analysis. In an ideal world this analysis would include data on countries such as Nigeria, Kenya and Ethiopia, which receive large amounts of donor commodity procurement assistance.

3.2.2 Data processing

The CGD purchased data from IMS Health at an **ATC3 level** and processed the Ghanaian data for this analysis. The 332 ATC codes were then grouped into 55 major therapeutic areas according to a subjective assessment of how they should be combined. This definition is similar to the ATC 2 level definition, albeit with slight variations. In addition, each ATC 3 code was also assigned to be either linked with the treatment of Chronic conditions, Acute conditions or HIV. The latter was given its own category due to its relative importance of this condition and the size of the ARVs market.

---

[11] Interview with the Ministry of Health in Senegal revealed their estimate to be the market is 70% private sector driven.
[12] Indian National Health Accounts Report 2013 / 2014 estimates the proportion of the national pharmaceutical market to be 91% private sector driven.

Extensive quality assurance is imperative subsequent to data procurement. Quality assurance in this instance mostly refers to examining the data with a critical eye and querying points that look unusual, unexpected or distortionary. Upon examining the IMS Health and Ghana therapy area data in depth it was necessary to query multiple points within both datasets. In some cases there were errors in the way the data had been pulled out. In others it was necessary to remove or moderate results that could not otherwise be explained and which risked disrupting the entire analysis. Examples of this include:

- In the Ghanaian database the value of antiparasitic imports was reduced due to what appeared to be an overstatement of the value of the goods. This was done on the advice of WHO representatives in the working group.
- In the South African database, the data from Gauteng province was removed from the analysis as the public sector data only covered 2/3 public sector depots while the private sector had full coverage. Including this province would therefore skew the analysis.
- In the Philippines' database the volume of ophthalmic medication sales appeared unfeasibly high, it was necessary to moderate this to prevent it from affecting the analysis.

Following the quality assurance steps, the countries were grouped together according to their rough level of economic development, as per agreement between the CGD and IMS Health. In practice this meant that "All analyses using this data must combine data from three or more countries / areas, and that no analysis allows for the identification in volume or value terms of any single country / area."

There were not enough countries of the same economic level to use the World Bank income groupings to combine countries together according to the LIC, LMIC and UMIC categories. As such, the countries were grouped into Lower Income Countries (Senegal, Zambia, Ghana and Kerala state) and Middle Income Countries (Philippines, Tunisia, South Africa and Serbia).

Upon doing the analysis it was found that the health commodity consumption of Kerala state in terms of the type of commodities was closer to the Middle Income Countries, than it was to the Lower Income Countries. Despite this, it was decided to treat it as a Lower Income Country throughout. It is interesting to note that Kerala is so much closer to a middle income country and this indicates the level of diversity there is in health commodity consumption between countries, also potentially reflecting the differing epidemiological challenges between the African and Asian continents, Kerala State does not have a high burden of HIV for example but has a large burden from diabetes.

In addition to looking at the therapy areas according to income level, it was also a priority to understand the differences in public and private sector health commodity consumption. For this purpose the data was sub-divided to therapy area by national share of public and private sectors.

Data for South Africa and Senegal was provided in units rather than in standard units. It was necessary to convert these using an average SU per unit conversion supplied by IMS Health. This may introduce a small amount of inaccuracy into the volume analysis. However, the effects should be limited.

Two of the databases (Zambia and Ghana) encompass data collected from different sources and the price levels differ from the other countries. However, as all countries were weighted equally it was not necessary to take differences in price, taxation or average levels of discounting into account for this analysis, though these issues were significant in Analysis 3.

Table 5 Key Data Sources for Analysis 2

Country	Income Level (2016 GNI/ capita Atlas Method)	Total % Coverage	Channel's covered	Source and Price Level	Other Caveats / notes
Serbia	MIC ($5,310)	93%	Public pharmacy, public hospital, private pharmacy, private hospital.	IMS Health - Average wholesaler/manufacturer sell in price	Average discount of 30% applied to public prices based on reported discounts[13]
Tunisia	MIC ($3,690)	100%	Public sector, private sector	IMS Health - Regulated prices at public level	
Philippines	MIC ($3,580)	100%	Private sector, public tender, public hospital	IMS Health - Manufacturer list price (even for tender information)	Public prices from online database applied with a 20% discount for private sector distribution costs
South Africa	MIC ($5,490)	100%	Private sector, public depots (tenders), public direct delivery	IMS Health - Retail panel – based on Single Exit Price; Hospital Panel based on the average of tender prices and wholesaler delivery prices.	37% discount applied to the private sector (4% distribution fee + 33% Dispensing fee)[14] Only covers 3/9 states – KwaZulu-Natal, North West and Eastern Cape
Zambia	Lower Income Country ($1,360)	100%	Public (CMS), Private sector	IMS Health - Import prices as declared to the relevant regulatory agency, sometimes as FOB, sometimes as CIF or other.	
Kerala State (India)	Lower Income Country ($~1,500)	95% (projected)	Private doctors, private hospitals, private pharmacies	IMS Health - Average wholesaler/manufacturer price.	Projected from 7,000 out of 22,000 stockists
Senegal	Lower Income Country ($950)	70%	Private sector only	IMS Health - Average wholesaler/manufacturer price.	Retail only but coverage of private sector is 95%
Ghana	Lower Income Country ($1,380)	80%	Private and public sector imports only – missing local manufacturing	GC Net import record data - Import prices as declared to the relevant regulatory agency – CIF in GHC.	Data only in value terms at a therapy area level. Cannot do ATC3 analysis.

---

[13] Analysis of Possible Savings on Pharmaceuticals in Serbia - World Bank's Human Development Network (2015)

[14] Price Formation in the South African Pharmaceutical Market (2017). Hardin Ratshisusu, Deputy Commissioner, Competition Commission South Africa
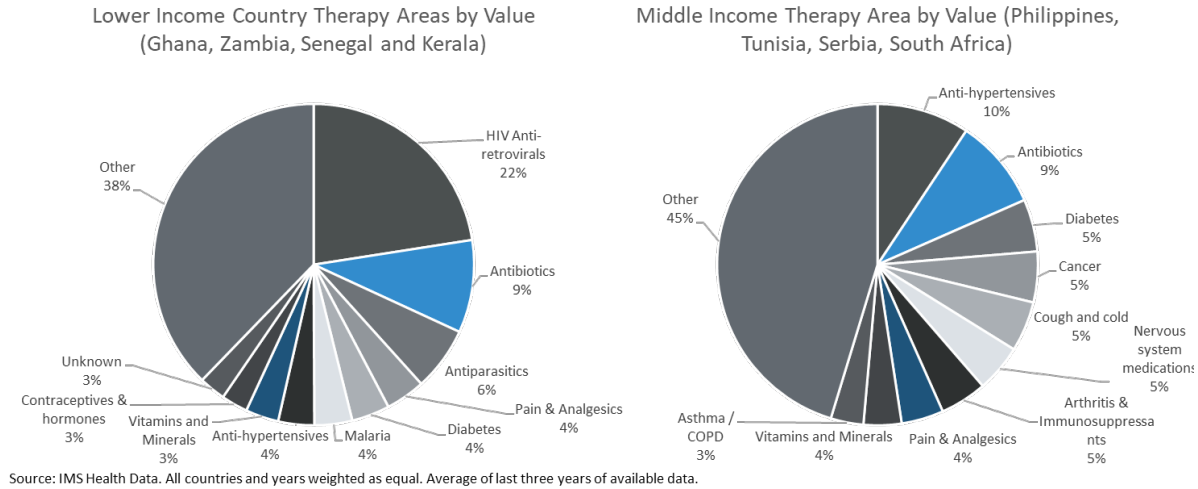
3.3 Results

As illustrated in Figure 6 and Figure 7, HIV is the biggest spending area for the Lower Income Countries. On the back of the findings from the summation of donor data in Analysis 1, this is in line with our expectations. These Lower Income Countries are also procuring a large amount of antibiotics accounting for 13% of volume and 9% of value. In contrast the middle income countries, with the exception of South Africa, do not have a serious epidemiological burden from HIV and as such they purchase far less medicine of this type.

Instead the Middle Income Countries tend to be consume more medicines for non-communicable diseases such as diabetes, hypertension and cancer. Under the category of Nervous System Medications the largest components were anti-psychotics, sedatives and psycho-stimulants.

Including Senegal and Kerala state in this total market analysis is not ideal as the data coverage excludes the public sector and in Senegal's case is biased towards retail pharmacies over the hospital channel. However, in the absence of other available data on lower income markets this was necessary, to have enough countries to meet the anonymisation criteria. IMS Health's Senegal data covers ~70% of the total market and Kerala State's data covers ~90% of the total market.

Figure 6 Total Market Split by Therapy Area in Value Terms ($)

Source: IMS Health Data. All countries and years weighted as equal. Average of last three years of available data.

Note: The ten therapy areas (specified by 55 aggregated definitions) shown in each figure represent those that constitute the largest share by value of the total health commodity market for the public and private sectors, excluding vaccines. The "other" category is an aggregation of all remaining therapy areas included in the analysis. Data for Ghana is from the Ghanaian FDA's import GCNet database, processed by molecule into pharmaceutical therapy areas. Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.

Looking at the PEPFAR Country Operational Plan for South Africa's health commodity procurement the country is buying around $375 million in ARVs and other relevant medicines.[15] The private sector is thought to account for ~20% of value but only ~10% of volume which would give a total spend of around $500mn. However, this is still relatively
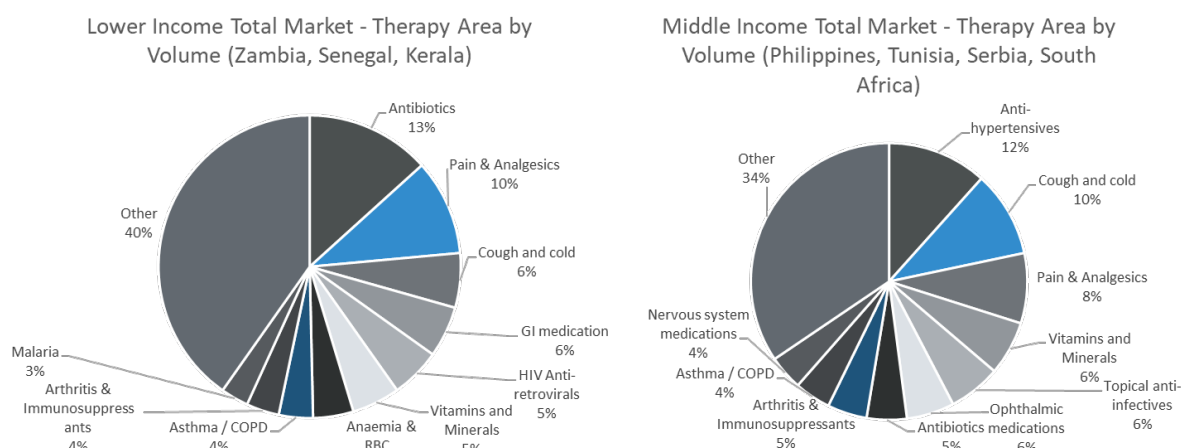
---

[15] South Africa Country Operational Plan 2017 (COP17) Strategic Direction Summary (SDS).

small compared to the total size of the South African market. It is helpful to look at the South African example as, from an epidemiology perspective, it is closer to the majority of major African countries transitioning from aid in the next decade.

Repeating the same analysis for volume (in Standard Units), the high volume areas between the lower and middle income countries tend to be more similar; over-the-counter medicines such as for pain and cough/cold tend to have high volume sales and low prices. The major difference between the value and volume analyses is that Ghana has been removed from Graph 4, as it was not possible to generate sufficiently accurate volume data without processing the Ghana import data further.

Figure 7 Total Market Split by Therapy Area in Volume Terms (SU)

Lower Income Total Market - Therapy Area by Volume (Zambia, Senegal, Kerala)

Middle Income Total Market - Therapy Area by Volume (Philippines, Tunisia, Serbia, South Africa)

Source: IMS Health Data. All countries and years weighted as equal. Average of last three years of available data.

Note: The ten therapy areas (specified by 55 aggregated definitions) shown in each figure represent those that constitute the largest share by value of the total health commodity market for the public and private sectors, excluding vaccines. The "other" category is an aggregation of all remaining therapy areas included in the analysis. Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.
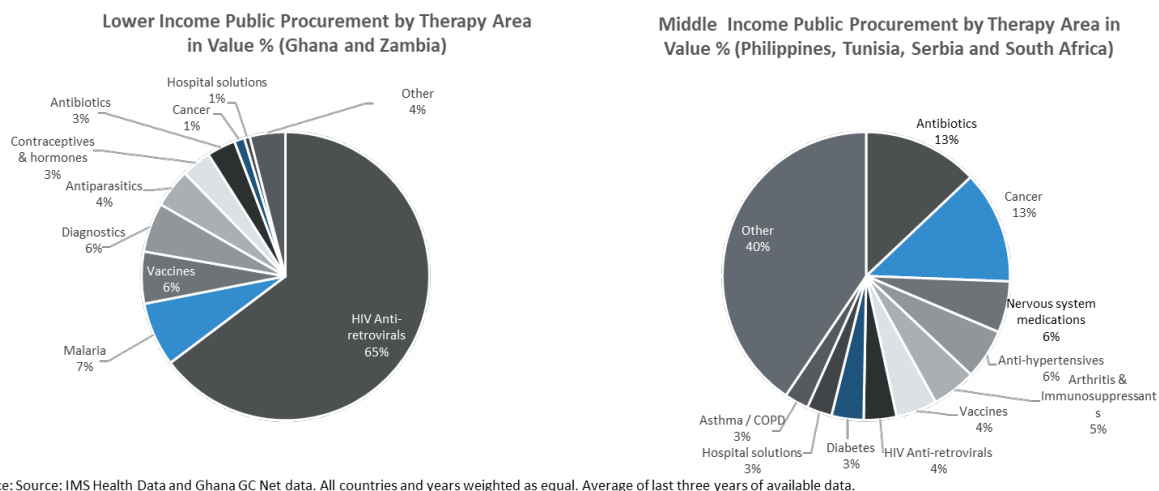
3.3.1 Therapy Areas split by Public and Private sector

Looking at the public sector only requires that Kerala and Senegal are omitted from the analysis, as their data only include the private sectors of their respective countries. Zambia is the only country in the lower income cohort, which has sufficient in terms of quantity and quality public sector volume data. Due to the rule around anonymisation of data, this data cannot be shown. Thus, consumption in lower income countries is only depicted in value terms shown in Figure 8.

The most notable takeaway from the analysis of public sector procurement is the large proportion of HIV spending. At first glance, HIV and Anti-retrovirals accounting for 65% of public sector (including NGO) spend seems high. However, scrutinising the numbers on a country level, gives credence to this finding. E.g. in Zambia, the PEPFAR country operational plan for ARV procurement estimated a spend of $100 million in 2016. The total size of the market is only around $200 million. Once the private sector – albeit small – is accounted for, 65% is high but not impossible

In addition, the burning down of the Ghanaian CMS in 2015, which resulted in the loss of $110 million in uninsured medicines, would have required a restocking of donor medicines.[16] Furthermore, the Ghana data is excluding local manufacturers (20% of the market), who are likely to sell a significant proportion to the government outside of donor commodities. This is likely to be creating a distortion to further inflate the size of HIV's share of public procurement.

Figure 8 Public Sector Market Split by Therapy Area in Value Terms ($)

Lower Income Public Procurement by Therapy Area in Value % (Ghana and Zambia)

Middle Income Public Procurement by Therapy Area in Value % (Philippines, Tunisia, Serbia and South Africa)

Source: Source: IMS Health Data and Ghana GC Net data. All countries and years weighted as equal. Average of last three years of available data.

Note: The ten therapy areas (specified by 55 aggregated definitions) shown in each figure represent those that constitute the largest share by value of the total health commodity market for the public and private sectors, excluding vaccines. The "other" category is an aggregation of all remaining therapy areas included in the analysis. Data for Ghana is from the Ghanaian FDA's import GCNet database, processed by molecule into pharmaceutical therapy areas. Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.

Public sector procurement for oncology medicines in middle income countries is relatively high at 13% of total procurement value. This trend is being driven by two of the four Middle Income Countries with public sector data. The other two spent relatively little on Cancer treatment. This exemplifies how procurement profiles differ among countries with similar income levels.

The two drug classes with the highest public sector spend were L01G Monoclonal Antibodies and L01H Protein Kinase Inhibitors. Both classes of medicine have extremely high average prices. In light of this, the fact that some middle income governments choose to prioritize the treatment of cancer is interesting.

IMS Health evaluates whether a product has been sold by the private or public sector by assessing the individual facility, which the distributor delivered the medicine to. If the facility is a government hospital, the assumption is that the medicine is procured and used by the public sector. However, the line between public and private facilities is not always completely clear-cut. In some countries high value medicines are being sold privately through the public tertiary care systems to patients in a manner that appears to be public sector, but in reality is private sector as the medicines are paid by the patient and not funded by the government.

---

[16] The Central Medical Store Fire Disaster: A Test for Institutional Compliance in Disaster Prevention in Ghana
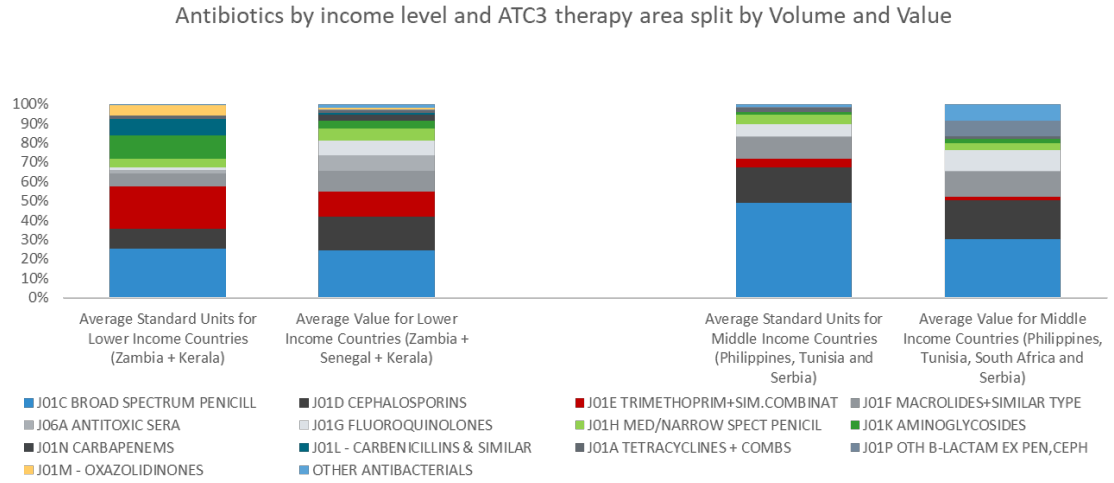
Whether these highly expensive medicines are being procured by the government or not would require further investigation. If these medicines are procured and found to be overly expensive from a health technology assessment perspective, limiting their usage or attempting to negotiate for better prices, possibly with a public co-pay, could yield considerable savings and increased access for public and even private sector patients.

Figure 9 Private Sector Market Split by Therapy Area in Value Terms ($)

Lower Income Private Procurement by Therapy Area in Value % (Ghana, Senegal and Zambia)
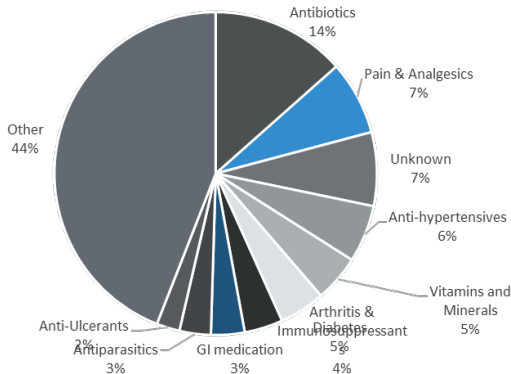
Middle Income Private Procurement by Therapy Area in Value % (Kerala, Philippines, Tunisia, Serbia and South Africa)
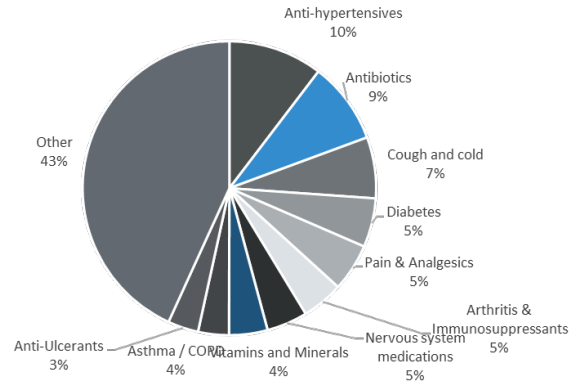
Source: IMS Health Data. All countries and years weighted as equal. Average of last three years of available data.

Note: The ten therapy areas (specified by 55 aggregated definitions) shown in each figure represent those that constitute the largest share by value of the total health commodity market for the public and private sectors, excluding vaccines. The "other" category is an aggregation of all remaining therapy areas included in the analysis. Data for Ghana is from the Ghanaian FDA's import GCNet database, processed by molecule into pharmaceutical therapy areas. Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.

In lower income markets the private sector is predominantly represented through over-the-counter medications. Middle Income Markets have a greater proportion of the medications in prescription driven therapy areas. Some OTC some areas like pain and cough and cold medication make up a notable share as well. The overall market trend of medication for non-communicable disease areas like hypertension and diabetes remains consistent with the overall market trend with the private sector driving the uptake. The only exception is cancer, which is primarily publicly procured.

3.3.2 Therapy area analyses

In addition to comparing the usage of medicines in countries at an aggregated therapy area level, it is worthwhile analysing the utilisation of medicines within each therapy area by value and volume. These can also be split by public and private utilisation of medication. In this analysis, medicines are classified at an ATC 3 therapy area level, rather than using the 55 aggregated definitions, see Figure 10.

35

Figure 10 Antibiotics by income level and ATC3 therapy area by volume and value

Antibiotics by income level and ATC3 therapy area split by Volume and Value

Source: Data sources and definitions listed in Annex Section 2. *Kerala is lower income economically but it's commodity consumption is closer to middle income

Given adequate data, it is possible to split therapy areas by NFC code, which describes the form of the medicines. In the case of antibiotics this would enable differentiation of the injectable hospital antibiotics from oral antibiotics, for example. This analysis was not performed for the CGD working group.

Based on the analysis of the antibiotic space, as shown in Figure 10, but also analysing data on therapy areas such as oncology and hypertension, this analysis found that the medicines used in lower income environments tend to be from older classes of medicines. Moreover, the proportion of these medicines differ significantly between the two groupings. Innovation diffusion is still a big problem; there is a group of countries, which will potentially miss entire generations of progress. Even when products go generic there is no guarantee they will make it to these countries. We discuss this further below.

3.4 Key Findings

There are a lot of different analyses that could be performed with these national therapy area datasets. However, the rules around anonymisation for the publishing of findings have limited the number of ways that the data can be used, especially at a country-by-country level. While it would be possible to do a deep dive on each of the 55 therapy areas to look at differences in consumption it would take up too much resource for the purposes of the CGD WG.

This analysis has found substantial differences in the consumption of health commodities between Lower Income Countries in our sample and the Middle Income Countries. Most of these differences are to be expected with a transition from HIV, malaria and deworming to hypertension, diabetes and cancer. However, there are also notable differences in country level spending between countries of a similar income level. For example, one middle income country spent 12% of health commodity spend on diabetes while another had 3% of spend on the disease. Equally in oncology two different middle income countries spent 8% and 2% on oncology respectively.

Publicly funded healthcare systems want to treat the most number of people, with the greatest health impact for the least amount of money. Therefore, health system strengthening often starts with vaccination campaigns and maternal and neonatal health. Controlling communicable diseases and reducing infant and maternal mortality are prioritized for delivering the greatest long term health impact per dollar. However, in many LICs and LMICs donor priorities have driven health priority setting at a national level. This has led to creating silos of healthcare provision by thematic area, underinvestment in non-donor funded areas and weak systems to select health commodities, negotiate prices, procure and make the medicines available. This includes negotiating with the private sector, regulating the private sector and commissioning the private sector to carry out critical functions. Non-communicable diseases (NCDs) are evidently most affected by this lack of skills and functions. NCDs received less than 2% of overall donor funding, despite representing 29.3% of the total healthcare burden in Disability Adjusted Life Years (DALYs) in Low Socio-Demographic Index (SDI) countries and 44.5% in low-middle SDI countries.[17]

Figure 11 Flows of global development healthcare financing[18]
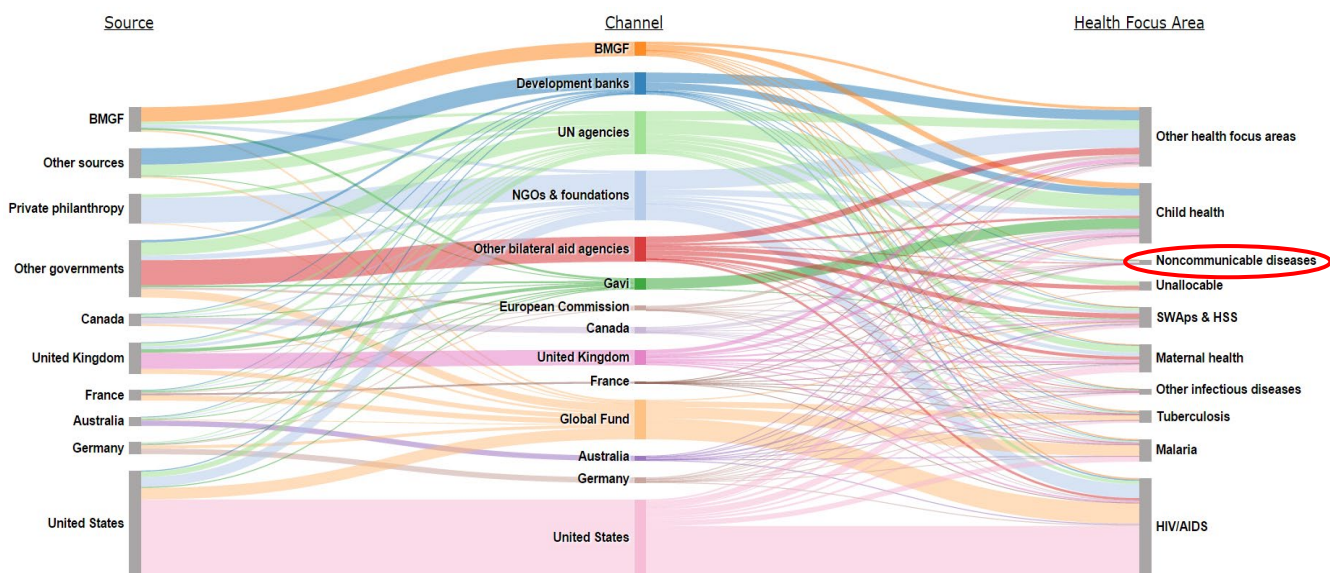
Based on the assessments of low income markets receiving large quantities of aid in Table 3 and the results in Analysis 2 in Figure 66 and Figure 77, the non-communicable diseases (NCD) needs of lower income countries and the poorer segments of the population in LMICs are most likely underserved, especially by the public sector.

Although there is a reluctance to act on NCDs as they are associated with being diseases of the rich, "strong scientific evidence suggests an increase in the clustering of non-communicable conditions with low socioeconomic status in low-income and middle-income countries since 2000, as previously seen in high-income settings."[19]

---

[17] Institute of Health Metric Evaluation – Global Burden of Disease Database (2015)

[18] Institute of Health Metric Evaluation – Data visualisation tool (2014)

[19] Niessen, L., Mohan, D., Akuoku, J., Mirelman, A., Ahmed, S., Koehlmoos, T., Trujillo, A., Khan, J. and Peters, D. (2018). Tackling socioeconomic inequalities and non-communicable diseases in low-income and middle-income countries under the Sustainable Development agenda. The Lancet.

4 Procurement Performance Relative to International Reference Prices (Analysis 3)

4.1 Objectives

This analysis has collected and processed health commodity procurement data to look at trends in price drivers/determinants in different countries. The objective of this analysis was to examine how prices vary by country type, negotiating mechanism type, procurement mechanism type and competitive dynamics..

4.2 Methodology

A basket of 39 health commodities to track across countries was determined, all taken from the WHO Essential Medicines List 2017. The commodities in the basket are summarised in Appendix: Country Health Commodity Data Collection Tool. In the selection of these commodities, the aim was to achieve a balance between pharmaceuticals, medical devices and diagnostics, but also between different therapy areas, commoditised generic medicines, expensive biologics and donor priority molecules.

The selection criteria for commodities were based on two overall objectives. First was to achieve balanced representation in the types of health commodities between pharmaceuticals and medical devices and diagnostics as well as therapy areas, commoditised generic medicines, expensive biologics and donor priority molecules.

The other objective of the product selection was to find products that are likely to be procured in all countries. To establish these products, the first point of reference was the basket of products used by Health Action International in their health commodity pricing analyses. This formed a large part of the selection along with contributions from Clinton Health Access Initiative and CGD to establish which donor products, oncology treatments, diagnostics and medical devices should be added to the basket.

There is debate as to whether greater transparency in medicine prices can result in better prices for patients. The pharmaceutical industry has argued in favour of price discrimination amongst countries based on confidential discounts. Public health academics, advocates and the WHO argue that this approach is insufficient to increase access and that "Current pharmaceutical price negotiations are an example of information asymmetry—a situation where one party to the transaction has more complete and better information than the other party."[20] A further discussion of the issues forms part of an accompanying analysis [insert URL]. However, it is important to distinguish between different types of product (e.g. generics and branded generics and their primary APIs vs on-patent innovative products) where transparency in pricing is likely to deliver greater efficiencies as opposed to adversely impacting on affordability and access for the poorest, in the current global IP system.

---

[20] S. Vogler and K. Paterson (2017) Can Price Transparency Contribute to More Affordable Patient Access to Medicines?

For analysis 3 it was also necessary to source pricing and volume data at a country level to evaluate the performance of different countries. There is relatively little of pricing data in a publicly accessible format since it is considered to be commercially sensitive. Thus, to collect information at a country level we followed three streams of investigation:

- Online databases where sales are published at an invoice level including price, volume and manufacturers. This data was extracted for the basket of health commodities. Sources included Management Sciences for Health's online database, which however is limited by not publishing volumes or manufacturer names. The Philippines Drug Price Reference Index was the only other online database that was straightforward enough to access without assistance.
- Questionnaires were sent out to Ministry of Health and CMS procurement department representatives in 40 countries, out of which we received 8 responses with full or partial data. On top of these eight responses, in two instances the local representative helped us access an online platform which was in the local language and this was classified as an online response.
- IMS Health public and private data. As discussed in the methodology section of Analysis 2 CGD made a purchase of health commodity data, focused on developing countries where data was available for both public and private sectors. For each of these countries CGD purchased data on the 29 pharmaceuticals (IMS Health does not supply medical device data for developing countries) listed in the same data collection questionnaire that was sent out to countries. The countries where this data was of a high enough quality are listed in Table 6 below.

Table 6 Country pricing data for a basket of products

Sources for price volume analysis (2015)

Country	Online	Respondents	MSH	Private	IMS Public Tender	Public direct delivery	Public Pharmacy
Brazil		✓					
Colombia		✓					
Indonesia	✓						
Jordan	✓						
Kerala		✓	✓				
Kyrgyzstan		✓					
Lao		✓					
Peru			✓				
Philippines	✓			✓	✓	✓	
Senegal		✓		✓			
Serbia				✓		✓	✓
South Africa			✓	✓	✓	✓	
Thailand		✓					
Tunisia				✓	✓		
Ghana		✓					
Zambia				✓	✓		

4.2.1 Data cleaning and harmonisation

The health commodity data landscape is complex. There are hundreds of thousands of different packs and formulations of medicines available globally. This presents a challenge in health commodity price comparison because each company, government procurement

department or distributor may choose to call a pack of medicine something slightly different. In addition, a medicine could have the same active ingredient but a different strength (10mg vs. 20mg) or a different formulation (tablet vs. capsule vs. soluble solution).

When comparing the procurement performance of different countries it is imperative to compare like for like. Some differences between medicines are cosmetic, i.e. a tablet is not substantially different from a capsule. However, it cannot be assumed that a 20mg tablet has the equivalent cost of two 10mg tablets - even though the cost of API may be equivalent, the cost of excipients and packaging may not be. Injectable solutions are also found in many different vial or bottle volumes, with different concentration of active ingredient per volume. In these cases, comparison is done via International Units (IU) to ensure these differences are accounted for.

Ensuring that all health commodities included in this analysis from different data sources were equivalent to one another required manual inspection and cross-referencing of all data points. Prices that were substantial outliers were verified with the data source, or if the data could not be satisfactorily verified, the data points were dropped. It is not uncommon for errors to appear in pricing datasets, particularly datasets that have been manually entered, and data curation is therefore a standard and necessary procedure. Pricing data was recorded as mean price per unit. When multiple suppliers were present, average prices were calculated normalising for the proportion of commodities from each supplier. In these cases, also the median, minimum and maximum price were recorded. Apart from pricing data, the total volume and largest volume supplier (if multiple) were also recorded. Separate datasets were collected for the public and private sectors.

4.2.2 Pricing Analysis

Of the 39 health commodities in the product basket, the data obtained was primarily on pharmaceuticals rather than medical devices and diagnostics. This was to be expected with IMS Health which does not include non-pharmaceutical health commodities. However, the medical device and diagnostic data from respondents and online sources was also severely restricted. In one case, a procurement official reported that medical devices were procured by a separate department within the Ministry of Health. It is unknown how many respondent countries had this arrangement, but it could explain why device and diagnostic data received from respondents was sparse. Alternatively, it is possible that the descriptions in the data questionnaire which is in the annex were not sufficiently granular for medical devices.

Fragmentation and brand preferences in the private sector result in higher prices at the point of procurement and for patients. Based on the data we have collected, private sector mean procurement prices are on average ~180% higher than in the public sector, with the median price being ~130% higher in the private sector.

**Figure 12 Comparison of Public and Private Pharmaceutical Procurement Prices ($)**
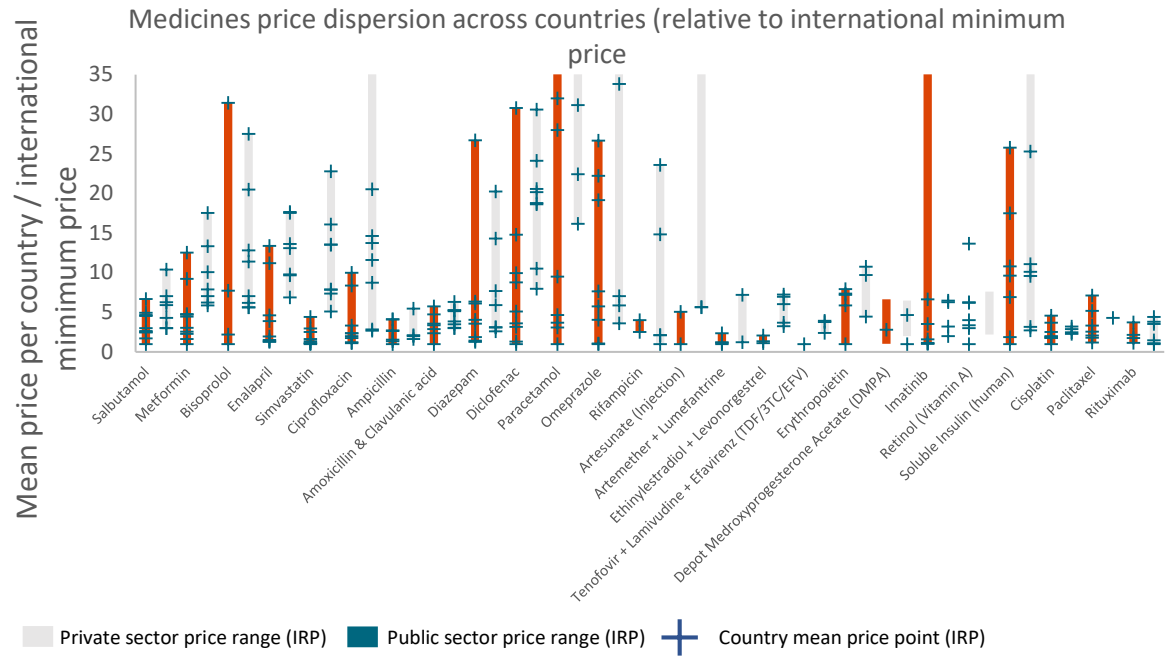
Medicines price dispersion across countries (relative to international minimum price

Legend: Private sector price range (IRP) | Public sector price range (IRP) | Country mean price point (IRP)

Average price data was available for all data sets and for all products in the basket, although minimum prices were only available when multiple suppliers were present. The minimum prices across sectors were also compared to minimise the potential impact of brand preferences in the private sector on price differences. The underlying assumption being that the minimum price in both public and private sectors would be a generic. By comparing minimum prices, a price difference of 78% remained between the public and private sectors (Figure 13), suggesting brand preference is not the only driver of the observed difference. Higher prices in the private sector are more likely attributed to the fragmentation in the private sector procurement structure. In addition, in the IMS Health private sector databases the prices often exclude rebates and discounts, so it is possible the real difference between sectors is smaller. Average rebates off list prices in High Income Countries (HICs) are in the order of 20-29%, which is less than the difference between sectors observed here.[21]

---

[21] Ref: Morgan, Steven G., Sabine Vogler, and Anita K. Wagner. 2017. "Payers' Experiences with Confidential Pharmaceutical Price Discounts: A Survey of Public and Statutory Health Systems in North America, Europe, and Australasia." Health Policy 121 (4). Elsevier Ireland Ltd: 354–62. doi:10.1016/j.healthpol.2017.02.002.

**Figure 13 Comparison of average public vs. private prices for lowest priced products for each molecule in the product basket**
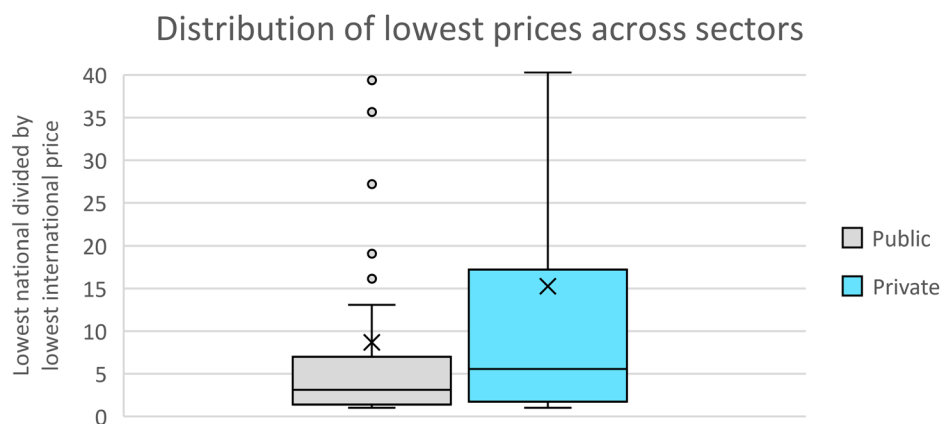
Distribution of lowest prices across sectors

There was no correlation between the income level of countries and the performance of their public sector procurement mechanisms. The average price paid for health commodities by the public sector actually increases on average with income level. India is in the lowest income bracket which may create bias as India is probably not reflective of an average LIC or LMIC with an income of $0 - $3,000, given that it tends to achieve very low prices by international comparison. A possible hypothesis is that the richer the country, the more it spends on health products, the less sensitive it is to the prices of commodities on the essential medicine list that are mostly cheap generic medicines, with some exceptions.

Figure 14 Country price dispersion relative to minimum reference price (public sector)

Country price dispersion relative to minimum reference price (public sector only)
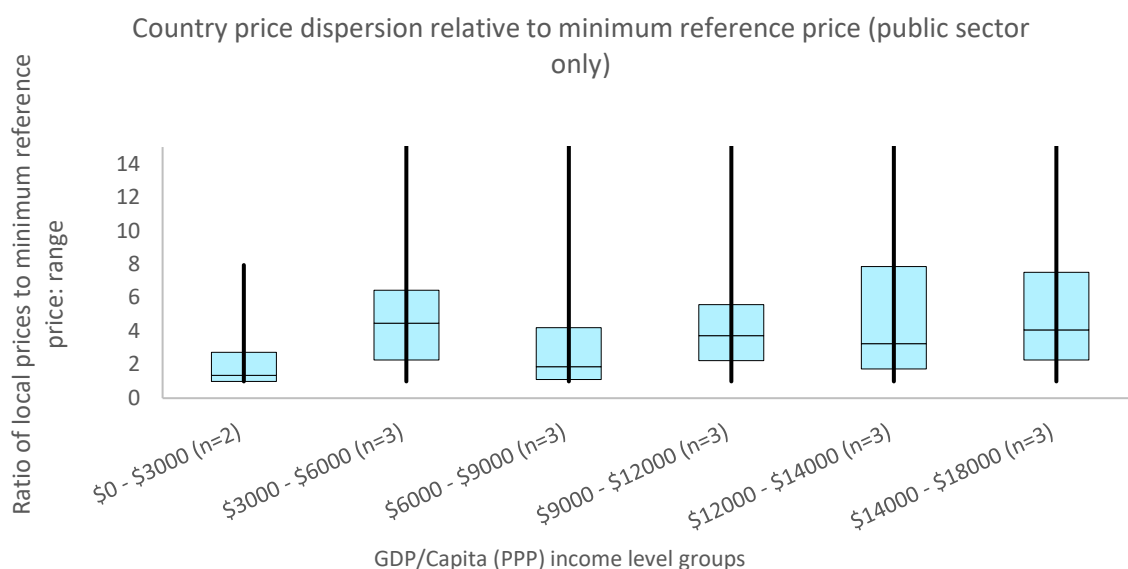
Notes: Minimum/maximum (vertical lines) and 25th , 50th and 75th quartile (blue boxes/crosses) of country prices divided by lowest international reference price.

Source: Public prices taken from each countries in Table 5: Country pricing data based on basket of products specified in annex. Where IMS Health data used Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.

We were able to observe price differences between countries based on the size of the market in value terms and the way that distribution was structured, either with centralised or decentralised procurement. These attributes of national procurement are not based on the data itself but were established by cross referencing prices to the properties of the country procurement systems, as identified by a non-exhaustive secondary literature review outlined in the Annex.

On average for low- and middle-income countries , the wealthier the country the more likely it was to have already transitioned towards a decentralised model of procurement. We hypothesise that in these countries, procurement prices tended to be slightly higher as there was more autonomy for health facilities to purchase medicines and they do not always stick to the same brands and products. This has the effect of fragmenting the public sector's buying power. However, as we will explore in the Conclusion section of the report there are many other benefits that come from a decentralised procurement system around wastage, delivery accountability (if a facility does not receive medicines it does not pay for them), leakage and theft.

It is not possible, nor is it the intention of this work, to publish results on a country level. Instead the analysis has sought to categorise countries into archetypes according to similarities in procurement structure, and to comment on health commodity price differences between categories.

The pricing data has been plotted in box and whisker graphs to show the median, upper quartile, lower quartile and range of mean prices. Prices are all calculated relative to the lowest international reference price for each product.

Figure 15 Country Archetype Price Dispersion Relative to Minimum Reference Price (public sector)

Country group price dispersion relative to minimum reference price (public sector)
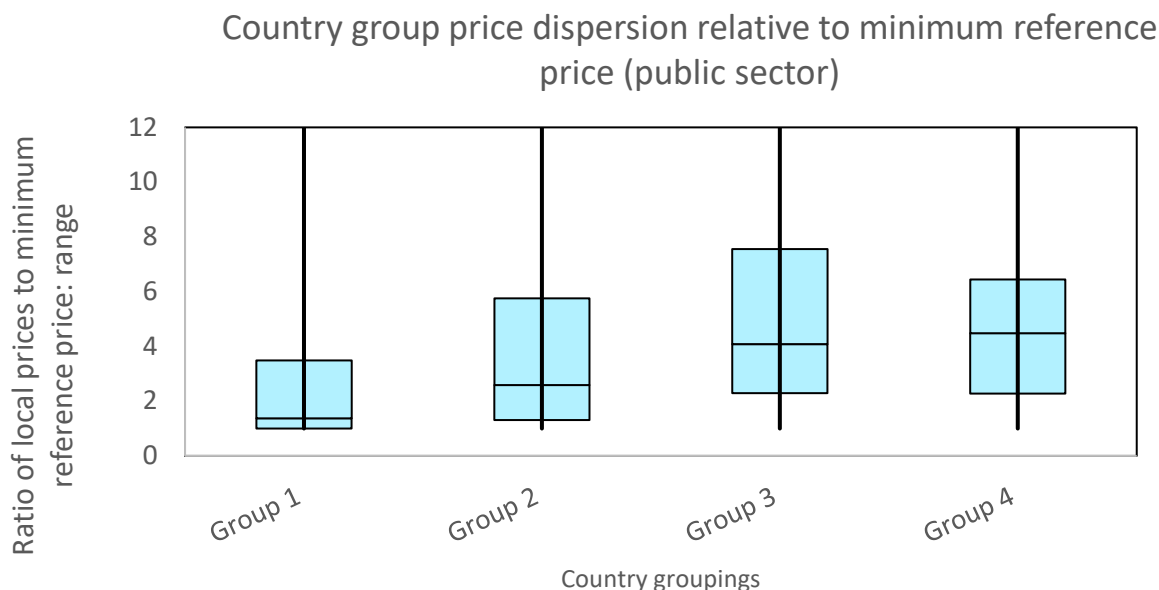
Source: Public sector pricing data only excluding Country B. Sources described in depth in Table 5: Country pricing data for a basket of products. Where IMS Health data used Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.

In order to categorise countries in scope for this analysis, a short non-systematic literature review was undertaken to determine the properties of their procurement systems. The details of the literature review are available in the annex. This review was complemented by a qualitative examination of country procurement trends and attributes, based on prices, volumes and largest suppliers (manufacturers) observed for the basket of 39 products.

The country archetypes were defined as follows along with their key characteristics:

Attribute	Group 1	Group 2	Group 3	Group 4
Market size of government procurement (value US$)	Large	Medium / Small	Medium / Large	Small
Centralised or Decentralised Procurement	Mostly Centralised	Mostly Centralised	Decentralised	Centralised
Product Selection / Brand Preferences	Strong generic preference	Generic preference	Mix of brands and generics	Generic preference
Import reliance	Predominantly local manufacturer	Mix of local and imported health commodities	Mix of local and imported health commodities	Predominantly import reliant
Median of International reference prices	1.3	2.6	4.1	4.6

Group 1. Thailand + Kerala – Big spenders (relatively speaking) with strong local industry and strong competition. They mostly buy from local manufacturers. On average prices were 1.3 times the lowest international reference price, meaning the lowest prices on average.

Group 2. South Africa + Senegal + Tunisia - Some centralised procurement but still with regional or local budgetary control. Highly generic focused or they negotiate for differential pricing on branded medicines. On average prices were 2.6 times the lowest international reference price.

Group 3: Philippines + Serbia + Brazil + Indonesia – Have a national program overseeing pricing and publicly reimbursed medicines but regions / facilities / districts have large amounts of autonomy. Large amount of purchasing from distributors means higher prices but the governments gain efficiencies by not running their own distribution. On average prices were 4.1 times the lowest international reference price.

Group 4: Zambia + Lao + Krygyzstan - Small countries, procurement is centralised, mostly reliant on imported generics, sometimes countries buy from distributors rather than procure directly from manufacturer. On average prices were 4.5 times the lowest international reference price making this the worst performing group for pricing.

Figures 14 and 15 show the level of variation in pricing between the different groups of countries by income level and therapy area. The key takeaway from this is that generally in UMICs we are seeing greater levels of decentralised procurement and higher average prices. This is likely connected to the quality of medicines, brand preferences and greater facility level autonomy in procurement which is explored in more depth in the key findings section.

4.2.3 Price-to-volume relationship results

Looking at only the public sector (but excluding Country B due to some unusual results), this analysis observed a statistically significant price-volume relationship (Figure 166). Note that the graph uses a logarithmic scale on both axes, and the trend line is a power function which appears linear on a log-log plot. Although the R^2 is significant, it is small (0.05) and consequently many factors besides volume evidently impact international reference prices. This analysis was only undertaken for public sector data, as IMS Health private sector distributor data aggregates sales to multiple facilities and distributors on an annual basis, compared to the public tender data that tended to have fewer transactions of a larger size. IMS data also often does not include visibility of the discounts offered to distributors, while government reported data generally does include these discounts. The correlation between price and volume was not seen consistently across all products, particularly those that were less commoditised generics such as Imatinib and Erythropoietin.

Figure 16 Relationship between price and volume for public sector only
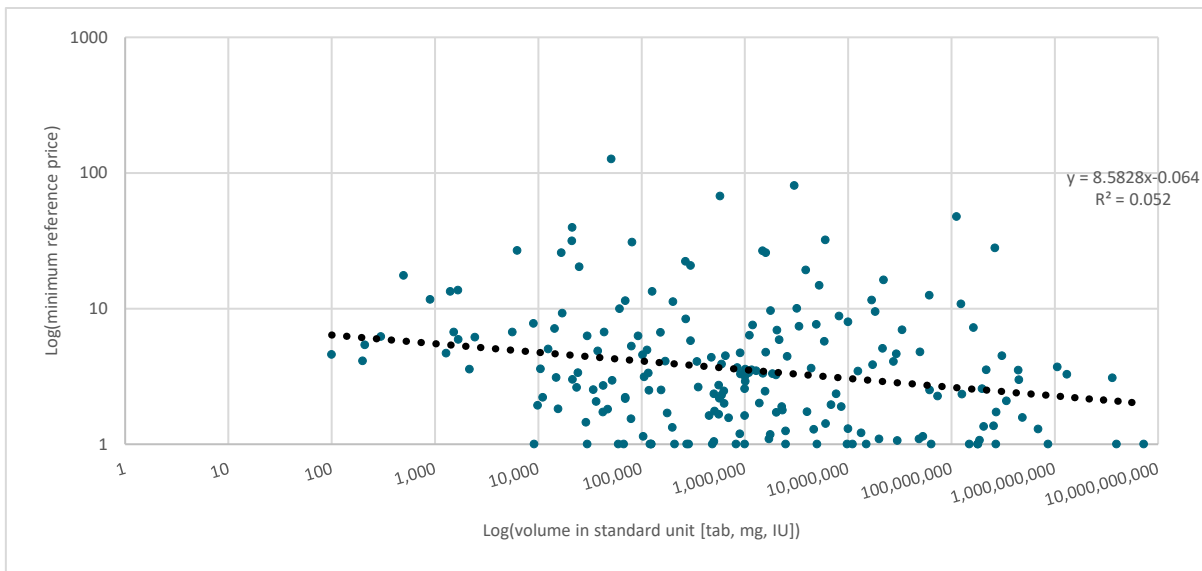
At an individual product level only 5/21 molecules with sufficient data showed statistically significant (P value <0.05) price to volume relationships. The products that had strong correlations were Enalapril, Amoxicillin & Clavulanic acid, Diazepam, Paracetamol and Paclitaxel. These products do not have a clear common property other than being high volume. As several products were tested individually, this may also be due to chance, however as the overall sample shows some price-volume relationship, it would be expected that some individual products exhibited this characteristic. However the relatively few products with significant price-volume correlation indicates that while the price volume relationship is important there are other factors contributing to final price, such as the level of competition in the market and structure of tenders.

4.2.4 Country Variation in Prices Paid

Due to the rules around data usage it is not possible to publish country commodity prices in this report. That said, it is possible to show the results to a country level when anonymised to show the levels of variation in price relative to lowest available international price. Bearing in mind that all the medicines in the basket of products were taken from the WHO Essential Medicines List there is a surprising level of variation in the prices achieved by public procurers, with some countries performing very well and others, such as Country B, are performing much worse. In fact, Country B performed so badly that it was excluded from the other analyses as it had a distortionary effect.

When evaluating the cost efficiencies that can be achieved by interventions in health commodity procurement this indicates that savings are likely to depend on the starting point of each country relative to their performance as measure in prices achieved.

Figure 17 Comparison of country relative pricing anonymised for illustrative purposes
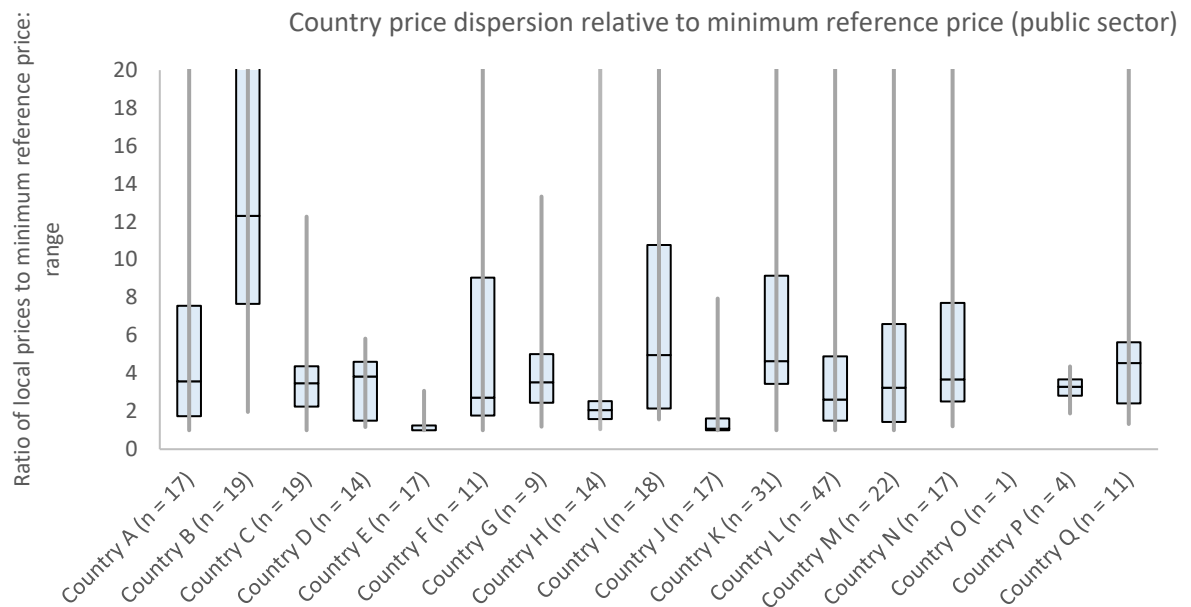
Source: Public sector pricing data only. Sources described in depth in Table 5: Country pricing data for a basket of products. Where IMS Health data used Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2 and Table 5.
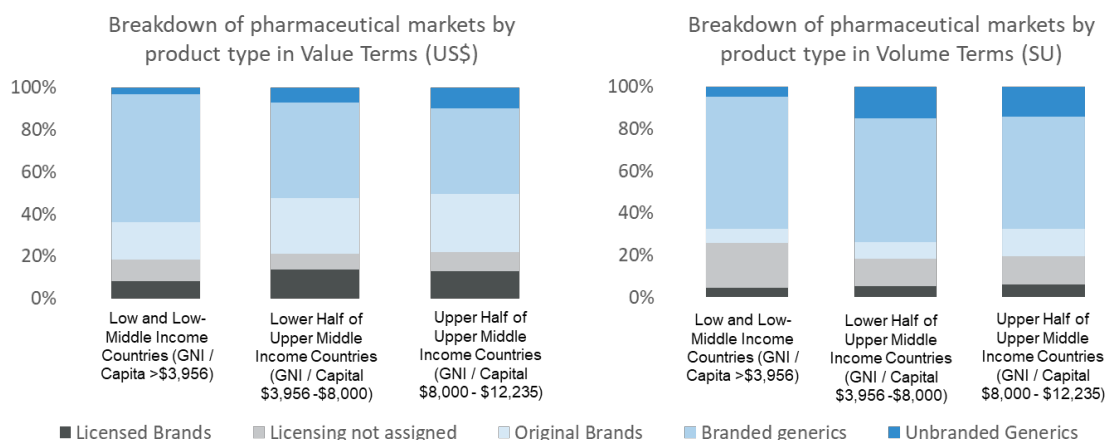
4.3 Key Findings

The price differences between the public and private sectors line up with findings from Health Action International that shows consistently higher prices for patients in the private sector. While some healthcare stakeholders consulted in this project expected public procurement prices to be higher, their rationale being that institutional bureaucracy would lead to a procurement premium, we found the opposite to be true.

However, this analysis has mainly found the opposite to be true. The largest proportion of this difference is caused by the private sector's preference for original brand and branded generics. Compared to the public sector, the prices of the privately procured branded products are often much higher.

Looking at Figure 18 we note how small a proportion of the market is made up by unbranded generics, representing only 3.3% of value and 5.0% of volume in Low and Low-Middle income countries. Judging from the relationship between volume and value, the poorest counties do not appear to get a good deal even with their unbranded generics, and certainly less of a good deal than richer counties with their branded generics. This indicates that it is possible that the brand premium is greater in poorer countries, which points to lack of competition and structural weakness in procurement, prescription, formulary and reimbursement control. Another key reason why brands are favoured in developing countries is the lack of faith in regulatory authorities and a fear of counterfeit and substandard medicine.

Figure 18 Pharmaceuticals Procured in Low and Middle Income Countries by Brand and Licensing Status

Breakdown of pharmaceutical markets by product type in Value Terms (US$)

Breakdown of pharmaceutical markets by product type in Volume Terms (SU)

■ Licensed Brands   ■ Licensing not assigned   ◻ Original Brands   ■ Branded generics   ■ Unbranded Generics

Source: IMS Health MIDAS Database. Low and Low Middle Income = French West Africa, India, Philippines. Lower half of Upper Mid-Income = Tunisia, Serbia, Thailand and South Africa. Upper half of UMIC = Mexico, Malaysia, Turkey, Romania and Brazil. Fr. West Africa is an aggregation of 10 Francophone countries from the West African Region and contains: Cote d'Ivoire, Senegal, Cameroon, Burkina Faso, Benin, Togo, Chad, Mali, Guinea and Niger

Even when comparing the price of the lowest available priced generics the private sector was still significantly more expensive. It is the opinion of the authors that this can be explained by two main factors that have not been previously discussed – a smaller range of products in the public sector helps to concentrate spending power coupled with a fragmentation in the supply of health commodities in the private sector and the concealing of discounts and rebates in the IMS Health private sector data. In addition, as mentioned before there are hidden costs in public sector supply chains that are often not taken into account.

4.3.1 Fragmentation of healthcare commodity supply chain and procurement

Across both the private, donor and public distribution sectors, consolidation and vertical integration at a national – or even trading block level – leads to more efficient distribution.[22],[23] Larger logistics companies can achieve greater efficiencies in stock management, purchasing power, shipping, storage and logistics resulting in lower overheads. In most developed markets the majority of pharmaceutical distribution is handled privately by a few large players within a well regulated by the public sector framework. This keeps the market both competitive and efficient. Some countries manage to employ small distributors efficiently. At a regional level, a smaller distributor supplying all the pharmaceutical needs to a discrete geographic region is another form of consolidated supply. Depending on the volume of product and the size of the region, a regional player may be more efficient than three larger companies' vehicles visiting the same pharmacy.[24]

The problem is that a large proportion of lower income and middle income countries have an overabundance of importers and distributors that fragment the procurement landscape, as

---

[22] Yadav P; Barton I. "53" - Strengthening of Pharmaceutical Wholesalers in Africa. Working paper; 2012.

[23] Carlton D, Perloff J. Modern industrial organization. Harlow: Pearson; 2014.

[24] IMS Health - D Rosen; S Rickwood - Supply Chain Optimisation in Africa's Private Sector Reducing the Price to Patient 2014.

well as additional layers of sub-wholesalers sitting underneath the main importers. These companies are unable to achieve the necessary economies of scale.[13] This fragmentation can be expected to reduce the relative size of the orders being placed with manufacturers to import products to the market.

In addition, while the procurement departments of the public sector are likely to have a relatively small number of products that they buy each year, the private sector will also have a much wider selection of brands, formulations and smaller order sizes in turn are likely to increase prices.

4.3.2   IMS Health's Private Sector Prices Do Not Include Rebates and Discounts

For the purpose of this analysis the private sector data had to be entirely sourced from IMS Health, as the only reliable source of data on this sector. However, while the volumes and rough values are reliable the private sector data for most countries does not include rebates or discounts, as companies are often keen to keep this information confidential from their competitors.

In an attempt to compensate for this issue a flat percentage has been removed from the prices to take distribution and retail mark-up costs into account for South Africa. In Serbia we applied a 30% discount to the list prices based on a report that was provided to the working group. However an additional factor has **not** been applied to calculate the likely level of discounting that manufacturers may be providing to their distributors in each country. Average rebates off list prices have previously been found to be in the order of 20-29 in high income countries.[25]

4.3.3   Medicine quality analysis – an important missing piece of the procurement equation that is difficult to quantify

Although in this analysis there was an attempt to look at the quality of medicines relative to price this was not eventually possible. Without having access to national databases of post-market surveillance for medicine quality or having some idea of how often companies fail their quality assurance standards globally it is very difficult to comment on the quality of medicines. We were able to say whether countries were buying more of their medicines from local vs. international companies, and whether the companies that the governments are buying from are in possession of international quality assurance standards such as being WHO Prequalified, or having product accepted by a recognised stringent regulatory authority (SRA).

While a protocol was devised to divide manufacturers according to international quality assurance credentials, it was decided that this was not a good enough metric for measuring quality. What can be done using a combination of data collected from secondary research, countries data collection and IMS Health is to look at the proportion of pharmaceuticals being purchased from local manufacturers vs. international manufacturers which as we have seen earlier, may be a determinant of higher prices (in the case of imports) or increased international brand preferences. At the same time, domestic industrial policies that favour

---

[25] Ref: Morgan, Steven G., Sabine Vogler, and Anita K. Wagner. 2017. "Payers' Experiences with Confidential Pharmaceutical Price Discounts: A Survey of Public and Statutory Health Systems in North America, Europe, and Australasia." Health Policy 121 (4). Elsevier Ireland Ltd: 354–62. doi:10.1016/j.healthpol.2017.02.002.

local manufacturing may also drive price premiums, particularly in countries with small manufacturing industries and little domestic competition.

Figure 19 Average proportion of local manufacturing and importation of pharmaceuticals and vaccines (US$)
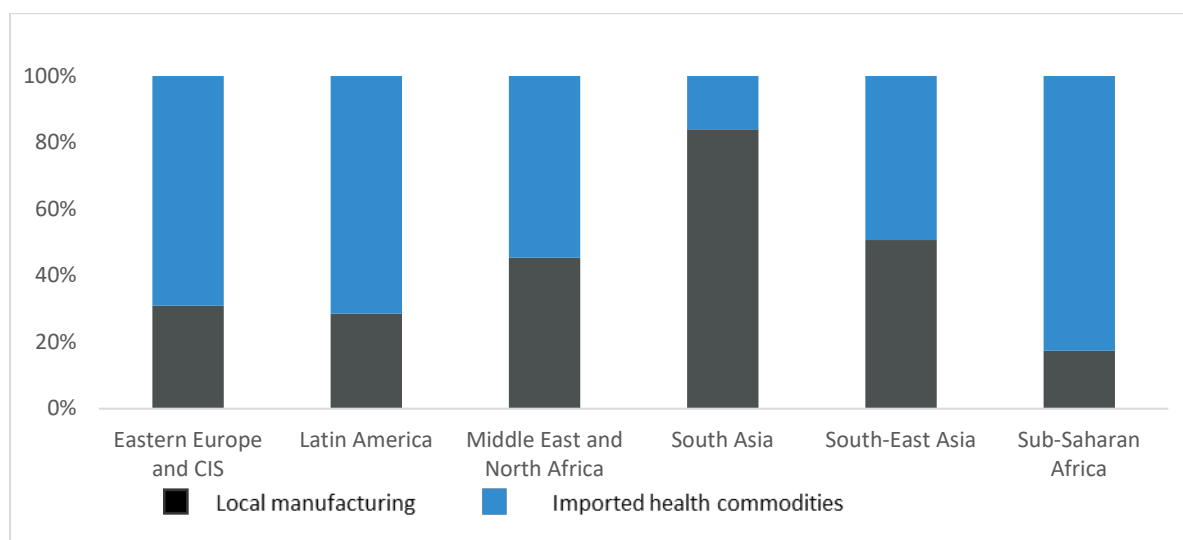
Source: AfRx Consulting secondary research

In most of sub-Saharan Africa, only a small proportion of total pharmaceutical need is met through local pharmaceutical manufacturing (ranging from 0% in 27/49 countries to ~5% in Cameroon, ~20% in Tanzania to ~30% for Nigeria). In total, AfRx Consulting estimates that in value terms, local pharmaceutical manufacturing in sub-Saharan Africa (excluding South Africa) had revenues worth around US$1.25bn in 2015, this accounts for just 15% of total pharmaceutical consumption in the region (~$8bn), this figure excludes vaccines. This figure includes all countries in the region and not just the countries included in Analysis 1. This estimate is also possibly too high as most of the studies referenced on the subject of local manufacturing contribution are out of date, based on extremely weak data or do not distinguish between volume or value contribution.[26]

4.3.4 Governments prefer to purchase health commodities from local manufacturers

Looking at the largest suppliers of health commodities to the public sector, based on the data supplied by respondents, online databases and IMS Health manufacturer level data, governments are purchasing the majority of health commodities in volume terms from local manufacturers, if they exist and produce the relevant products. This same trend was observed in Uganda by stakeholder interviews that the country's industrial policy - Buy Uganda, Build Uganda was having a significant impact on the procurement outcomes, both in terms of prices and quality. In addition to this observation, through the use of a non-exhaustive literature review (Table 7) it was possible to identify a number of similar rules in

---

[26] UNIDO Pharmaceutical Sector Profile: Kenya (2010)

different LICs and LMICs that would favour procurement from local manufacturers usually at a price premium.

These protectionist policies make sense when you consider that buying from local companies helps to support job creation, diversify the economy and reduce the national trade deficit. At the same time the feedback from interviews indicated that medicine quality may suffer because of such policies.

Table 7 Non-exhaustive literature review result for preferential policies for local manufacturing

Country	Rules on Procurement of Locally Manufactured Health Commodities	Country	Rules on Procurement of Locally Manufactured Health Commodities
Ghana	Apart from the ARVs, ACTs and RDTs (which are procured through Global Fund PPM) Ghana has not procured any of the commodities in the basket through central procurement systems in our year of interest. Regional Health Administrations and Teaching Hospitals have done their own procurements in accordance with the provisions of the Ghana Public Procurement Laws.	Colombia	Limited national pharmaceutical policy, particularly for the supply and procurement of medicines. High levels of international brands observed.
South Africa	The black economic empowerment rules means companies that employ black South Africans will be given a price preference in government tenders. "It seeks to ensure broader and meaningful participation in the economy by black people to achieve sustainable development and prosperity". This can be used in practice to give preference to local firms.	Jordan	For medicines that are produced locally, a local tender is used allowing Jordan-registered entities to enter the bid with preferential treatment. Most local manufacturers however export their goods to other countries since they are limited in what they produce (typically only some generics).
Philippines	Local government procure medicines directly from local suppliers. This doesn't seem to exclude multinational manufacturers.	Senegal	Local manufacturers and pharmaceutical authorities are advocating for protection of local production who face competition from large countries (e.g. India and China). The MoH department for procurement also emphasised their efforts to promote local manufacturing as well.
Indonesia	The Indonesian procurement authority have said that only companies with local manufacturing facilities in Indonesia are allowed to bid on their contracts for pharmaceutical provision	Kerala State (India)	Tenders are largely published in local newspapers which will inherently favour local manufacturers
Thailand	Public facilities must purchase medicines from the Government Pharmaceutical Organisation, a government owned manufacture if they produce the products of interest for procurement	Brazil	Establishment of public supported institutions for R&D of medical supplies and medicines led to an increase in local production. Federal Act No. 12.329 / 2010 "Public Procurement Law", mandates the use of government procurement (which now relies more heavily on local production)
Kazakhstan	State Programme for Development of Pharmaceutical Industry for 2010-2014 offers benefits for domestic pharmaceutical providers and foreign manufacturers who localise their production	Lao (People's Democratic Republic)	Among companies that apply to the bidding process, local manufacturers are given preference

India was found to have the lowest average prices for health commodity procurement. This is likely to be a function of both large volumes and a strong local manufacturing industry. However, countries do not buy all their medicines from India. Because of national market dynamics in registration and brand preference, there will be limits on the ability of the public health community to consolidate procurement between countries at an international level.

The observation of the strength of India's procurement lined up with the observation by Health Action International that the procurement prices in India did tend to be significantly

cheaper than those of the Middle Income Countries.[27] However, the data differed from the previous findings as the variation in price actually appeared to increase as countries become richer, not decrease. A large part of this is probably explained by the difference in methodology that this analysis was looking at the average price paid per pack in each country, whilst the HAI analysis focussed on the lowest-priced generics. In the Upper Middle Income countries in Analysis 4 the data showed a large proportion of brands (branded generics and original brands) being purchased that sometimes eclipsed the lowest priced generic in both value and volume terms.

---

[27] Cameron a, Ewen M, Ross---Degnan D, Ball D, Laing R. Medicine prices, availability, and affordability in 36 developing and middle-income countries: a secondary analysis. Lancet. 2009 Jan 17;373(9659):240–9.

5 An Assessment of the State of Health Commodity Innovation Diffusion in Developing Countries (Analysis 4)

5.1 Objectives

As mentioned in the objectives for Analysis 3, the CGD Working Group is keen to understand the current state of innovation diffusion, meaning how many new products reach developing countries? These questions were answered using a different methodology to Analysis 3 so it was necessary to give it a separate section.

5.2 Methodology

To measure innovation diffusion in developing markets there is only one source of data that the authors were aware of that is able to tackle this question across a sufficient number of geographies, the IMS Health MIDAS database. Not all IMS local country databases are available on MIDAS, which provides additional tools to organise data according to global launch date and brand / licensing status. The aim of Analysis 4 was to select a number of countries to examine based on the following criteria.

- Over 90% market coverage (this can exclude the public sector if it is not available as innovative products are extremely unlikely to be exclusively present in the public sector)
- Over 90% accuracy in the data audit according to the IMS MIDAS evaluation.
- Coverage of both the retail and hospital channels for medicine distribution.

A full list of the panels included in analysis 4 is available in the Annex. One exception was made to these criteria as the Fr. W. Africa database is only a retail panel database, but as the only database with countries from sub-Saharan Africa (excluding South Africa) on MIDAS it was decided to keep it in. The working group did raise concerns that the sample of the francophone African countries should not be extrapolated to the entire continent and noted that innovation diffusion in Nigeria, Ghana and East Africa is probably slightly better. Unfortunately the availability of data prevents us from looking at these countries.

The data procured from IMS Health was for sales of all new chemical entities launched globally in the past ten years. If a country had any sales of these products in the past 10 years then it was considered to have launched in that country. The new chemical entities were selected according to molecule, not brand, and licensed brands were counted as launches for the purpose of the analysis.

The IMS MIDAS database was also used to look at the originator branded and licensed medicines by age, allowing for a rough analysis on the likely patent status of medicines in LICs and LMICs. This same data was used in Figure 18, in the key findings section of Analysis 3, which split pharmaceutical sales according to the proportion of branded generic, originator brand, licensed brand and unbranded generic medicines.

In addition, data purchased for Analysis 2 was also used to look at individual therapy areas, in a similar way to Figure 10, to look at difference in the classes of medicines typically used in developing countries, showing that older classes of medicine were used more in lower income countries.

5.3 Results

Looking at the proportion of new chemical entities launched in a selection of developing countries shows that a relatively small proportion reach these markets. The analysis is arranged by GNI per capita with the poorest country on the left rising to the wealthiest on the right. For each year the analysis looks at the number of new chemical entities launched globally which were observed in each country. If sales are 0 in the IMS data, the assumption is that the product was never launched in that market.

French West Africa, which represents ten countries in the region, only registered 21 launches of NCEs in the past 10 years, from a global total of 330. Figure 20 shows that the proportion of chemical entities that have reached a country is more closely linked to the total size of the market than to the level of economic development. It also shows the launch delay between product reaching the US and the rest of the world with fewer launches observed for most countries from 2015-2016.

Figure 20 Number of New Chemical Entities shows little innovation diffusion to small lower income countries

Number of New Chemical Entities (NCE) in Each Country by Year of First Global Launch

Year of NCE First Global Launch	Fr West Africa	India	Philippines	Tunisia	Serbia	Thailand	South Africa	Romania	Mexico	Brazil	Malaysia	Turkey	USA	Global Launches
2007	5	21	16	5	8	19	16	16	22	19	17	15	22	**32**
2008	2	10	9	3	8	12	9	11	14	14	13	10	19	**24**
2009	5	27	17	7	11	17	10	16	22	18	18	15	27	**38**
2010	0	7	7	1	9	11	6	8	14	12	9	9	17	**22**
2011	3	10	14	2	11	19	8	20	21	17	16	15	32	**36**
2012	0	5	7	0	7	12	4	11	17	11	10	12	27	**31**
2013	2	12	9	2	6	12	6	12	23	18	13	17	40	**43**
2014	2	7	12	1	6	11	1	12	20	13	10	12	42	**45**
2015	2	3	4	0	3	3	1	6	9	8	5	4	37	**37**
2016	0	1	0	0	0	2	1	0	3	0	0	0	22	**22**
Total 2007-2016	**21**	**103**	**95**	**21**	**69**	**118**	**62**	**112**	**165**	**130**	**111**	**109**	**285**	**330**

Source: IMS Health MIDAS Database. *Fr. West Africa is an aggregation of 10 Francophone countries from the West African Region and contains: Cote d'Ivoire, Senegal, Cameroon, Burkina Faso, Benin, Togo, Chad, Mali, Guinea and Niger

Copyright IMS AG and its affiliates. All rights reserved. 2017. Caveats as outlined in Table 2.

The lack of new launches is also borne out by an analysis of the age of originator brand and licensed brand medicines by sales value and volume in Figure 21. This shows that in the low and low-middle income countries in the sample ~60% of sales were of products that are over 20 years old globally, and thus extremely likely to be off patent worldwide. Less than 4% of sales came from products launched in the past 10 years. This indicates that the life science industry is launching very little in these markets. So in summary low- and middle-income countries seem to be getting worst of both worlds – both little innovation diffusion and high prices for old off patent products, based on Figure 18.

Figure 21 Average Age of Originator and Licensed brand products show a high proportion to be older products

Average age of originator brand products in value terms (US$)	Average age of originator brand products in volume terms (SU)

Legend: ■ 0-5 years old ■ 6-10 years old □ 11-20 years old ■ 21-30 years old ■ 31-40 years old ■ 40+ years old

Source: IMS Health MIDAS database. *Fr. West Africa is an aggregation of 10 Francophone countries from the West African Region and contains: Cote d'Ivoire, Senegal, Cameroon, Burkina Faso, Benin, Togo, Chad, Mali, Guinea and Niger

5.4 Key Findings

The data from Analysis 4 suggests that a large proportion of new and innovative treatments are not reaching Lower Income Countries. Some of this is likely to driven by changes in the pharmaceutical industries overall R&D direction. Increasingly new medicines developed for the US and European markets are for specialist therapy areas like cancer and autoimmune disorders, rather than primary care areas. However, this doesn't fully explain the lack of uptake especially as we have seen an increase in spending on NCDs as countries become richer.

To better understand the issues this analysis looked at sofosbuvir as an example of a new and innovative compound that has relevance for the epidemiology of LICs and LMICs. Gilead, the originator of sofosbuvir, voluntarily licensed the medicine to eleven Indian generic manufacturers to maximise the affordability of the medicine in 101 developing countries with a combined patient population of 103 million. However, the medicine is still not reaching as many patients in developing countries as it should.

The Indian generic manufacturers are making great strides in expanding access to Hepatitis C treatment in Asia where there is more buying power and market understanding. However, these same generic companies need encouragement to enter new markets, especially where these are seen as risky. Issues that these generic companies need to overcome include regulation, cost of training and sensitising clinicians, diagnostics, disease awareness campaigns, adherence and reliable distribution networks. Based on these needs we conclude that access is not solely a function of price or IP status.

Sofosbuvir was the fastest selling blockbuster drug in history within a year of launch, in part due to Gilead's pricing strategy, but certainly a breakthrough medical advance. However,

even with voluntary licensing for lower income countries the Hepatitis C treatment space still needs more public health support to realise its potential benefits.

This analysis indicates that arguments about patent laws and how they apply to lower income markets are becoming less relevant, as most of what is actually being used in these countries is already off patent. Patent expiration does remain relevant for middle income countries. We believe that in lower income countries, lack of generic substitution, a competitive generics market, appropriate mechanisms to pass the efficiencies on to patients, regulations and difficulties in new product introduction are the bigger hinderances to access.

Similarly, one cannot assume that once medicines go off patent they will make it to LICs and LMICs. Launching a new medicine in a market carries significant costs (regulation, cost of training and sensitising clinicians, diagnostics, disease awareness campaigns, adherence and reliable distribution networks). As a result of these obstacles, there is a risk that countries where there is low launch uptake now may miss out on decades of medical advances if this were to continue.

There is more to innovation diffusion than patent pooling and voluntary licencing. This includes health professional training, diagnostics, disease awareness and regulatory activities to launch a new treatment. The Gilead example is a clear indicator that one cannot assume that generic companies will make the investments to take newer medicines to smaller LICs and LMICs that are not already established markets.

Figure 22 Example of Gilead Voluntary Licensing shows innovation diffusion is about more than patents and IP

Snapshot

Gilead has agreements with 11 Indian companies to manufacture generic hepatitis C medicines for **101 developing countries**

There are **103 million** people living with hepatitis C in these developing countries

Gilead also offers its branded hepatitis C medicines at a **significantly reduced flat price** in these countries

Indian exports of branded generic Sofosbuvir to a selection of destination countries in number of packs - up until November 2016

Asia (Central and South)		Sub-Saharan Africa	
Myanmar	92626	Burundi	1299
Vietnam	42538	Cameroon	998
Mongolia	10412	Kenya	315
Nepal	7395	South Africa	180
Turkmenistan	2425	Ghana	46
Kyrgystan	2378		
Uzbekistan	1452		

Source: Indian export database 2014 – November 2016 – Zauba

6 Conclusions

Rather than repeat the findings of the executive summary and the key findings, this conclusion is focused on the implications of the findings for a typical country undergoing the transition from donor dependence to greater domestic procurement and independent procurement.

Analysis number	Key Finding	Real World Implication
1	Countries experiencing transition from aid will require effective procurement and low health commodity prices to achieve UHC.	The assistance that countries are likely to require for transition from aid is likely to take the form of; • Multilateral approaches that look to group procurement between countries to achieve better prices • Technical assistance for national procurement, pricing systems and value based assessment strengthening. • Increased availability of appropriate data for decision making
1	Governments are failing to grow their provision of healthcare commodities fast enough to match demand. As countries transition and donors gradually withdraw their support, the private sector in LMICs takes over the role as the primary procurer of health commodities.	Given the financial burden that OOP spending on medicines has on patients in developing countries, governments should be lobbied increase health commodity spending. • Multilateral pooled procurement mechanisms, such as the Global Fund, have effectively lowered prices in areas like HIV, Malaria and TB as the payers have clear incentives to co-operate. • Group purchasing in graduating countries is likely to hinge on the strength of political commitment to co-operate, the size of potential savings and the regulatory hurdles of participating countries.
1	Procurement fragmentation and brand preferences in the private sector result in higher prices at the point of procurement and for patients.	It should not be assumed that the same pooled procurement approach will work as donors withdraw and an often fragmented private or public sector procurement system takes over. • Understanding the levels of fragmentation in procurement and supply chain for countries approaching transition should be a priority to ensure better procurement outcomes, along with creating policies to encourage consolidation in procurement at either the national or sub-national level. • Pooled procurement or consolidation of the private sector supply chain will require correct incentives, price framework agreements and the skills to create and monitor PPP contracts • The public sector typically can use either centralized tendering or framework agreements with price setting to get the best prices and procurement outcomes, Central Medical Stores are no longer essential.
2	Data availability and data quality is currently insufficient for the performing of tasks relating to regulatory, scientific evaluation, health economics, pricing and reimbursement,	As countries lose aid eligibility and make progress towards Universal Health Coverage, spending on health commodities will be critical, and data on such spending—within and across countries—most valuable in monitoring progress, ensuring accountability, and understanding what does and does not work.

	procurement monitoring and evaluation.	• Procurement and consumption data should be provided in a standardised reporting structure, or systems be linked at the back end to allow for information flow • The skills to process, clean and disseminate data and insights could potentially be centralized and deliver results to a wide range of public health officials.
2	There are significant differences in the consumption of health commodities between LICs and MICs.	Changing disease burden necessitate a wider remit for procurement reform. With many of the products for HIV, TB and malaria already being purchased through multilateral procurement platforms the levels of savings from these products is likely limited. • Health commodity procurement interventions need to widen their remit to include non-communicable diseases in middle income countries to achieve the biggest impact.
3	As countries get richer they tend to move away from centrally planned procurement systems towards decentralised framework agreements with direct delivery, usually by the private sector. These countries tend to pay higher prices for health commodities compared to those with centralized procurement systems.	The wide variation in prices paid for medicines on the WHO Essential Medicines List suggests that there are significant potential savings to be had in improving health commodity procurement for low and middle income countries. • These savings can likely best be achieved by both understanding the cost of goods better, international reference pricing, consumption volumes, disease burdens and technology value assessment.
4	Over 50% of original branded health commodities sold in LMICs and UMICs, in value terms, are over 20 years old from the date of first international launch and are now off-patent. Despite being significantly more expensive than generic alternatives they continue to be used in these markets.	Addressing brand preferences, particularly for the private sector, is not a simple regulatory matter. • Regulatory measures like mandatory generic prescribing would help. However, without addressing the lack of faith in local regulators and post-market quality surveillance this will not achieve the results required. • Pharmaceutical companies also provide continual medical education, which heavily influences prescribing behaviour. Better national CME programs for doctors would also increase rates of generic substitution.
4	Lower-income countries may miss-out on entire generations of progress in medical commodities, even in therapy areas that are directly relevant to their epidemiological profile, due to lack of innovation diffusion.	Given the slow rate of innovation diffusion to developing countries regulatory reform projects such as the African Medicines Harmonisation project should continue to be a focal point for investment. Better data on gaps in health commodity availability and pricing could also encourage generic competition • Even when products go generic there is no guarantee they will make it to new markets. It may be possible to put incentives in place for new product introduction to offset the costs of market entry. These costs include health professional training, diagnostics, disease awareness and regulatory activities required to launch a new treatment.

Annex: Literature Review for Country Procurement Systems Analysis 3

Searches were undertaken in Google, Google Scholar and PubMed. The first 50 hits were reviewed for relevance by; using CTRL + F to find relevant words in the document; scanning the abstract/introduction (where applicable) or first page (for a non-scientific papers) for relevant text, and scanning the whole document for relevant header sections.

The following searches were undertaken:

Database	Search term(s)	Years	Number of hits	Number of relevant hits
Google Scholar	procurement medicines drugs [Country]	2012-present	14,100	7 out of 50
Google	procurement medicines drugs [Country]	2012-present	Not defined	18 out of 50
Google	[Country] medicines procurement process	2016-present	Not defined	3 out of 50
PubMed	Health commodity procurement [Country]	Any period	33	3 out of 33
Google	[Country] medicines procurement process	2012-present	Not defined	3 out of 50

Annex: MIDAS Data Panels used for Analysis 4

COUNTRY	SECTOR	DATA TYPE	MIDAS PANEL NAME	AUDIT TYPE	FIRST AVAILABLE
BRAZIL	NON RETAIL	SELL-IN	BRAZIL NON RETAIL	Wholesalers, Tenders, Deliveries and Direct Sales from MNF	2007
BRAZIL	RETAIL	SELL-IN	BRAZIL RETAIL	Wholesaler and direct to pharmacy sales	1968
FR. W. AFRICA	RETAIL	SELL-IN	FR. W. AFRICA RET	Wholesaler to pharmacy sales	1980
INDIA	HOSPITAL	SELL-IN	INDIA HOSPITAL	Stockist to hospital sales	2006
INDIA	COMBINED	SELL-IN	INDIA TOTAL SALES	Stockist to retailers, hospitals and dispensing doctors sales	2011
MALAYSIA	COMBINED	SELL-IN	MALAYSIA COMBINED	Manufacturer to dispensing doctor, private hospital and retail pharmacy sales	1987
MALAYSIA	HOSPITAL	SELL-IN	MALAYSIA GOV HOSP	Distributor and direct manufacturer to govt. Hospital and institution sales	2008
MEXICO	NON RETAIL	SELL-IN	MEXICO NON RETAIL	Sales to government and private hospitals, institutions and clinics	2004
MEXICO	RETAIL	SELL-IN	MEXICO RETAIL	Wholesaler to pharmacy, supermarket sales	1961
PHILIPPINES	HOSPITAL	SELL-IN	PHILIPPINES HOSP	Audit of private and government hospitals, clinics w/ beds, HMO's, government agencies, and hospital traders	1968
PHILIPPINES	RETAIL	SELL-IN	PHILIPPINES RETAIL	Audit of non-hospital outlets, drugstores, dispensing physicians, clinics w/o beds, industrial, and pharmaceutical traders	1968
ROMANIA	HOSPITAL	SELL-IN	ROMANIA HOSPITAL	Wholesaler to hospital sales	1995
ROMANIA	RETAIL	SELL-IN	ROMANIA RETAIL	Wholesaler to pharmacy sales	1995
S. AFRICA	HOSPITAL	SELL-IN	S. AFRICA HOSPITAL	Wholesaler and direct to hospital sales	1979
S. AFRICA	RETAIL	SELL-IN	S. AFRICA RETAIL	Wholesaler and direct to pharmacy sales	1974
S. AFRICA	RETAIL	SELL-IN	S. AFRICA TOT MKT	Wholesaler and direct to pharmacy, private hospital and other non-retail outlet sales	1974
SERBIA	COMBINED	SELL-IN	SERBIA COMBINED	Wholesaler and direct sales to retail and hospital	2011
THAILAND	HOSPITAL	SELL-IN	THAILAND HOSPITAL	Wholesaler and direct to hospital sales	1988
THAILAND	RETAIL	SELL-IN	THAILAND RETAIL	Wholesaler and direct to pharmacy sales	1984
TUNISIA	HOSPITAL	SELL-IN	TUNISIA HOSPITAL	Census data collected from PCT (Central Pharmacy of Tunisia)	2014
TUNISIA	RETAIL	SELL-IN	TUNISIA RETAIL	Wholesaler to pharmacy sales	1983
TURKEY	HOSPITAL	SELL-IN	TURKEY HOSPITAL	Wholesaler to hospital sales	2000
TURKEY	RETAIL	SELL-IN	TURKEY RETAIL	Wholesaler to pharmacy sales	1967
US	HOSPITAL	SELL-IN	US CLINIC	Wholesaler/MNF to clinic sales	1992
US	RETAIL	SELL-IN	US DRUGSTORES	Wholesaler/Drug Chain Warehouse/MNF to drugstore sales	1957
US	HOSPITAL	SELL-IN	US FED FACILITIES	Wholesaler/MNF to federal facilities sales	1992
US	RETAIL	SELL-IN	US FOODSTORES	Wholesaler/Food Chain Warehouse/MNF to foodstore sales	1957
US	HOSPITAL	SELL-IN	US HMO	Wholesaler/MNF to HMO sales	1992
US	HOSPITAL	SELL-IN	US HOME HLTH CARE	Wholesaler/MNF to home health care service sales	1992
US	HOSPITAL	SELL-IN	US LONG TERM CARE	Wholesaler/MNF to long term care facility sales	1992
US	RETAIL	COMBINATION	US MAIL SERVICE	Wholesaler/MNF to mail service pharmacy sales	1957
US	HOSPITAL	SELL-IN	US MISCELLANEOUS	Wholesaler/MNF to outher outlet sales	1992
US	HOSPITAL	SELL-IN	US NON-FED. HOSP	Wholesaler/MNF to non-federal hospital sales	1992

Annex: Secondary Sources for Public : Private Procurement Split

Country	Source on Public Private health commodity split	Link	Year
Afghanistan	J.Harper & G. Strote (2011) – Afghanistan pharmaceutical sector development: problems and prospects- Southern Med Review Vol 4 Issue 1. April 2011	http://apps.who.int/medicinedocs/documents/s18434en/s18434en.pdf	2011
Algeria	Pharmaceutical Executive (2015) - Country Report: Algeria. Volume 35, Issue 8. Aug 01, 2015	http://www.pharmexec.com/country-report-algeria-0	2015
Angola	USAID (2014) - Assessment of the Medicines Regulatory System in Angola: Report. Dec 22, 2014	http://siapsprogram.org/publication/assessment-of-the-medicines-regulatory-system-in-angola-report/	2010
Bangladesh	Commercial/Academic data provided in confidence	Commercial/Academic data provided in confidence	2015
Bolivia	WHO (2008) – Bolivia Perfil Farmacéutico Nacional	http://apps.who.int/medicinedocs/documents/s19746es/s19746es.pdf	2008
Burkina Faso	Bioforce Development Institute (2011) - Burkina Faso Pharma Report. March 2011	https://peoplethatdeliver.org/ptd/sites/default/files/country-partnership-files/burkinafaso-cs-en_0.pdf	2010
Cambodia	The Food and Drug Department in the Ministry of Health (2015) - Situational Analysis Pharmaceutical Sector in Cambodia (DRAFT)	https://www.google.co.uk/url?sa=t&rct=j&q=&esrc=s&source=web&cd=26&cad=rja&uact=8&ved=0ahUKEwj5hJ6_3IvXAhUElxoKHYuFBto4FBAWCEEwBQ&url=http%3A%2F%2Fwww.racha.org.kh%2Frc2008%2F339%2FDRUG-_039_Pharmaceutical_Sector.doc&usg=AOvVaw1hCDNkcoOi75wMAdjTtqcI	2015
Cameroon	PEPFAR (2016) - Cameroon Country Operational Plan COP 2016, Strategic Direction Summary. May 20, 2016	https://www.pepfar.gov/documents/organization/257657.pdf	2015
Chad	WHO & Le Fonds mondial (2011) - OMS/Fonds Mondial Profil pharmaceutique de pays, Tchad	http://apps.who.int/medicinedocs/documents/s19854fr/s19854fr.pdf	2011
Côte d'Ivoire	PEPFAR (2016) - Côte d'Ivoire Country Operational Plan COP 2016, Strategic Direction Summary. April 21, 2016	https://www.pepfar.gov/documents/organization/257653.pdf	2015
Dem. Rep. of the Congo	PEPFAR (2016) - Democratic Republic of CongoCountry Operational Plan (COP/ROP) 2016, Final Strategic Direction Summary. June 24, 2016	https://www.pepfar.gov/documents/organization/257652.pdf	2015
Dominican Rep.	USAID, SIAPS & Ministerio de Salud Pública (2014) - Programming the Purchase of Medicines and Supplies in the Dominican Republic's Public Health System. August 2014	http://apps.who.int/medicinedocs/documents/s21651en/s21651en.pdf	2014
Ecuador	E. Ortiz-Prado, C. Galarza, F. Cornejo León & J. Ponce (2014) - Acceso a medicamentos y situación del mercado farmacéutico en Ecuado. Rev Panam Salud Publica 36(1), 2014	http://www.paho.org/journal/index.php?option=com_docman&view=download&category_slug=pdfs-july-2014&alias=776-acceso-a-medicamentos-y-situacion-del-mercado-farmaceutico-en-ecuador&Itemid=847	2012
Egypt	Ministry of Health Egypt & WHO (2011) – Egypt Pharmaceutical Country Profile. MIDAS Channel data	http://apps.who.int/medicinedocs/documents/s19733en/s19733en.pdf	2015
Ethiopia	Wondwossen Assefa Hailemariam (2015) - Pharmaceutical Products Value Chain in Ethiopia, Bird's eye view. Addis Ababa Chamber of Commerce and Sectoral Associations (MAU)	http://mau.addischamber.com/sites/default/files/Pharmaceutical%20supply%20chain%20in%20Ethiopia.pdf	2015
Ghana	PEPFAR Country/Regional Operational Plan (COP/ROP) 2017 Guidance (DRAFT). December 30, 2016. Policy Note: Pharmaceutical Sector in Ghana, November 2009	http://apps.who.int/medicinedocs/documents/s16765e/s16765e.pdf & https://www.pepfar.gov/documents/organization/266402.pdf	2014
Guatemala	Ministerio de Salud Pública y Asistencia Social, WHO (2015) - Reporte de Guatemala al Informe de Estadísticas Sanitarias Mundiales. Guatemala, 19 de enero de 2015	http://apps.who.int/nha/database/DocumentationCentre/GetFile/51654641/en	2013
Guinea	Ministère de la Santé, WHO (2011) – Republique De Guinee Profil Pharmaceutique Du Pays	http://www.who.int/medicines/areas/coordination/Guinea_PSCPNarrativeQuestionnaire_FR_16062011.pdf	2010
Haiti	PEPFAR (2016) - Haiti Country Operational Plan (COP/ROP) 2016 Strategic Direction Summary. July 8, 2016	https://www.pepfar.gov/documents/organization/257647.pdf	2011
India	National Health Accounts Technical Secretariat (NHATS), National Health Systems Resource Centre (NHSRC), Ministry of Health and Family Welfare (MoHFW), Government of India - National Health Accounts, Estimates for India, 2013-2014	http://apps.who.int/nha/database/DocumentationCentre/GetFile/53952681/en	2014
Indonesia	WHO & The Global Fund (2011) - Pharmaceutical Sector Country Profile Questionnaire, Indonesia	http://www.who.int/medicines/areas/coordination/Indonesia_PSCPQuestionnaire_21072011.pdf?ua=1	2010
Iraq	WHO, Government of Iraq (2008) - Iraq National Health Accounts, 2008	http://apps.who.int/nha/database/DocumentationCentre/GetFile/54758901/en	2008
Kenya	PEPFAR (2016) - Kenya Country Operational Plan (COP) 2016 Strategic Direction Summary. April 21, 2016	https://www.pepfar.gov/documents/organization/272016.pdf & GAVI	2015
Madagascar	Ministère de la Santé de Madagascar, WHO (2011) – Madagascar Pharmaceutique Du Pays	http://www.who.int/medicines/areas/coordination/Madagascar_PSCPNarrativeQuestionnaire_29062011.pdf?ua=1	2010
Malawi	PEPFAR (2016) - Malawi Country Operational Plan COP16 Strategic Direction Summary. July 1, 2016	https://www.pepfar.gov/documents/organization/257638.pdf	2015
Mali	Mathieu Lamiaux, Francois Rouzaud, Wendy (2011) - Private Health Sector Assessment in Mali: The Post-Bamako Initiative Reality. World Bank Working Papers	https://books.google.co.ke/books?id=XZcutXZ5zikC&pg=PA13&lpg=PA13&dq=mali+public+private+pharmaceuticals&source=bl&ots=N5rrC7yA6J&sig=i-AbiqX-RS2ukx6_Feo7kuWMX1k&hl=en&sa=X&ved=0ahUKEwjYx7PCw7vXAhWCLVAKHds3CW0Q6AEIRzAF#v=onepage&q=mali%20public%20private%20pharmaceuticals&f=false	2011

Morocco	Royaume du Maroc, Ministère de la Santé (2013) - Politique Pharmaceutique Nationale	http://www.sante.gov.ma/Documents/2016/02/PPN-Fr-2015.pdf	2013
Mozambique	PEPFAR (2016) - Mozambique Country Operational Plan (COP) 2016 Strategic Direction Summary (SDS). April 21, 2016	https://www.pepfar.gov/documents/organization/257637.pdf	2015
Myanmar	World Health Organization, Regional Office for South East Asia, New Delhi, India (Nov 2014) - Medicines In Health Care Delivery Myanmar, Situational Analysis: 13 - 23 October 2014	http://www.searo.who.int/entity/medicines/myanmar2014.pdf?ua=1	2013
Nepal	World Health Organization, Regional Office for South East Asia, New Delhi, India (Jan 2015) - Medicines In Health Care Delivery Nepal, Situational Analysis: 17-28. January 2015	http://www.searo.who.int/entity/medicines/nepal_situational_analysis_2014.pdf?ua=1	2011
Niger	Republique Du Niger, Ministere de la Sante Publique & WHO (2014) - Comptes de la Sante. Mars 2016	Niger - Health Accounts 2014 (SHA 2011) p. 110	2014
Nigeria	Federal Ministry of Health - Nigeria, WHO & EU(2010) - Mapping of Partners' Procurement and Supply Management Systems for Medical Product	http://apps.who.int/medicinedocs/documents/s16889e/s16889e.pdf	2010
Pakistan	IMS Health & Quintiles	IMS Health Channel Data	2015
Peru	Ministerio de Salud Peru & Peru Progreso para Todos (2015) – Cuentas Nacionales De Salud, Perú 1995-2012	http://bvs.minsa.gob.pe/local/MINSA/3248.pdf	2012
Philippines	Commercial/Academic data provided in confidence	Commercial/Academic data provided in confidence	2015
Rwanda	PEPFAR (2017) - Rwanda Country Operational Plan 2017, Strategic Direction Summary. May 4, 2017	https://www.pepfar.gov/documents/organization/272021.pdf	2015
Senegal		Interview with Central Medical Store (CMS)	2015
South Africa	PEPFAR (2017) - South Africa Country Operational Plan (COP17), Strategic Direction Summary (SDS). March 16, 2017	https://za.usembassy.gov/wp-content/uploads/sites/19/2017/03/SA-PEPFAR-COP-2017-Strategic-Directions-Summary-final-draft-16-March-2017-Public-Version.pdf	2015
Sri Lanka	Commercial/Academic data provided in confidence	Commercial/Academic data provided in confidence	2015
Sudan	Sudan Ministry of Health & WHO (2010) - Sudan Pharmaceutical Country Profile	http://www.who.int/medicines/areas/coordination/sudan_pharmaceuticalprofile_december2010.pdf	2010
Thailand		Figures confirmed by MoH official	2015
Tunisia	Commercial/Academic data provided in confidence	Commercial/Academic data provided in confidence	2015
Uganda	PEPFAR (2017) – Uganda Country/Regional Operational Plan 2016 Strategic Direction Summary. January 18, 2017	https://www.pepfar.gov/documents/organization/257628.pdf	2015
Ukraine	Commercial/Academic data provided in confidence	Commercial/Academic data provided in confidence	2015
United Rep. of Tanzania	PEPFAR (2017) - Tanzania Country Operational Plan (COP) 2017 Strategic Direction Summary. March 2, 2017	https://tz.usembassy.gov/wp-content/uploads/sites/258/2017/05/COP2017_SDS_Submission.pdf	2015
Uzbekistan	Armnian Development Agency (2012) - Pharmaceutical Industry: Russian, Georgian, Uzbek & Kazakhstani Market Research for Pharmaceutical Industry	http://georgien.ahk.de/fileadmin/ahk_georgien/Publikation/ADA-Pharmaceutical_Industry_2012.pdf	2011
Viet Nam	Commercial/Academic data provided in confidence	Commercial/Academic data provided in confidence	2015
Yemen	Ministry of Public Health & Population of the Republic of Yemen & WHO (2012) - Yemen Pharmaceutical Country Profile	http://www.who.int/medicines/areas/coordination/YemenPSCP_Narrative2012-12-16Final.pdf	2007
Zambia	PEPFAR (2016) - Zambia Country Operational Plan (COP) 2016 Strategic Direction Summary. June 14, 2016	https://www.pepfar.gov/documents/organization/257624.pdf	2015
Zimbabwe	PEPFAR (2016) - Zimbabwe Country Operational Plan (COP) 2016 Strategic Direction Summary. May 25, 2016	https://www.pepfar.gov/documents/organization/257623.pdf	2015

Annex: Secondary Sources for Estimation of Local Manufacturing Capacity (Pharmaceuticals only) - accessed November 2nd 2017

Country	Source on Proportion of Local Manufacturing	Link
Afghanistan	Aapi-af (2017) – Pharmaceutical Market in Afghanistan	http://www.aapi–af.com/pharma_in_afg.html
Algeria	Zawya Reuters (2017) – Algeria targets pharmaceutical production	https://www.zawya.com/story/Algeria_targets_pharmaceutical_production–ZAWYA20151206034354/
Angola	WHO – Country Data Profile on the Pharmaceutical Situation in the Southern African Development Community (SADC) Angola	http://apps.who.int/medicinedocs/documents/s17205e/s17205e.pdf
Bangladesh	Future Startup (2017) – Bangladesh Pharmaceutical Industry 101 – Future Startup	http://futurestartup.com/2017/07/27/bangladesh–pharmaceutical–industry–101/
Bolivia	Export.gov (2017) – Healthcare Resource Guide: Bolivia	https://2016.export.gov/industry/health/healthcareresourceguide/eg_main_092224.asp
Burkina Faso	Haiweb.org (2017) – Measuring medicine prices, availability, affordability and price components in Burkina Faso	http://haiweb.org/wp–content/uploads/2015/07/Burkina–Faso–Report–EN–Pricing–Surveys.pdf
Cambodia	Pacific Bridge Medical (2014) – Cambodia: A Future Emerging Pharmaceutical Market	http://www.pacificbridgemedical.com/news–brief/cambodia–a–future–emerging–pharmaceutical–market/
Cameroon	WHO (2011) – Republique Du Cameroun Profil Pharmaceutique Du Pays	http://apps.who.int/medicinedocs/documents/s19742fr/s19742fr.pdf
Chad		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Côte d'Ivoire	Oxford Business Group (2013) – Looking locally: More support is being given to domestic pharmaceuticals producers	https://www.oxfordbusinessgroup.com/analysis/looking–locally–more–support–being–given–domestic–pharmaceuticals–producers
Dem. Rep. of the Congo	FocusAfrica.gov – Democratic Republic of Congo (DRC)	http://focusafrica.gov.in/DRC_Pharmaceutical%20Sector.html
Dominican Rep.	European and Latin American Business Services and Innovation Network (Dec 2016) – Most attractive markets: total pharma revenue (24)	http://www.liaa.gov.lv/files/liaa/attachments/pharma_lac.pdf
Ecuador	The Business Year (2015) – Home Grown Ecuador 2015	https://www.thebusinessyear.com/ecuador–2015/home–grown/focus
Egypt	BluePharma Group (2016) – Business Opportunities in Egypt	18 Marco 2016	http://fundacaoaip.pt/wp–content/uploads/2016/03/Bluepharma–CCIAP_BLPH_Egipto_18032016.pdf
Ethiopia	Fed. Dem. Rep. of Ethiopia Ministry of Health and Ministry of Industry (2015) – National strategy and plan of action for pharmaceutical manufacturing development in Ethiopia (2015–2025)	http://www.who.int/phi/publications/Ethiopia_strategy_local_poduction.pdf
Ghana	gtz (2007) – The viability of pharmaceutical manufacturing in Ghana to address priority endemic diseases in the West Africa sub–region	http://apps.who.int/medicinedocs/documents/s17981en/s17981en.pdf
Guatemala	European and Latin American Business Services and Innovation Network (Dec 2016) – Most attractive markets: total pharma revenue (24)	http://www.liaa.gov.lv/files/liaa/attachments/pharma_lac.pdf
Guinea	WHO (2011) – Republique De Guinee Profil Pharmaceutique Du Pays	http://www.who.int/medicines/areas/coordination/Guinea_PSCPNarrativeQuestionnaire_FR_16062011.pdf?ua=1
Haiti	HERA Health Research For Action (2009) – Regional Assessment Of Drug Registration And Regulatory Systems In Caricom Member States And The Dominican Republic, Final Report – Vol. III	http://apps.who.int/medicinedocs/documents/s18706en/s18706en.pdf
India	ASA & Associates LLP (2015) - A brief report on pharmaceuticals in India	https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&ved=0ahUKEwjwxszM2KnXAhUEOhoKHUWQBWYQFggkMAA&url=http%3A%2F%2Fwww.cci.in%2F%2Ffile-download%3Ffile%3D%252FUpload%252FfldInsights%252FPharmaceutical-Industry-in-India.pdf%26mac%3DIZhsVaW2mqgD1VWvjsNMa5CrTzXnniGdYEANEVQC1Ag%253D&usg=AOvVaw3eKZKyMhhqpTuyFj77uSRR
Indonesia	Frost & Sullivan (2016) – Indonesia Healthcare Outlook 03rd November 2016	http://pharmexcil.org/uploadfile/ufiles/1333958694_Indonesia0401201617MrktRprt.pdf
Iraq	Medicare Iraq Baghdad (2015) – Investing Today for a Healthy tomorrow	http://www.nojanrad.com/wp–content/uploads/Iraq–Medicare–2015–Baghdad–Brochure.pdf
Kenya	UNIDO (2015) – Pharmaceutical Sector Profile: Kenya	https://www.unido.org/fileadmin/user_media/Services/PSD/BEP/Kenya_Pharma%20Sector%20profile_TEGLO05015_Ebook.pdf
Madagascar		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Malawi		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Mali		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Morocco	IPEMED (September 2013) – Moving towards a North African pharmaceutical market	http://www.ipemed.coop/adminIpemed/media/fich_article/1435337693_IPEMED%20–%20Moving%20towards%20a%20North%20african%20pharmaceutical%20market.pdf
Mozambique		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).

Country	Source	Link
Myanmar		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Nepal	A. Mishra (2015) – A study on Pharmaceutical Industry of Nepal CMS Business School JAIN University	https://www.slideshare.net/abhishekmsra/os–report
Niger		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Nigeria	Dr. O.C. Ugbam & E.P. Okoro (2017) – A Strategic Study of the Nigerian Pharmaceutical Sector: Organizational Leadership, Market – share, and Competitive Performance. International Journal of Business, Humanities and Technology, Vol. 7, No. 1; March 2017	http://www.ijbhtnet.com/journals/Vol_7_No_1_March_2017/1.pdf
Pakistan	PPMA Pakistan Pharmaceuticals Manufacturers' Association (2017) – Pakistan Pharmaceutical Industry	http://www.ppma.org.pk/Profile/pakistan–pharmaceutical–industry/
Peru	PHARMEXCIL (2017) – Peru Pharmaceutical Data	http://iphex–india.com/bsm/uploads/PERU.pdf
Philippines	Wallace Pharmaceuticals PVT. Ltd. – Philipines Pharmaceutical Marketing Study	https://www.slideshare.net/NadiaDias5/the–philippines–pharmaceutical–market–70933101
Rwanda		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Senegal	Oxford Business Group (2009) – The Report: Senegal 2009, Emerging markets series, ISBN (1902339215, 9781902339214)	https://books.google.co.uk/books?id=tIKob3eKf4IC&pg=PA160&lpg=PA160&dq=senegal+local+pharmaceutical+manufacturing&source=bl&ots=l6zImoXJef&sig=Rt04n7OTeA8N1wjmTLYSLNtwVmE&hl=en&sa=X&ved=0ahUKEwjFlLKDufzWAhWpDMAKHWl2AVwQ6AEIVzAH#v=onepage&q=senegal%20local%20pharmaceutical%20manufacturing&f=false
South Africa		IMS Manufacturer Data
Sri Lanka	Daily News (2017) – Pharmaceutical manufacturing in SL, a window of opportunity, Jul 21 2017	http://dailynews.lk/2017/07/21/business/122711/pharmaceutical–manufacturing–sl–window–opportunity
Sudan		UN Comtrade Data (if a country has no pharmaceutical exports an assumption is made that there is no domestic industry).
Thailand	BOI: Thailand Investment Review (2015) – Industry Focus: Thai Market is Large and Growing Fast	http://www.boi.go.th/tir/issue/201507_25_7/42.htm
Tunisia	Oxford Business Group – Tunisian pharmaceutical industry is looking to export more	https://www.oxfordbusinessgroup.com/analysis/good–shape–local–pharmaceutical–industry–looking–export–more
Uganda	UNIDO (March 2007) – Pharmaceutical Sector Profile: Uganda	https://www.unido.org/fileadmin/user_media/Services/PSD/BEP/Uganda%20Pharma%20Sector%20Profile_TEGLO05015_Ebook_.pdf
Ukraine	InvestUkraine & Deloitte – Pharmaceutical industry in Ukraine	http://www.investin.if.ua/doc/pub/Ovewview_Pharmaceutical.pdf
United Rep. of Tanzania	WHO (2011) – Local production and accessto medicines in Low– and middle–income countries, A literature review and critical analysis	http://apps.who.int/medicinedocs/documents/s19061en/s19061en.pdf
Uzbekistan	Pharmaceutical Market Access in CEE / CIS / Asia (2015) – Uzbekistan. Pharmaceutical market overview	https://cispharma.blogspot.co.uk/2015/03/uzbekistan–pharmaceutical–market.html
Viet Nam	Pharma Group (2015) – Vietnam Pharmaceuticals 2015	https://www.slideshare.net/olmas66/vietnam–pharmaceuticals–2015
Yemen	Alshakka et. Al. (2014) – Current Pharmaceutical Situation (Services) in Yemen and Future Challenges. Indian Journal of Pharmaceutical and Biological Research (IJPBR), Indian J. Pharm. Biol. Res. 2014; 2(4):77–83	http://ijpbr.in/pdf/Current–Pharmaceutical–Situation–Services–in–Yemen–and–Future–Challenges.pdf
Zambia	WHO – Pharmaceutical Sector Country Profile Questionnaire, Zambia	http://www.who.int/medicines/areas/coordination/Zambia.pdf
Zimbabwe		

Annex: Country Health Commodity Data Collection Tool

We would very much like to make sure that our findings and recommendations are relevant for <country>, and that we accurately reflect your country's experience with procurement. To include <country> in the analysis, we would need data on a basket of 39 medicines and devices which may have been publicly procured, and wondered if you would be able to assist with this request? Any national pricing data you chose to share will be kept confidential or be anonymised, but will be aggregated with other participating countries by geography, income status, tender structure and procurement volume. In return, we are offering each participating country access to anonymised pricing data from all other countries that choose to take part. We will be asking over 40 different countries to participate. If you did not order a medicine in the form or strength indicated can you please indicate what strength or alternative molecule was procured. A number of patented and more expensive medications have been included in this list, if procurement of these molecules was zero please indicate a zero.

Line 2 of the data collection sheet below shows an example, Metformin of the commercial name "Exermet" was procured from Cipla in packs of 10 tablets per pack. 100,000 packs were procured at a cost of $0.43 per pack. All 100,000 packs were purchased in one tender.

Therapy Area	Molecule / Medical Device	Formulation / Strength	Seller	Brand name / generic manufacturer	Pack size (number of tabs/vials/etc. per pack)	Volume 2015 (number of packs or units)	Volume 2015 given in [packs/units]	Currency	Price 2015	Price 2015 given as [per pack/per unit/total]	International Commercial (INCO) Terms	Additional comments
Example: Diabetes	Metformin	500mg cap / tab	Cipla Name of company	Exermet / Cipla	10	100,000	Packs	USD	0.43	Per Pack	FOB – Free on Board	
Asthma	Salbutamol	0.1mg/dose inhaler										
Diabetes	Metformin	500mg cap / tab										
Cardiovascular	Bisoprolol	5mg cap / tab										
Cardiovascular	Enalapril	10mg cap / tab										
Cardiovascular	Simvastatin	20mg cap / tab										
Infectious disease	Ciprofloxacin	500mg cap / tab										
Infectious disease	Ampicillin	1g/vial										
Infectious disease	Amoxicillin & Clavulanic acid	500 +125mg cap / tab										
CNS	Diazepam	5mg cap / tab										
Pain / Inflammation	Diclofenac	50mg cap / tab										
Pain / Inflammation	Paracetamol	24mg/ml suspension										
Ulcer	Omeprazole	20mg cap / tab										
TB	Rifampicin	300mg cap / tab										

Malaria	Artesunate + amodiaquine	100mg + 270mg cap / tab									
Malaria	Artesunate (Injection)	60 mg / vial									
Malaria	Artemether + Lumefantrine	20 + 120mg cap / tab									
Hormonal Contraceptive	Ethinylestradiol + Levonorgestrel	30 + 150μg cap / tab									
HIV	Tenofovir + Lamivudine + Efavirenz (TDF/3TC/EFV)	300 + 300 + 600mg cap / tab									
HIV	Tenofovir + Lamivudine + Dolutegravir (TDF/3TC/DTG)	300 + 300 + 50mg cap / tab									
Anaemia / Conjunctive therapy	Erythropoietin	1000IU/ 0.5 mL									
Deworming	Albendazole	400mg cap / tab									
Diarrhoea	Zinc + ORS	10mg cap / tab									
Diabetes	Depot Medroxyprogesterone Acetate (DMPA)	150mg / vial									
Oncology	Imatinib	100mg cap / tab									
Vitamins & Minerals	Retinol (Vitamin A)	10,000 IU cap / tab									
Diabetes	Soluble Insulin (human)	100 IU/ml in 10ml vial.									
Oncology	Cisplatin	100mg /100ml vial									
Oncology	Paclitaxel	6 mg/ml suspension									
Oncology	Rituximab	100mg in 10ml vial									
Hepatitis C	Sofosbuvir	400mg cap / tab									
Diagnostics	Ultrasound machines										
Diagnostics	MRI Scanner										
Diagnostics	Malaria RDT										
Medical device	Pacemakers										
Diagnostics	Glucometers										
Bed nets	LLINs										
Diagnostic test	HIV Viral load tests										
Diagnostic test	TB diagnostics										