Can Better Procurement Be the Key to Financing UHC? Potential Savings from Health Sector Procurement Reforms in Low- and Middle-Income Countries

Kalipso Chalkidou, Janeen Madan Keller, Mead Over, and Alex Jones

Abstract

Around the world, procurement processes—which are vital to ensuring an affordable, reliable, and high-quality supply of health products—remain fraught with obstacles. Further, the ongoing pandemic is magnifying challenges, for both COVID-19-related supplies and other essential health products. This paper summarizes current challenges in health product markets in low- and middle-income countries; presents estimates for the range of potential savings that could be realized from improved procurement; and highlights possible policy options for the way forward.

From simulations of three procurement reform approaches, we find that 50 of the poorest low- and middle-income countries could achieve savings between $10 to $26 billion per year, equivalent to 16 to 41 percent of the estimated $63 billion in annual spending on health products. Precise estimates of the potential savings from improved procurement of health products are difficult to compute due to scarce data. We also recognize that procurement-related reforms are contingent on overcoming complex political-economy dynamics in the real world. Nevertheless, our findings provide an illustrative range for the magnitude of possible savings and highlight the value proposition of addressing the inefficiencies that characterize procurement systems in low- and middle-income countries. In a post-pandemic world, improving procurement of health products must remain central to countries' efforts to maximize health outcomes—it will also ensure health systems are more resilient when the next outbreak hits.

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The analyses in this paper build upon the data on health product markets in low- and middle-income countries that were used to inform CGD's Working Group on the Future of Global Health Procurement. The dataset comprises a combination of procurement data that are country owned and data from IQVIA that were shared under proprietary guidelines. More information on the data is provided in Annex 1 and is also documented in Appendix D of the final report of CGD's Working Group on the Future of Global Health Procurement, available at: https://www.cgdev.org/sites/default/files/better-health-procurement-tackling-triple-transition.pdf#page=95. Additional details about the data and analyses are available upon request.

Introduction

Access to essential health products remains a persistent challenge—notably, one-third of the world's population still lacks regular access to medicines.[1] Governments in low- and middle-income countries (LMICs) also tend to provide little funding for medicines and other health products.[2] As a result, patients often cover these expenses out of pocket in the private sector—which is a major driver of catastrophic health spending.[3] Further, procurement processes, which are vital to ensuring an affordable, reliable, and high-quality supply of health products, remain fraught with challenges. As highlighted by CGD's Working Group on the Future of Global Health Procurement, national and international procurement systems are failing to deliver health products at affordable prices in LMICs.[4]

Within this context, many LMICs are making ambitious commitments to Universal Health Coverage (UHC), while facing the prospect of transitioning away from donor assistance and simultaneously experiencing growing demands for more complex and expensive healthcare technologies.[5,6] In this paper, we summarize current challenges in health product markets in LMICs, drawing on findings from CGD's Working Group on the Future of Global Health Procurement; present estimates for the range of potential savings based on simulations of three procurement reform approaches; and highlight possible policy options for the way forward.

The ongoing pandemic is exacerbating procurement challenges in LMICs, for both COVID-19-related supplies and other essential health products. Disruptions to the production of active pharmaceutical ingredients in China and beyond, export bans, and transport interruptions are having far-reaching ripple effects in supply chains globally.[7,8,9] Supply shortages and quality issues for essential health products are also likely to extend well beyond the immediate crisis.[10] The significant economic fallout will, in turn, affect the spending ability of governments, donors, and households around the world.[11] Nevertheless, as LMIC governments and the global health community mount a response to address these challenges, there may be opportunities for them to emerge from the crisis stronger, with better and more efficient procurement systems that provide greater access to quality health products at current levels of LMIC and donor spending.

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[1] Hogerzeil and Mirza 2011.
[2] "Global Spending on Health: A World in Transition" 2019.
[3] Selvaraj et al. 2018; and Ewen et al. 2017.
[4] Silverman et al. 2019.
[5] Silverman 2018.
[6] Glassman et al. 2018.
[7] Blackburn 2020.
[8] Bown 2020.
[9] Armstrong 2020.
[10] Pisani 2020; and Newton and Bond 2020.
[11] Gheorghe et al. 2020.

Through previous work, we approximated that the total size of the health product market (comprising spending by governments, donors, and the private sector) in 50 of the poorest LMICs is roughly $63 billion.[12] Each square of the eight-by-eight figure below represents $1 billion in current spending (see Figure 1). We vertically slice the $63 billion into shares of government, private, and donor spending. We split government spending further between the proportion that is centralized (shaded brown; $7.9 billion) and the remaining share that remains decentralized (shaded yellow; $4.8 billion), based on our working assumption that roughly two-thirds of procurement is currently centralized.[13] The $4 billion of donor spending is shaded orange, while the remaining $46.2 billion of spending by the private sector is shaded teal.[14]

Building on this partition of total spending on health products, we run simulations of three procurement reform approaches: centralizing public sector procurement at the national level; switching to unbranded generics; and benchmarking prices to reduce variability of prices for generic health products. Our estimates of potential savings suggest that annual government, private, and donor spending on health products in 50 of the poorest LMICs could be reduced by roughly 16 to 41 percent of the total health products market, for savings ranging from $10 to $26 billion per year.

These illustrative estimates are based on several underlying assumptions and extrapolations from limited data on global health product markets.[15] Further, the estimates are contingent on overcoming complex political-economy issues and realizing potentially challenging institutional reforms. Recognizing that precise estimates of potential savings from improved procurement are difficult to compute given scarce, outdated, and incomplete information, our findings highlight the value proposition of addressing the inefficiencies that characterize procurement systems in LMICs. In a post-pandemic world, improving the efficiency and effectiveness of procurement must remain central to countries' efforts to maximize health outcomes and financial protection for their citizens—it will also ensure health systems are more resilient and better prepared to respond when the next outbreak hits.

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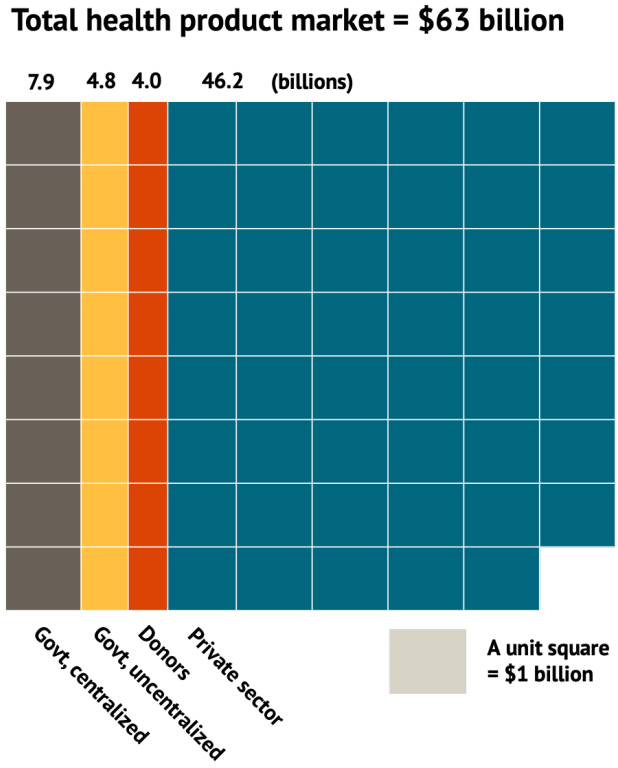
[12] This comprises spending on pharmaceuticals, hospital consumables, diagnostic devices, long-lasting insecticide-treated nets, and biologics including vaccines. For details on the 50 LMICs included in this analysis, see the map in Figure 11 and Annex 1. More details on what constitutes the government, donor, and private sectors are in Annex 1. See also Rosen et al. 2017 and Silverman et al. 2019.

[13] The exact proportion of government spending on health products that is currently centralized is generally unknown; the literature suggests a wide range across LMICs, including those where procurement is entirely centralized (e.g., South Africa, Uganda, Rwanda) or roughly 75 percent centralized (e.g., Algeria, Senegal, Tanzania) compared with others where procurement is almost entirely (e.g., Ghana) or mostly decentralized (e.g., Nigeria, Philippines). In this paper, we conservatively assume the existing level of centralization could be anywhere between 50 and 75 percent and adopt the midpoint of this plausible range, 62.5 percent. Therefore, our working assumption is that approximately two-thirds of current government purchases is already centralized, leaving one-third, or $4.8 billion, which could benefit from centralization.

[14] The total sums to $62.9 billion, which differs slightly from $63 billion due to rounding error.

[15] Chalkidou et al. 2018.

Figure 1. The components of spending on health products in 50 of the poorest low- and middle-income countries total approximately $63 billion dollars per year



Notes: An area equivalent to the square in the legend below the figure represents $1 billion. Since total spending across 50 LMICs is one billion less than $64, we remove one square from the bottom row of the eight-by-eight array. The last five columns (shaded in teal) are composed only of squares representing $1 billion each. The first through fourth columns are composed of rectangles each of which is one unit in height, with its width adjusted to represent the appropriate proportion of $1 billion. For government spending, our working assumption is that 62.5 percent of procurement is already centralized, leaving 37.5 percent of current government purchases, or $4.8 billion, which could benefit from centralization (see footnote 13). This assumption determines the relative width of the first two columns of Figure 1, with $7.9 billion of government spending already centralized (shaded brown) and $4.8 billion available for centralization (shaded yellow).

I. Health Product Markets in Low- and Middle-Income Countries: Five Key Challenges

1.3 As countries transition from low-income to lower-middle-income status, the relevance of donor expenditure for health products drops rapidly and the private sector—where most patients pay out of pocket—dominates as the primary purchaser of health products.

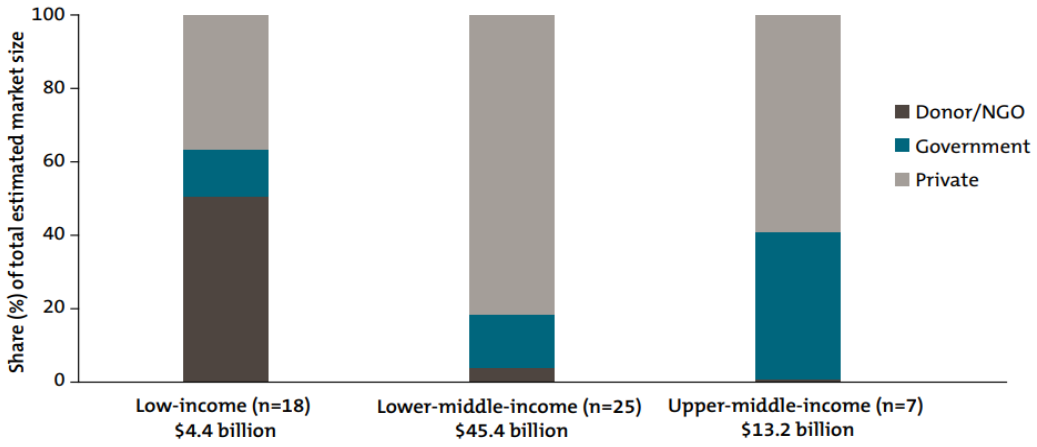
While Figure 1 presents the average shares of government, donor, and, private spending on health products, the breakdown of spending among these three sectors varies considerably from country to country. Figure 2 shows the variation in shares of the $63 billion market of health product spending by the country's income level.[16] Donors account for half of all spending on health products in low-income countries, but finance a mere 4 percent in lower-middle-income countries. In contrast, over 80 percent of health products in lower-middle-income countries is procured by the private sector where individuals tend to pay out of pocket (see Figure 2). This pattern reflects the "missing middle" problem observed in CGD's research and the Institute for Health Metrics and Evaluation's analysis of global health financing trends; as development assistance for health wanes, newly middle-income governments can be slow to fill the resulting gap, leaving patients to rely on out-of-pocket spending.[17,18] Governments' inability (or unwillingness) to fill in for donor spending exacerbates inequalities and undermines progress towards UHC.

[16] This estimate is based on a subset of 50 of the poorest LMICs with a population over 10 million: 18 low-income countries, 25 lower-middle-income countries, and 7 upper-middle-income countries where spending on global health products totals $4.4 billion, $45.4 billion, and $13.2 billion, respectively. See the map in Figure 11 and Annex 1 for more details.

[17] Rosen et al. 2017.

[18] "Increased out-of-pocket spending threatens universal health coverage in 'missing middle' countries" 2019.

Figure 2. Private, government, and donor/NGO financing as a share of the total estimated market (value) for health products by country income groups



Source: Reproduced from Silverman et al. 2019. Analysis based on UN Comtrade and secondary research. Data sources and definitions listed in Silverman et al. 2019 (Appendix D).

Notes: Donor/NGO procurement includes: integrated procurement within government systems; multi-country NGO global tenders (e.g., through Gavi, PAHO, GFATM); Government procurement includes: CMS, MOHs; regional medical stores, state/group of hospitals; social security programs; Private procurement includes: Large hospitals or pharmacy chains (GPOs); private wholesalers and retailers; private distributors (e.g., Eurapharma/Laborex in FWA); government hospitals, clinics, pharmacies purchasing directly from domestic private sector distributors outside of framework agreements.

1.2 Most spending on health products in low- and middle-income countries goes to off-patent products; further, these countries disproportionately purchase more expensive branded generics rather than unbranded medicines.

Global conversations on access to medicines tend to focus on pricing for on-patent (originator) drugs and intellectual property status. Yet, we find that less than 10 percent of expenditure on health products goes to on-patent products in our sample of LMICs where we have detailed data.[19] A large share—and based on our sample over 90 percent—is spent on pharmaceutical products that are no longer protected by patents.

We find that branded generics, which usually command a price premium over unbranded generics, make up about two-thirds of the market by volume and value in our sample of LMICs. Unbranded generics, usually the least expensive option, account for a tiny sliver of

[19] See Annex 1 for the list of 15 countries. Note, we found that in these countries, an estimated 30 percent of expenditures on pharmaceuticals in 2015 was for original or licensed brand products, on average. Of this, only 31 percent, on average, was spent on products launched within the last 20 years (note, we assume that most patents expire after 20 years). Therefore, 30 percent of 31 percent is 9.4 percent.

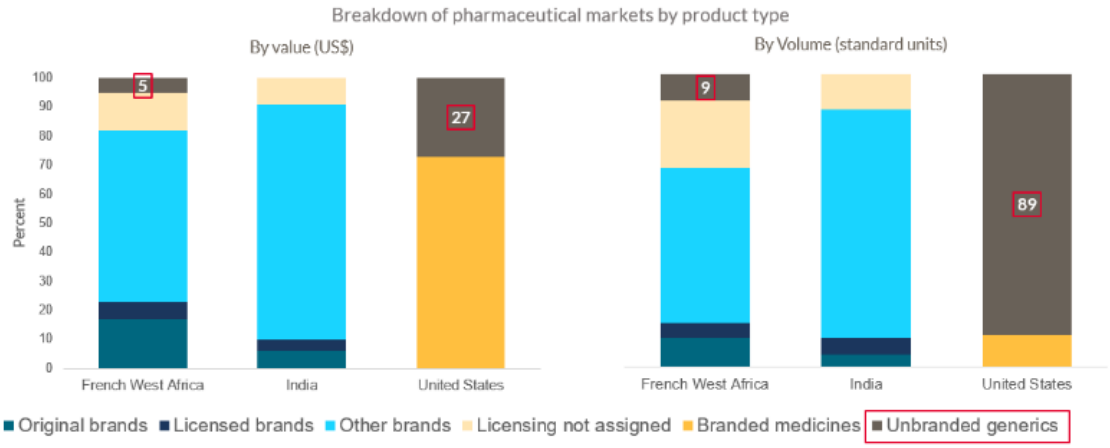
the market, only comprising 5 percent by volume and 3 percent by value. In countries like the United States and the United Kingdom, unbranded generics account for more than 80 percent of the pharmaceutical market by volume, but less than 30 percent by value (see Figure 3).[20]

This trend in LMICs is explained, in part, by a preference for branded products among patients and prescribers, possibly because a brand may serve as a proxy for quality in settings with low levels of trust in national regulatory and quality control regimes.[21] When preferences for a branded product reduce the elasticity of demand for that product, the resulting market power of the brand's manufacturers, distributors, and retailers enables them to offer incentives to medical professionals, pharmacies, and wholesalers to favor the product—and then build the cost of those incentives into the price of the branded product. Thus, buyer preferences for branded products and their higher unit costs can together explain the larger proportion of spending on branded products, especially in richer LMICs.

[20] We have used 2015 figures for the United States here to be able to compare with our available data from LMICs for the same year. Generic medicines accounted for 90 percent of all prescriptions and only 22 percent of all drug spending in the United States in 2018. See "2019 Generic Drug & Biosimilars Access & Savings in the U.S. Report" 2019. See also IMS Institute for Healthcare Informatics 2016 on price declines after branded medicines lose exclusivity in the United States. That said, generics markets in high-income countries are not without their own challenges. In the United States, for example, a multi-year investigation uncovered a widespread price-fixing scheme among leading generic drug manufacturers that is now the subject of a lawsuit filed by 44 states: see: https://portal.ct.gov/-/media/AG/Press_Releases/2019/FINAL-UNREDACTED-Teva-Complaint-for-CT-District-Court.pdf; https://www.nytimes.com/2019/05/11/health/teva-price-fixing-lawsuit.html and here https://www.nao.org.uk/wp-content/uploads/2018/06/Investigation-into-NHS-spending-on-generic-medicines-in-primary-care.pdf from NHS enquiry into generic spending. Both the United States and the United Kingdom are keen to safeguard the competitiveness of their generics markets.

[21] The little empirical evidence we have on the quality of branded and unbranded products suggests that quality problems arise with unbranded as well as with branded products—and even on-patent products. While expensive branded or on-patent products seem to be more subject to falsification and counterfeiting, inexpensive unbranded generics are more likely to be substandard. As such, there is a strong need for more and better empirical evidence, including better post-marketing surveillance, especially across sub-Saharan Africa. See Pisani et al. 2019.

Figure 3. Comparison of health product markets by brand and licensing status in French West Africa, India, and United States



Source: Authors' analysis building on Silverman et al. 2019. IMS Health MIDAS Database for French West Africa and India data points; Association for Accessible Medicines (AAM) Annual report for 2016 for United States data points.

Notes: French 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.

Licensed brands are products that are licensed out by an originator company to a company located in another region or country. Licensing not assigned refers to products specific to that country or region (e.g., locally manufactured branded generic medicines) where the brand is not recognized in the global IQVIA system or the data has not been recorded properly by the distributors supplying IQVIA with data.

Data on French West Africa and India are segmented into the following categories: Original brands are products developed by originator/innovator companies. Branded generics are off-patent medicines sold under a brand name. Unbranded generics are marketed as the international non-proprietary name (INN) of the active ingredient(s). See Silverman et al. 2019 (Appendix D) for more details. Data for the United States are segmented by AAM into unbranded generics and branded medicines (which encompass original brands, licensed brands, and other brands).

1.3 Consumers pay higher percentage mark-ups for branded generic drugs in poorer countries.

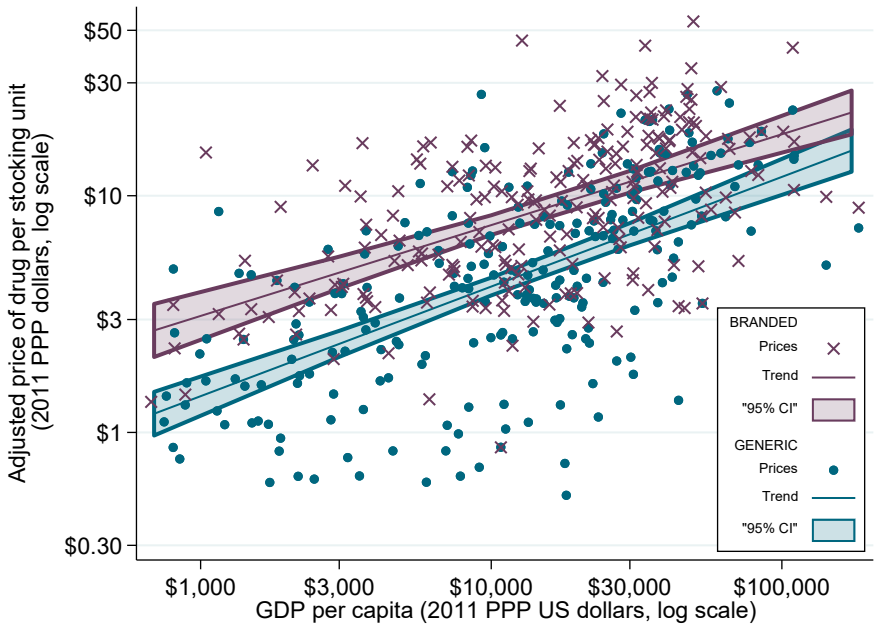
The largest internationally comparable survey of retail prices is conducted every five years by the International Comparison Project, which uses the data to construct the well-known "Purchasing Power Parity" (PPP) index of national income.[22] Data from this project on the prices of branded and unbranded versions of four commonly used drugs support the finding that, on average, consumers pay more for branded generic products than for unbranded versions. Furthermore, the mark-ups that consumers pay for branded versions over unbranded versions are higher in poor countries.

For four commonly used generic medicines—aspirin, acyclovir, omeprazole, and metronidazole—the International Comparison Project collected the average retail prices of either an unbranded generic, a branded generic or both versions in 123 countries in 2011.[23] Figure 4 shows that, with few exceptions, the retail prices of branded drugs (the x's in Figure 4) were higher than those of generic versions (the dots in Figure 4). The prices of both branded and generic drugs were higher in richer countries, but the percentage mark-up is higher in poorer countries. The average percentage mark-up for a country with a PPP-adjusted per capita GDP of $1,000 (e.g., Niger) was about 34 percent, while that for a country with a per capita GDP of $100,000 (e.g., Singapore) was only 17 percent, about half as large.

[22] For its 2011 revision, the International Comparison Project (ICP) collected data on the price of each of more than 3,000 consumer goods in each of almost 200 member countries. In the pharmaceutical sector, each of 152 countries collected retail prices on from one to 42 molecules covering 43 molecules in all. Publication of the 2017 revision of ICP is expected in April 2020. For more information, see "International Comparison Program (ICP)" n.d.; and "Purchasing Power Parities - Frequently Asked Questions (FAQs)" n.d.

[23] Aspirin is a nonsteroidal anti-inflammatory drug commonly used to treat pain, fever, and inflammation; acyclovir is an antiviral medicine; omeprazole is commonly used for heartburn treatment; and metronidazole is an antibiotic.

Figure 4. Consumers in poorer countries pay a higher percentage mark-up for branded medicines

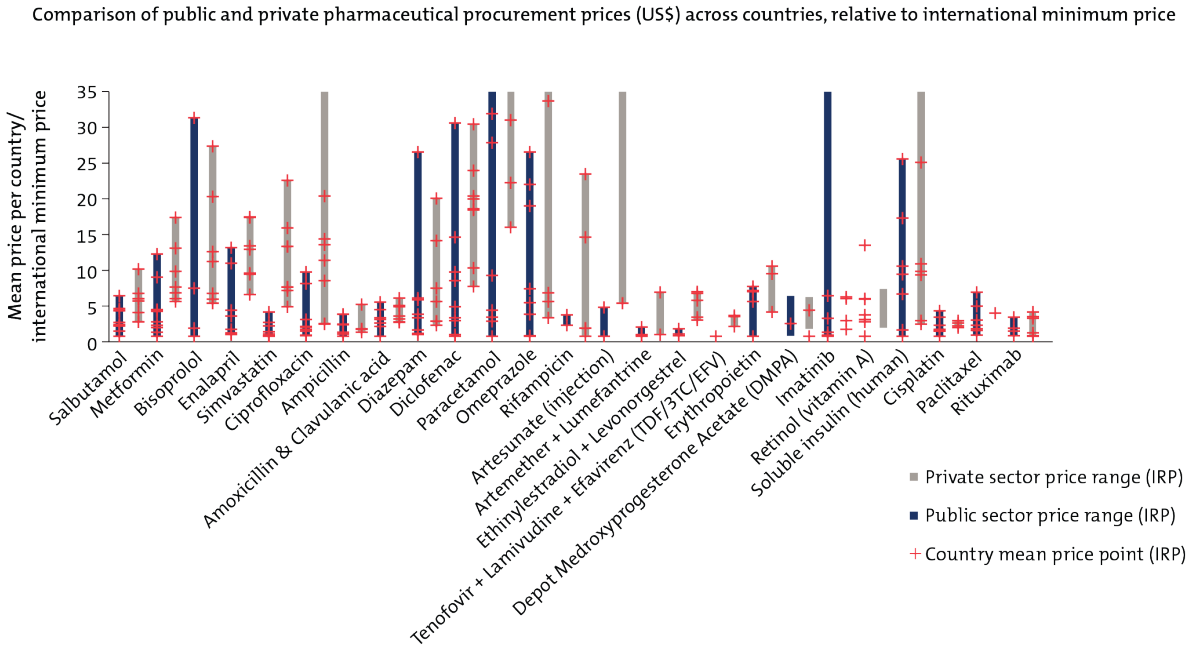


Source: Authors' analysis.

Notes: Data are for four molecules in 123 countries as collected by the International Comparison Project (accessed, December 2019). To control for the systematic differences in price by drug, the average prices of individual drugs are shifted such that all four share the same overall geometric mean price of $6.16 per stocking unit. Each point plots an adjusted average price (on the vertical axis) against the per capita income of the country in which that average price was observed (on the horizontal axis). The average prices of branded drugs are plotted as an X, while those of a generic drug as a dot. The top (bottom) of the two fitted trend lines represents the estimated relationship between the retail price of a branded (generic) drug and the per-capita income in the country where the price was observed. The slope of the top (bottom) line is 0.38 (0.46) and represents the percentage increase in the branded (generic) price associated with a one percent increase in per capita income. The shaded area around each line shows the 95 percent confidence interval for the adjusted price of that type of drug at a given per capita GDP.

Figure 4 also illustrates the high variability of retail prices for the same generic drugs across countries. While some of this variability is due to variation in the mark-ups from buyer to buyer within in-country supply chains, evidence suggests that much of the retail price variation is driven by differences in procurement prices paid by importers even before they sell the products to wholesalers or retailers. As highlighted by CGD's Working Group on the Future of Global Health Procurement, prices for medicines vary so much that some purchasers in LMICs pay as much as 20 to 30 times a minimum international reference price for basic generic medicines, such as the common pain reliever paracetamol, soluble human insulin, and the heartburn treatment drug omeprazole (see Figure 5).

Figure 5. Price variation across seven low- and middle-income countries for generic pharmaceutical products



Source: Reproduced from Silverman et al. 2019. IMS Health Data for Indian state of Kerala (Hospital, Retail), Philippines (Private), Senegal (Private), Serbia (Private, Public Hospital, Public Pharmacy), South Africa (Private, Public Tender, Public Direct), Tunisia (Public, Private), and Zambia (Public, Private). Respondents: Kerala, Senegal. Publicly available data: Philippines. Public sector respondent data from Kerala, Senegal, and publicly available data from the Philippines. Public data n= 154 data points, Private data n=131 data points.

Notes: Analysis measures price variation by molecule. International reference price (IRP) in this instance is defined as the lowest price found in the sample of countries analyzed.

1.4 Markets for health products in low- and middle-income countries are often dominated by a small number of suppliers, which may raise the prices paid by procurers and consumers.

A market in which there are few suppliers is said to be highly "concentrated." A common measure of concentration is the "concentration ratio," defined as the percentage of the value of market transactions sold by the largest supplier. In some instances, the largest seller of products for certain therapy classes in LMICs can account for 85 percent or more of all sales.[24] Examples include contraceptives in Zambia, Philippines, Senegal, and Kerala (a state in Southern India); cancer drugs in Zambia and Kerala; diabetes drugs in Zambia; and antiparasitic drugs in Philippines, Zambia, Tunisia, and South Africa (see Table 1).

[24] Dubois et al. 2019.

Research suggests competition in generics markets can help lower prices. Evidence from the United States shows the entry of additional generic competitors helps lower prices by 6 percent after the first entrant, 48 percent after a second entrant, and as much as 95 percent when there are 19 generic manufacturers in the market—savings that many LMICs forego due to the market power of a few sellers in a highly concentrated market.[25]

The causes of relatively high market concentration ratios for health products in LMICs are poorly understood. Several barriers to entry, including onerous and costly regulatory requirements, may prevent firms from entering LMIC markets, thus resulting in fewer firms and limited competition.[26] In this paper, we hypothesize that, in addition to these issues related to the potential profitability to the supplier of entering a LMIC market, barriers are higher than need be because governments and the international community are insufficiently proactive in implementing barrier-reducing policies (see discussion in later section).

Table 1. One-firm concentration ratio by therapy area for selected countries/states (sample of 40 molecules)

	Country (%)						
Area	Kerala	Philippines	Senegal	Serbia	South Africa	Tunisia	Zambia
Anemia		66.4	100.0	88.1			
Antiulcerants	44.4	44.0	18.4	72.1	61.4	50.4	81.3
Antihypertensives	62.2	62.2	69.6	43.7	76.5	75.1	91.7
Antibiotics	21.9	51.9	88.3	63.2	29.0	44.5	61.9
Antiparasitics	33.1	100.0	40.0		91.8	97.5	98.2
Arthritis immunosuppressants	37.4	57.5	31.3	57.9	61.6	63.1	90.6
Asthma/COPD	84.8	62.9	96.2	84.0	78.9	95.7	100.0
Cancer	90.6	61.7	76.0	58.8	65.0	64.4	100.0
Contraceptives & hormones	84.4	97.2	87.3		72.5	80.7	98.7
Diabetes	27.3	51.5	72.4	61.0	59.8	56.0	100.0
HIV antiretrovirals	64.7				82.2	84.4	100.0
Lipid regulators	74.1	46.7	46.4	59.8	81.2	70.3	98.8
Nervous system medications	89.1	78.2	100.0	78.2	83.3	91.4	99.5
Pain analgesics		55.0	93.2	40.6	50.0	30.8	100.0
Tuberculosis	40.0	59.7	30.7	46.5	50.4	61.5	80.6
Vitamins and minerals		99.0	88.0	97.7	99.8	26.6	

Source: Reproduced from Dubois et al. 2019 (Table C.2).

Notes: IMS Health Data. Figures in the table represent one-firm concentration index—the proportion of domestic market share of the largest seller. Sample of 40 molecules with available data; see working paper for full details and caveats. Means over 2015-2017 for all countries except Philippines (2013-2016). Private sector only for Kerala and Senegal.

[25] "About the Center for Drug Evaluation and Research - Generic Competition and Drug Prices" 2017.
[26] Silverman et al. 2019.

1.5 Mark-ups and distribution costs across multiple intermediaries along the supply chain substantially raise the final price to patient.

Health product supply chains in many LMICs are long, complex, and fragmented.[27] They involve mark-ups and distribution costs across multiple intermediaries—including importers, wholesalers/sub- wholesalers, retailers, and distributors—which can significantly drive up prices by the time products reach patients (see Figure 6). A rough calculation for a subset of 43 low-income and lower-middle- income countries shows the estimated $50 billion worth of health products procured annually ends up costing approximately $80 billion by the time they reach end users, after taking estimated central medical store, regional medical store, wholesaler, and retailer operating costs and mark-ups into account.[28] Evidence from the experiment in India suggests price controls perversely benefited urban consumers, but harmed poorer and more rural consumers.[29] The proportion of distribution costs in the final price to patients in the private sector tends to be larger both for products with low price elasticity of demand[30] and when supply chains are highly concentrated;[31] conversely, the proportion of distribution costs in the final price to patients tends to be smaller when distributors can achieve scale economies.[32] The net effect on the retail price of these three factors varies from country to country and from product to product. While policies to improve the efficiency of in-country supply chains are outside the scope of this paper, the challenge to policymakers is to strike a balance in each supply chain between sufficient

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[27] Yadav 2015.

[28] Analysis by AfRx Consulting based on data from a subset of 43 countries (18 low-income countries and 25 lower-middle-income countries). In the private sector, estimates suggest that anywhere from 30-60 percent—and in extreme cases as much as 90 percent—of products' final cost to patients in the poorest countries is driven by national and sub-national distribution costs.

[29] Dean 2019 found that, for controlled products in comparison to similar uncontrolled products, urban consumers benefit from lower prices with no change in availability, while rural consumers suffered from significantly reduced availability.[30] At a low elasticity of demand, raising the price of a product will discourage sales less than if the elasticity of demand were greater. Therefore, profit maximizing producers/distributors, other things equal, tend to charge higher prices for products with low elasticities of demand.

[30] At a low elasticity of demand, raising the price of a product will discourage sales less than if the elasticity of demand were greater. Therefore, profit maximizing producers/distributors, other things equal, tend to charge higher prices for products with low elasticities of demand.

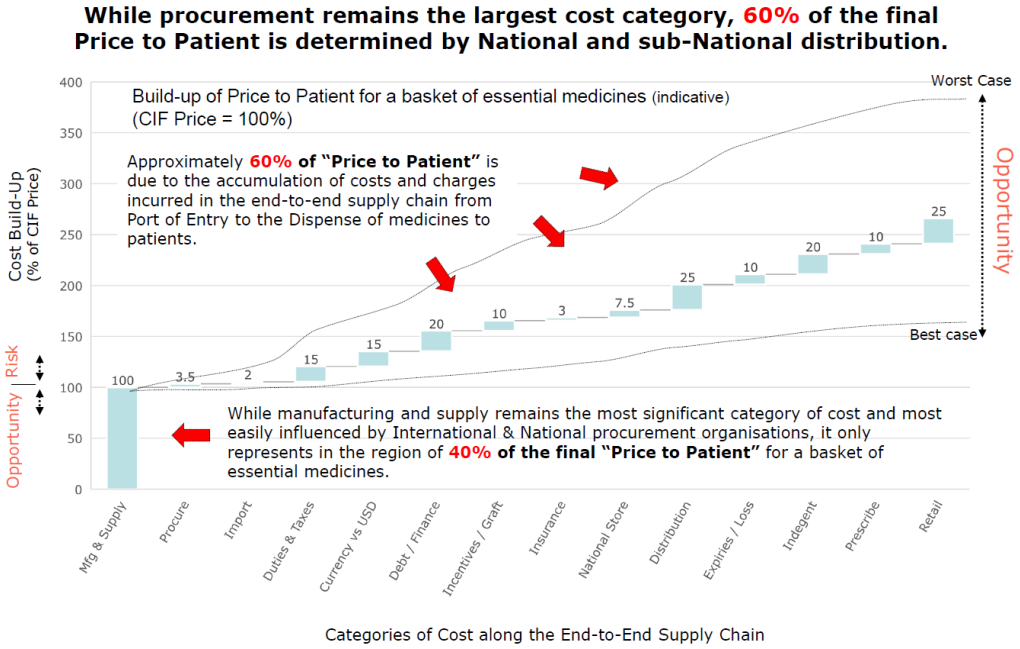
[31] In an imperfectly competitive market, other things equal, more concentrated sellers have more monopoly power and therefore raise their prices.

[32] Some suppliers in some markets have lower production and/or distribution costs because they are producing/distributing larger volumes of product; this is called achieving "scale economies". They may or may not pass on a portion of these cost-savings to consumers. They are more likely to pass on at least a portion of these savings if, by doing so, they can achieve other objectives. For example, lowering their price can be a strategy to increase market share or to reduce the elasticity of demand by improving consumer loyalty. Both of these last two objectives would tend to prevent the fall of retail prices and possibly allow for price increases in the longer run.

We also found that average mark-ups in the private sector are inversely correlated with the size of the private market; in many cases, a smaller private market in low-income countries is correlated with higher mark-ups. This explains, at least in part, why the share of the final cost to patient driven by distribution costs is lower in middle-income countries, compared to low-income countries. See Ball 2011; and Barham et al. 2017.

distributor consolidation to achieve scale economies and sufficient competition among distributors to check the unbridled exploitation of market power.[33]

Figure 6. Illustrative representation of mark-ups for health products along the distribution chain



Source: Reproduced from Silverman et al. 2019. Prepared by SmartChain (Richard Holmes and Nuno Alves) as input to the CGD Working Group on the Future of Global Health Procurement.

Notes: CIF = cost, insurance, and freight. For other sources on mark-ups see also Ball 2011; and Barham et al. 2017.

The percentages here are illustrative in nature and draw in large part on SmartChain's operational experience, including fieldwork commissioned by the Global Fund and DFID over the period 2014–2018. The analysis draws on a review of in-country supply chains in Nigeria, Ghana, the Democratic Republic of the Congo, and South Africa, and focuses primarily on products for HIV, TB, malaria, and other essential medicines. The estimations are based on information gathered through various informants across the in-country supply chains and through primary sources, including operational budget data from hospitals, clinics, national public- and private-sector warehouses, wholesalers, and distributors across the in-country health product supply chains. A limited degree of cross-checking with IMS data was conducted, particularly on import volumes, prices, and cost of goods.

[33] Note, that while consolidation among distributors may help achieve efficiencies and thus lower distribution costs, it also increases market concentration which hinders competition and can thus raise prices to consumers. See Rosen and Rickwood, 2017; and Rosen 2014.

II. Potential Modelled Savings from Simulations of Three Procurement Reform Approaches

Precise estimates of the potential savings from improved procurement are difficult to compute due in large part to scarce data. Nevertheless, different approaches to approximate potential savings suggest the magnitude of possible efficiency gains to LMICs from improved procurement could be sizeable. Here we estimate potential savings from simulations of three different, but complementary, approaches to procurement reform. We then show how total savings from implementing all three could be almost as large as the sum of the savings available from each alone. If all three reforms are implemented, we estimate that 50 of the poorest LMICs could save an estimated $10 to $26 billion—making it possible to expand coverage of essential health services or achieve other national objectives.

2.1 Centralizing public sector procurement at the national level

Dubois et al. (2019) show that centralized public sector procurement substantially lowers prices by as much as 50-75 percent, compared to both uncentralized public purchasing and private-sector procurement.[34] This finding suggests that large public purchasers, by exercising bargaining power and buying in large volumes, can effectively negotiate lower prices.[35] However, the benefits of pooled purchasing diminish and eventually disappear as supplier market concentration increases; as a single supplier controls an increasing share of the market for a specific product, its monopoly power partially offsets the negotiating power wielded by a pooled purchaser. Building on the work by Dubois et al., CGD's further analysis shows centralized public purchasers pay lower prices even for a transaction size of equal quantity.[36]

Using a dataset of 40 representative generic drugs drawn from seven countries, we find that, on average, prices paid by a public centralized purchaser are lower than those of an uncentralized purchaser, with an apparent savings of about 39 percent.[37] Next, we adjust for differences in transaction characteristics. The median transaction size of centralized

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[34] This analysis was commissioned by CGD as part of the background research for the Working Group on the Future of Global Health Procurement and is based on proprietary data from IQVIA. The 50-75 percentages represent the upper range of their estimates, see the discussion below and Table 2 for estimates under specific sets of assumptions. For more details, see Annex 1. Dubois et al. 2019.

[35] Devolution of purchasing authority to sub-national units is sometimes a political necessity that recognizes the need for greater regional autonomy and/or difficulties in centrally managed systems when demand forecasting and consumption reporting may not be in place. Framework agreements in some countries like South Africa have been shown to combine the autonomy and vendor managed inventory benefits of uncentralized decision-making with the price/volume arrangements of centralized systems. While we were unable to gather enough data on framework agreements for our analysis, we would broadly include this under the umbrella of centralized procurement.

[36] Over, forthcoming in 2020.

[37] The average price for a public uncentralized purchaser is $311 per thousand stocking units compared to an average price of $461 per thousand by a uncentralized purchaser. The difference between the means of the natural logarithms of price is -0.39 or -39 percent. This estimated difference can be confirmed by a direct calculation of the relative difference between the dollar values as ($311 - $461)/(($461 + $311)/2) = -0.39.

purchasers is approximately five times larger than that of the uncentralized purchaser. Since it is common for suppliers to give volume discounts, some of the 39 percent price savings in the observed public centralized market may be due to the higher median transaction volume.

Buyers also face different degrees of competition among suppliers. Centralized buyers face more monopoly power partly because they often place extremely large orders with single sellers. To the extent that suppliers with market power tend to insist on higher prices, the higher average supplier concentration in the public centralized markets can potentially offset a price advantage from larger transaction sizes and attenuate the price reduction received by national pooling of public transactions that are currently uncentralized.

Statistical analyses suggest prices are substantially lower under centralized purchasing even if neither supplier concentration nor transaction size changes. This benefit of centralization, which might be due to increased monopsony power or to the expertise of professional purchasing agents, is estimated at 46 percent.[38] On the other hand, suppose the centralization of formerly uncentralized purchases increases transaction sizes to those typical in centralized transactions without changing the lower concentration of suppliers enjoyed in the uncentralized markets. In this case, centralization could achieve an 82 percent reduction in average price. Finally, suppose the centralization of formerly uncentralized public procurement is accompanied by increases in both market concentration and transaction size. In this case, the price reduction will be 52 percent, substantially greater than in the first scenario, but less than could be achieved with greater competition.

[38] Although derived under different assumptions, this percentage price reduction is almost identical to that estimated at the median level of supplier concentration and the 75th percentile of transaction size in Table F-2; see Silverman et al. 2019.

Table 2. Potential savings from centralizing uncentralized public procurement in 50 of the poorest low- and middle-income countries (billions of 2017 US dollars and, in parentheses, percentage reductions)

		Does pooling of government purchases achieve volume discounts?	
		No	Yes
Does pooling of government purchases preserve or enhance supplier competition	No	$1.0 bn *(21%)** *[2% - 44%]*	$2.5 bn *(52%)*** *[25%- 78%]*
	Yes	$2.2 bn *(46%)*** *[22%-70%]*	$3.9 bn *(82%)*** *[49%-100%]*

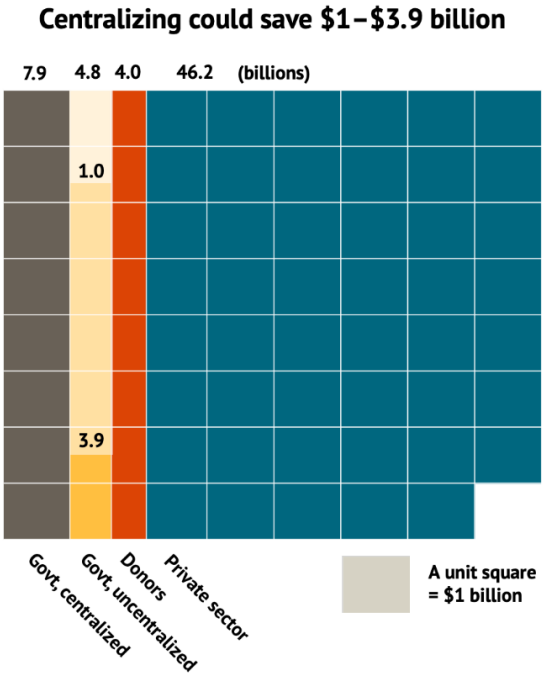
Source: Authors' estimates from IMS data based on Over (forthcoming).

Notes: The rows of the table correspond to supplier concentration levels after centralization of 0.518 (first row) and 0.326 (second row), which are the sample means of the Herfindahl-Hirschman concentration index for centralized and uncentralized procurement respectively (ibid.). The columns correspond to assumed average transaction sizes of 456,602 and 5,594,642 stocking units per transaction for uncentralized (first column) and centralized (second column) procurement respectively (ibid.). Application of the estimated percentage reductions to the $4.8 billion working assumption of currently uncentralized procurement assumes that the distribution of transaction price, transaction size and market concentration in the 7-country sample of 40 molecules are representative of government procurement in all 50 countries and that the behavioral equations estimated in Dubois et al. (2019) and Over (forthcoming) characterize the relationship between transaction price and these attributes in all 50 countries. Stars on the estimated percentage reductions in parentheses indicate p-values of 0.07 (one star) and less than 0.01 (two stars). The 95 percent confidence interval for each estimated percentage appears in square brackets.

Table 2 applies these findings to our $4.8 billion working assumption from Figure 1 of uncentralized annual government procurement expenditures in 50 of the poorest LMICs with a population over 10 million. Applying the estimated savings percentages to $4.8 billion yields the four entries in Table 2. Total potential savings range from $1 billion to $3.9 billion; the upper bound of this estimate could be achieved by preserving or stimulating competition

in the individual local product markets while increasing average transaction size.[39] Potential savings will necessarily differ from country to country, depending not only on the existing level of centralization of government procurement, but also on whether pooling can retain supplier competition while increasing transaction sizes and assuring the integrity of public sector financial management. Figure 7 illustrates the potential range of the $1 to $3.9 billion savings possible from the uncentralized government purchasing component (=$4.8 billion) of the total $63 billion health product market.

Figure 7. Centralizing currently uncentralized government procurement could save $1 to $3.9 billion per year (but may not affect other components of health sector spending)*



Notes: *Within the yellow column, the smaller rectangle with more intense white shading at the top of the column represents the lower savings estimate of $1 billion, while the larger rectangle with more transparent white shading extending from the top edge of the figure to lower in the same column represents the upper savings estimate of $3.9 billion.

[39] Not every country will need to move from an uncentralized to centralized system. In some countries like India, where there is fierce domestic competition, available savings may be less significant on aggregate, even if the country were to move from state to federal procurement, but may be worthwhile for specific product types (e.g., oncology) and may be worth considering in the context of the establishment of the National Health Authority/PMJAY-AB. However, a country like Nigeria, which operates an uncentralized procurement structure that purchases heavily from a fragmented private sector and has policies to protect local manufacturing from international pricing competition, could benefit significantly from procurement reform. See "Access to and Rational Use of Medicines at the Facility Level" 2010; and "Medicine prices in Nigeria: the prices people pay for medicine" 2006. Further, Kenya's recent devolution of procurement responsibilities to counties, though consistent with the country's devolution of health sector management, risks undermining the efficiency gains that could be achieved by a well-managed and monitored central procurement agency.

2.2 Switching to unbranded generics

There could also be substantial savings from improving the efficiency of pharmaceutical markets in LMICs which, as we note earlier, almost exclusively comprise off-patent medicines. In this vein, we consider how much LMICs could theoretically save by switching to unbranded generics from off-patent branded products and branded generic products—which together constitute a majority of the pharmaceutical market by value and volume (see Figure 3).[40]

We used detailed data from IQVIA showing the breakdown of the pharmaceutical market by brand category in both volume and value terms for 15 countries.[41] To quantify savings, we calculated the average price of a standard unit (SU) in each brand category, relative to the overall average. We then applied the observed price ratios and proportion of the breakdown across brand categories from our sample of 15 countries to the total market estimate for the 50 LMICs, excluding the 10 percent of the market spent on on-patent products.

Our calculation suggests that, all else equal, 50 of the poorest LMICs could collectively save an estimated $20 billion per year if both public and private sectors switched to unbranded generics.[42] This roughly comprises $7.3 billion in savings from switching original brands whose patents have expired to unbranded generics; $3.2 billion from switching licensed brands to unbranded generics; and $9.6 billion from switching branded generics to unbranded generics. This amounts to over 30 percent of the total $63 billion health product market in these countries.[43]

Indeed, several OECD countries are also substituting quality-assured generics for off-patent originator products as part of efficiency reforms that are helping to free up financial resources.[44] Although not strictly comparable to an LMIC switching to unbranded products, the wide use of competitively priced generics in the United States in 2018 is estimated to have saved approximately 38 percent of what total drug spending would have been without generic substitution.[45]

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[40] This analysis does not consider the 10 percent of the health products market made up of on-patent pharmaceuticals for which there are no off-patent alternatives, though there may be therapeutic substitutes which we do not consider here; see discussion in sections 1.3 above.

[41] See Annex 1 for the list of countries included, the definitions of the various brand categories, and other details.

[42] This is based on average proportions of average prices. The average price is calculated as total values (US$) divided by total volumes (standard units) for the different licensing categories in each country separately. Proportions are the average price in one category of license divided by the overall average within each country. Then, these proportions are averaged across countries to give the overall average (i.e., average price ratio of unbranded generic to overall average).

[43] Rosen et al. 2017.

[44] "Tackling Wasteful Spending on Health" 2017.

[45] The Association for Affordable Medicines (AAM) estimates that in 2018 generics generated an estimated $293 billion in savings in the US market. We applied this figure to the total spending on medicines in 2018, estimated at $482 billion. The savings percentage is calculated as 293/(293 + 482) = 38 percent. See:

We acknowledge that quality, which is an important consideration in decisions to switch from branded products to unbranded generics, is not considered in this calculation. Savings from switching to unbranded generics will only be realized when consumers, procurement agencies, and physicians trust that products are truly interchangeable. As described in the final report of CGD's Working Group on the Future of Global Health Procurement, brands are often used for quality signalling in markets where the quality of medicines is often unknown.[46] And while substandard medicines are common among unbranded generics, there is also some evidence suggesting the prevalence of falsified medicines seems to be higher among higher-priced branded products.[47]

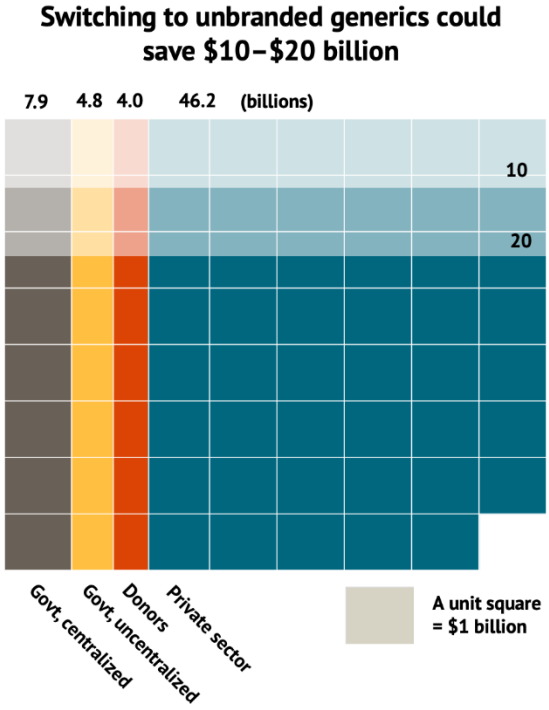
In sum, our $20 billion estimate represents the opportunity cost of failing generics markets and ill-equipped and under-resourced regulatory and quality control systems. This figure can also be understood as a conservative estimate of the value to governments and consumers of investing resources to strengthen regulation, improve quality control including through track-and-trace systems, and deploy other mechanisms such as information campaigns to assure the availability and use of high-quality, reasonably priced unbranded generic products as a core component of achieving UHC. To recognize the possibility that LMICs may not be able to switch this large a proportion of their spending to unbranded generic products without sacrificing quality, we consider potential savings using this approach to be within the range of $10 to $20 billion. Figure 8 illustrates the potential savings from switching to unbranded generics as a share of total health product spending across the government, donor, and private sectors.

https://www.accessiblemeds.org/resources/blog/2019-generic-drug-and-biosimilars-access-savings-us-report and https://www.statista.com/topics/1719/pharmaceutical-industry/.

[46] Dean 2019.

[47] Pisani et al. 2019.

Figure 8. Switching all health product purchasing to unbranded generics could save roughly $10-20 billion per year



Notes: The shaded portion of the columns represents the possible savings generated from switching to unbranded products. The smaller, more opaque shaded portion across the top of the figure represents a conservative estimate of $10 billion in savings from this reform, while the larger, more transparent shading figure represents the upper savings estimate of $20 billion.

2.3 Benchmarking prices to reduce the variability of prices for generic health products

As illustrated in section I, the price for the same health product can vary significantly both across and within countries. Suppose procurement agents were to routinely consult information on where the same health products were procured from the global market at lower prices by public purchasers in other countries. How much could the availability, acceptance, and use of "benchmark prices" based on such up-to-date price information help reduce spending on health products? We focus on price benchmarking for generic health products in LMICs as another approach to derive potential savings, along the lines of previous analyses that have estimated levels of waste and potential savings across different sectors of healthcare systems in OECD countries.[48]

[48] Carter 2016; and Skinner and Fisher 2020

To estimate the potential savings from benchmark pricing, we constructed two hypothetical scenarios. For our "benchmarking scenario 1," we calculated how much would be saved if public purchasers in all countries were able to buy products at the lowest price observed within our sample.[49] For our "benchmarking scenario 2," we estimated savings that would be achieved if public procurers were to switch to suppliers offering prices published in the (rather outdated) International Medical Products Price Guide,[50] where that yielded savings, or remained with their current supplier where the price they currently paid was lower than the Price Guide option. This approach assumes countries use the median price[51] reported by quality-approved suppliers in the Price Guide as a benchmark. Both scenarios assume that purchasing agents can reach a deal with at least one supplier at the benchmark price for each molecule, regardless of the local monopoly power of suppliers for that product, the cost of supplying a product in that country, or the size of the transaction the purchaser is able to absorb. We believe the second scenario reflects a more realistic estimate of the prices countries could get on the global market—and, in turn, that it provides a more realistic estimate of potential savings than scenario 1.

Since the minimum price for a drug is always less than the median price, scenario 1 using minimum prices gives an upper bound for potential savings from a benchmarking reform. For government and donor purchases of all health products in our 50 selected LMIC countries, we estimate potential savings according to benchmarking scenario 1 to be $10.7 billion. We acknowledge that in practice, it is unlikely that the lowest price observed in a specific market would be available to all procurers, given that each country's negotiated price is affected by idiosyncratic conditions such as geography and supplier discounts, among several other factors. Instead, this estimate may be better understood as a rough indication of the extent of price variation observed for the same products across countries.

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[49] Our method for benchmarking scenario 1 resembles the approach adopted by Croker et al. 2018 in estimating the potential savings to the British National Health Service if all general practitioners were to switch their prescriptions to equivalent generic drugs with prices in the lowest decile of prices for that molecule.

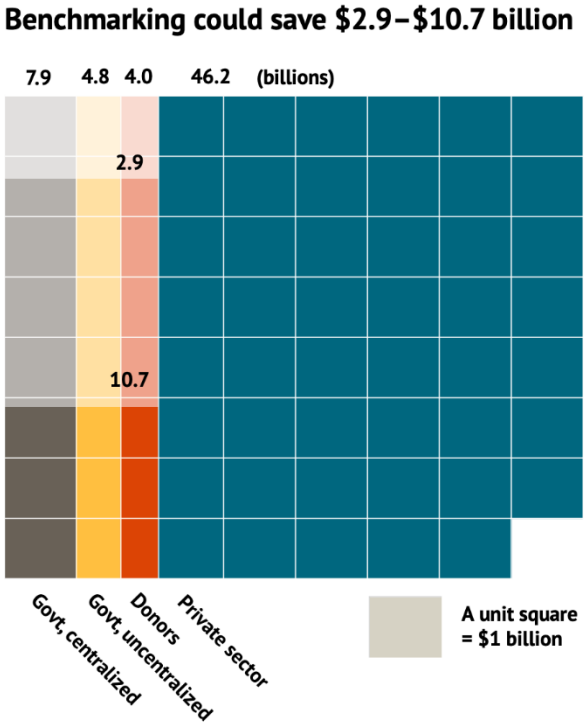
[50] Management Sciences for Health and WHO maintain the International Medical Products Price Guide which publishes the current prices of suppliers that have passed transparent quality control measures. In principle, the guide would be updated periodically with information from pharmaceutical suppliers, international development organizations, and government agencies. All suppliers included in the guide are required to have established quality assurance measures in place. See "Quality Standards" n.d. However, the guide omits prices subject to a confidentiality agreement between buyer and supplier and the listed prices "may only be available to the organization conducting the tender or procurement" (ibid., p. E-14). Furthermore, we note that the guide has not been updated since 2015.

[51] The "median" price is the "middle" price, located at the 50th percentile of the observed prices. Since observed price distributions for individual molecules are positively skewed, the median price is less than the average price. Like Kang et al. 2019 who estimate potential savings from using benchmark prices in the US, our scenario 2 method arrives at potential savings by replacing prices actually paid (in their case by third-party payers and consumers in the US, in our case by the 13 countries in our LMIC sample) with typical prices paid in other countries for the same drug (in their case average prices across Japan, Canada and the UK, in our case median prices across the world).

On the other hand, scenario 2 preserves the observed price variability below the median and thus costs more than scenario 1. Our second scenario nevertheless achieves substantial savings by shrinking all prices higher than the median back to that typical price for that molecule. For government and donor purchases in our 50 selected LMIC countries, we estimated potential savings according to benchmarking scenario 2 to be $2.9 billion.[52] These are recurrent annual savings (assuming prices and quantities from 2015). It should be noted that the largest share of potential savings (in both scenarios) accrues to upper-middle-income countries; this is largely a function of these countries spending relatively more in absolute terms on health products. Figure 9 represents the possible savings to government and donor spending from benchmarking prices, ranging from $2.9 to $10.7 billion. In reality, savings may well be closer to the lower end of this range. Nevertheless, LMIC governments alongside donors and international procurement mechanisms have a responsibility to drive towards efficient practices to maximize value for money.

[52] To derive these estimates, we combined multiple sources of public procurement information to construct a dataset that included mean price per standard unit, total volume procured, total expenditure and an international median supplier benchmark price for 30 health commodities in 13 countries in 2015. For each scenario, we calculated potential savings for each of the 13 countries using the available detailed data for the basket of 30 commodities and then extrapolated these calculations to the health product market that we estimated for the poorest 50 LMICs with a population over 10 million.

Figure 9. Government and donor use of benchmarked purchase prices could save $2.9 to $10.7 billion per year



Notes: Within the first three columns shaded brown, yellow, and orange, the white shaded portions represent the range of possible savings due to benchmarking health product purchases. The smaller, more opaque shaded area in the upper left corner of the figure represents the lower savings estimate of $2.9 billion, while the larger area with more transparent shading, represents the upper savings estimate of $10.7 billion.

2.4 Combining the savings from multiple reforms

Taken together, these three approaches represent the value proposition to LMIC governments and development partners of investing resources to improve procurement systems. We realize that any efforts to implement procurement reforms must accommodate the complex and idiosyncratic political and economic realities in countries. Nevertheless, there are several notable examples of countries implementing procurement reforms that have yielded significant savings, ranging from approximately 10 to 30 percent of total spend. For example, Ukraine's government led anticorruption reforms aimed at increasing competition and achieved savings between 10 and 38 percent for cancer, HIV, and TB drugs.[53] In Serbia, centralized procurement of drugs in hospitals and primary care centers achieved prices that were 27 percent lower, on average, for the same drugs compared to the previous uncentralized purchasing approach.[54] China's recent "4+7" reform to centralize purchasing across four municipalities and seven cities involves a single government

[53] "Making the Case for Open Contracting in Healthcare Procurement" 2017.

[54] "Centralized Procurement of Drugs Saves Serbia 25 Million Euros" 2014.

purchaser procuring predefined quantities of quality-assured generics and offering a 30 percent prepayment. Early results from the pilot suggest prices for 25 generic drugs fell by 52 percent on average; estimates for the first year suggest savings could be as much as $0.85 billion with the prospect of greater savings as efforts scale up.[55] Finally, in Mexico, reforms of the auction design aimed at reducing incentives for anticompetitive behavior resulted in price reductions averaging 20 percent for the highest-value products.[56]

Table 3. Estimated range of net savings from implementing the three proposed procurement reforms

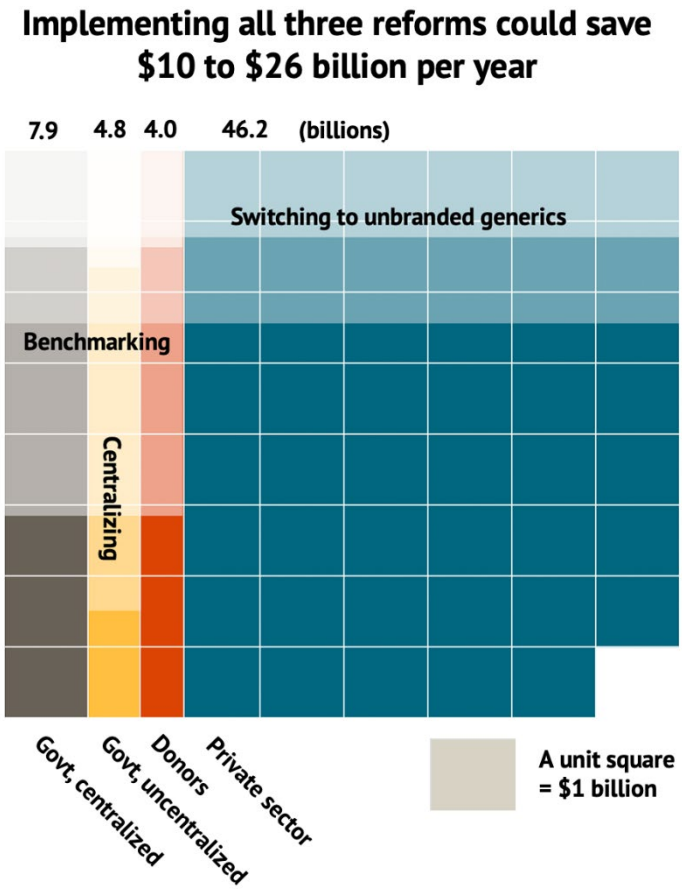
Reform type	Lower savings estimate (US$, billions)	Upper savings estimate (US$, billions)
1. Centralizing public sector procurement at the national level	1.0	3.9
2. Benchmarking prices to reduce the variability of prices for generic health products	2.9	10.7
3. Switching to unbranded generics	10	20
Sum of savings from separate reforms	13.9	34.6
— Policy overlap	— 3.4	— 8.3
Net savings	**10.5**	**26.3**

Note: "Policy overlap" is defined here as the price reductions for transactions due to one reform that would be likely to occur as a result of another reform if both were simultaneously implemented. See Figure 10 and Annex 2 for details.

[55] ""4+7" Drug procurement reform in China" 2019.

[56] "Policy Roundtables: Collusion and Corruption in Public Procurement" 2010.

Figure 10. Estimated range of potential savings from reforms to procurement in 50 low- and middle-income countries



Source: Authors' calculations. See text.

Notes: "Policy overlap" is represented by the overlap in the areas representing the savings achievable from each of the reforms separately. Note, all three policies would affect prices governments pay; two of the three policies would affect donor spending; and only one (i.e., switching to unbranded generics) would affect private sector spending. The more opaque the white shading in the figure (as in the upper left corner), the more redundant would be the potential savings for those transactions.

Each of the three different procurement reform approaches discussed above takes a different slice out of the $63 billion currently spent on health products in our sample of 50 LMICs. However, the same dollar cannot be saved more than once. So, the potential savings from implementing all three of the policies will necessarily be less than the sum of the savings achievable from each of the three by itself.

Table 3 and Figure 10 illustrate how the domains of the reforms could overlap. For example, the potential savings from benchmarking prices (see Figure 9) overlaps with the potential savings from centralizing government purchasing (see Figure 7). This is because the

benchmarking reform would lower some of the same prices that would be lowered by centralizing the $4.8 billion of currently uncentralized government procurement. Implementing both reforms would save less than the sum of the savings from implementing each of the reforms by itself. We refer to this phenomenon as "policy overlap." In addition, potential savings from switching to unbranded generics overlap, in the upper left corner of the figure, with the potential savings from benchmarking prices as well as the potential savings from centralizing currently uncentralized purchases. This is because government purchases that are shifted from branded to unbranded generics will achieve some of the same price reductions that could be achieved by benchmarking prices or centralization within the government sector.

Of course, the mix and sequence of reforms would differ from one country to the next. The overarching lesson from this exercise is that, by instituting some combination of these three procurement reforms, up to $26 billion—or more than a third of the estimated $63 billion currently spent by 50 of the poorest LMICs each year—could potentially be saved or reallocated to other spending priorities. Ultimately, savings generated from improved procurement could enable LMIC governments to expand coverage of health benefits packages, helping to reduce out-of-pocket expenditures and accelerate progress toward UHC, while also managing the effects of aid transition.

To further contextualize the magnitude of these savings estimations, we calculate how they could potentially be used to expand coverage of an essential health benefits package. For instance, we find that $10 to $26 billion in savings from improved procurement could help cover approximately 132 to 344 million people (the upper range is approximately equivalent to the population of Nigeria, Ethiopia, and Ghana combined) with an essential UHC package as defined by the Disease Control Priorities project.[57]

2.5 Caveats and limitations

The major limitation of this paper is that it is based on extrapolating from limited datasets drawing on a basket of tracer products from a few countries. Due to limited available data, our approximation that total annual spending on health products across the government, private, and donor sectors in 50 of the poorest LMICs equals $63 billion involved a series of assumptions and extrapolations. Further, due to limited available data to calculate potential savings, we had to extrapolate in two directions: first, from detailed data covering a basket ranging from 30 to 40 health products to all health products; second, from detailed data for a subset of countries (ranging from 7 to 15 countries across the different analyses) to a larger group comprising the poorest 50 LMICs with a population over 10 million (see Figure 11 and Annex 1 for more details).

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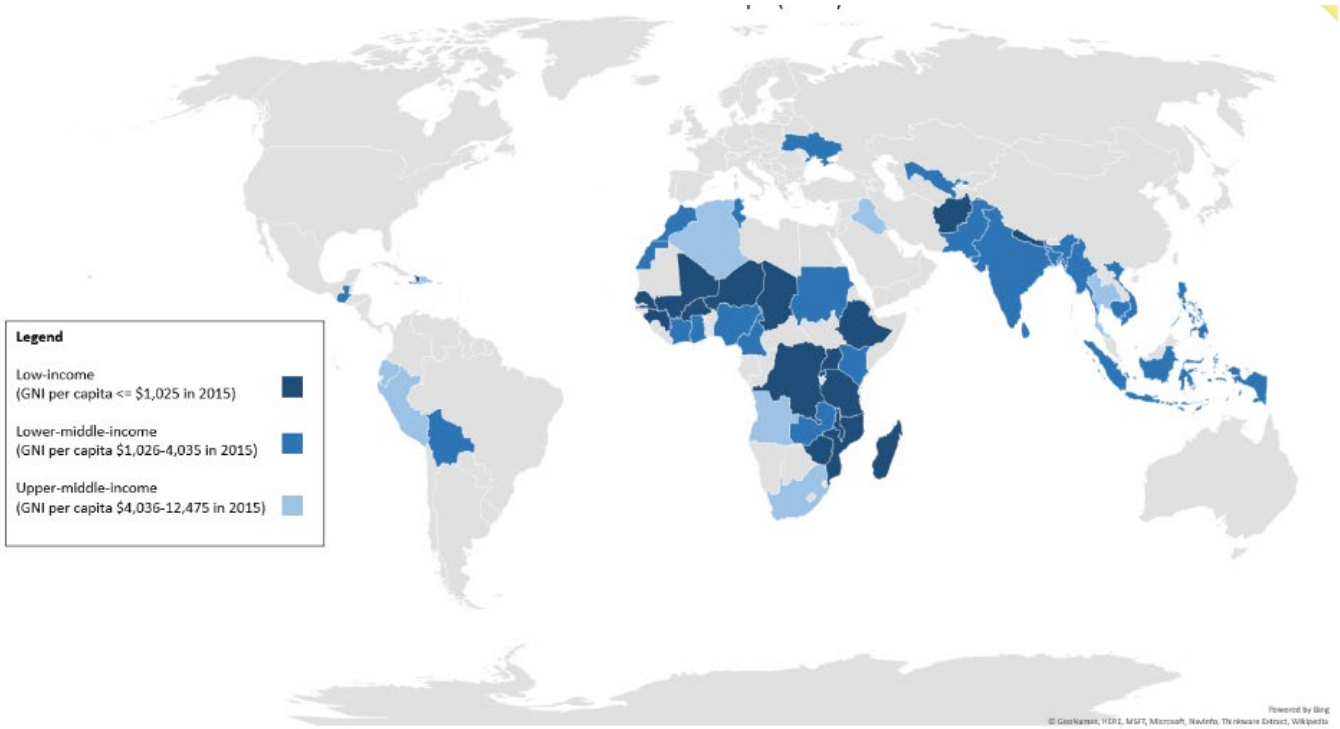
[57] Watkins et al. 2020. DCP3 estimates the incremental annual cost per person of a modelled "essential UHC" (EUHC) package at $64 in low-income countries and $92 in lower-middle-income countries; our calculation is based on taking the average across the estimates for both income groups. See Table 2, where the incremental annual cost per person is the estimated cost of going from current to full implementation (80 percent population coverage) of the Essential UHC package.

The simulations of three procurement reform approaches presented in this paper each have specific underlying limitations that may hinder the ability to fully realize the potential savings in the real world. For example, the potential benefits of centralization depend critically on the proportion of government pharmaceutical purchases currently centralized (See Table 2 and its note). While that proportion is close to 50 percent in the sample of seven LMICs where we have more detailed data, we have adopted the hypothesis that in the set of 50 LMICs more than 60 percent of government procurement is currently centralized, leaving less than 40 percent as a target for future centralization. Another big assumption is that centralization works; we know that poorly administered centralized procurers may end up doing a worse job than subnational or private buyers.[58] More broadly, even within the small subsets of countries where we have detailed data available, our estimates of potential savings are necessarily dominated by a few countries that display opportunities for substantial savings. For more information on the sample of countries, the basket of health products, and other details about the data used for these analyses, see Annex 1.

Finally, we acknowledge the inherent weakness in combining the results of potential savings from simulations of three different procurement reform approaches. Notably, these estimations rely on distinct methodologies and draw on limited, and sometimes outdated, data from different samples of countries and health products across varied time periods. However, we stress that our calculations are meant to be a first pass at estimating potential savings that LMICs could theoretically achieve by improving procurement systems and policies.

[58] The benefits we estimate for centralization may be undone by the inability of centralized procurers to accurately estimate sub-national demand forecasts. Further, the benefits are attenuated by less than perfect governance in existing centralized procurement in our sample. In fact, one can surmise that if we had properly controlled for governance in that econometric analysis, and so could "hold governance constant", we would have found even larger benefits of centralization. See here for one example: https://citizentv.co.ke/news/kemsa-scandal-usaid-global-fund-threaten-to-withdraw-ksh-400b-342697/.

Figure 11. Map indicating the poorest 50 low- and middle-income countries with population over 10 million included in the analyses



III. Policy Options and Conclusion

Realizing these potential savings will require investments in better regulatory and quality control systems, which we realize can be politically challenging in practice. This may also require additional structural changes; for example, that multiple generics suppliers enter the market, that they vigorously compete with one another with efficiency gains passed on to consumers, and that trust in the quality of unbranded generics is boosted thanks to effective efforts to strengthen the regulatory and surveillance system.

Although the estimates presented in this paper are meant to be rough and illustrative, they nonetheless represent the amount of resources LMICs governments, with support from development partners, ought to be willing to invest in strengthening procurement systems, improving regulation and quality control systems, and reducing barriers to entry and increasing competition, among other approaches.

Drawing on the analysis presented here, and building on the recommendations proposed by CGD's Working Group on the Future or Global Health Procurement, we offer three potential options that could be tested and built upon further to pave the path towards realizing potential savings from improved procurement:

1. Increased visibility of better procurement data: Improved data on pricing and product quality could help health product purchasers identify and address inefficiencies, including unexplained price variation. As a starting point, efforts to increase visibility of pricing information should focus on off-patent generic products, which make up a majority of the pharmaceutical expenditure in LMICs.[59] Greater access to information and improved analytics would empower LMIC purchasers—both public and private at the national and subnational levels—to become intelligent buyers by providing greater visibility into market price ranges. Data collection should not be limited to pricing alone, but should also cover registration status, stock levels, consumption data, forecasting tools, international reference pricing, and budgetary impact. Taken together, these types of data serve as public goods and reflect the real needs of national procurement departments. Further, efforts to share quality assurance data between countries could also have a big impact in helping to identify poor-quality products. Looking ahead, country partners and donors should build on existing data sources, which currently remain incomplete and fragmented, to create a comprehensive repository for global data on procurement. Collecting and disseminating this information would facilitate all three of the policy reforms we discuss above. Further, the protracted crisis stemming from the pandemic is likely to continue to stress supply chains and pose financial challenges that could undermine the transition to UHC. Procurement data visibility is all the more important to highlight shortages, quality lapses, and price hikes in the context of COVID-19.

2. A community of practice dedicated to country-level procurement support: As more countries make ambitious commitments to UHC, ensuring public monies for procurement are used efficiently will be critical in stretching scarce resources as far as possible. Accordingly, technical support at the country-level can provide guidance on how procurement reform can be a tangible way for countries to generate efficiencies. This may include, for example, guidance for budget holders and those designing healthcare insurance funds as to which policies may enable better procurement outcomes in their specific settings. A community of practice or joint learning network with a dedicated focus on procurement could help facilitate collaborative learning among procurement professionals. Further, a global secretariat could work closely with countries to develop a country reform diagnostic plan and subsequently design and structure reforms to realize potential savings. The International Decision Support Initiative (iDSI)—an existing global network of health, policy, and economic expertise that supports countries to make better decisions to achieve better value in public spending for health—could, for example, support the implementation of such efforts, working with the Joint Learning Network's efficiency collaborative.[60] The potential savings estimated in this paper from improved government procurement can only occur

[59] Berdud et al. 2019.

[60] "Joint Learning Network" n.d.

if procurement agencies strengthen the skills and experience that could be supported by such a community of practice.

3. Additional research on procurement modalities, including auction designs and group purchasing mechanisms: To achieve the potential procurement savings estimated in this paper, national procurement agencies—and international procurement entities—will need to deploy effective purchasing modalities such as auction designs and group purchasing mechanisms. Additional financial and technical resources are needed to pilot and evaluate different procurement modalities, including appropriate auction designs and group purchasing platforms for different market settings and product characteristics. Auction design, for example, could help maintain a healthy supplier base while also achieving cost savings. Additional pilots testing distinct design elements across product markets are necessary to build the evidence base. In addition, group purchasing and other collaborative arrangements at the regional and/or international levels could offer notable benefits to countries, especially as they reduce their reliance on donor-supported global arrangements to access health products. Pooled procurement—and the role of tiered pricing given the GDP divergence across countries—could help realize some of the billions of savings identified earlier.[61] But given the limited empirical evidence available on such arrangements, further research is needed by a group of stakeholders, potentially including the existing pooling mechanisms, to better understand barriers and what arrangements work best for specific products, geographies, and markets.[62] Broadly, collaborative procurement arrangements should be informed by health technology assessments (HTA) and aligned with regulation to anchor value and affordability.[63] Such efforts at the global or regional levels would go a long way in expanding the knowledge base of effective procurement approaches; the network described above could, in turn, promote shared learning of these best practices.

In conclusion, these findings demonstrate that potential savings from improved procurement in LMICs could be sizeable. We stress that these calculations, based on scarce, incomplete, and outdated data, are not meant to provide precise estimates of the savings possible in specific countries. In reality, the magnitude of savings will necessarily vary across contexts and be constrained by distinct political economy factors, including institutional challenges. Rather, this paper serves as a first pass at understanding the range of possible savings that should motivate LMIC governments and their development partners to make investments to address pervasive procurement challenges. Implementing health sector procurement reforms will help ensure LMIC health systems are more efficient and resilient in the future, enabling governments to extend health coverage and financial protection to more of their citizens. Doing so will also be critical to paving the path to achieve UHC for all.

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[61] Kalipso Chalkidou and Robert Hecht 2020; and Chalkidou et al. 2020.

[62] Nemzoff et al. 2019.

[63] "HTA procedures within the Beneluxa Initiative" n.d.

References

"2019 Generic Drug & Biosimilars Access & Savings in the U.S. Report." Washington DC: Association for Accessible Medicines (AAM), n.d. https://accessiblemeds.org/sites/default/files/2019-09/AAM-2019-Generic-Biosimilars-Access-and-Savings-US-Report-WEB.pdf.

"About the Center for Drug Evaluation and Research - Generic Competition and Drug Prices." US Food & Drug Administration (FDA), November 28, 2017. https://www.fda.gov/AboutFDA/CentersOffices/OfficeofMedicalProductsandTobacco/CDER/ucm129385.htm.

"Access to and Rational Use of Medicines at the Facility Level." Abuja, Nigeria: World Health Organization and Federal Ministry of Health, Nigeria. 2010. http://digicollection.org/hss/en/m/abstract/Js16886e/.

"Centralized Procurement of Drugs Saves Serbia 25 Million Euros." World Bank, 2014. https://www.worldbank.org/en/results/2014/02/24/centralized-procurement-of-drugs-saves-serbia-25-million-euros.

"Global Spending on Health: A world in Transition." Geneva: World Health Organization, 2019. https://www.who.int/health_financing/documents/health-expenditure-report-2019.pdf?ua=1

"HTA procedures within the Beneluxa Initiative." The Beneluxa Initiative, n.d. https://beneluxa.org/HTA_procedures.

"Increased out-of-pocket spending threatens universal health coverage in 'missing middle' countries." Institute for Health Metrics and Evaluation (IHME), April 25, 2019. http://www.healthdata.org/news-release/increased-out-pocket-spending-threatens-universal-health-coverage-%E2%80%98missing-middle%E2%80%99.

"International Comparison Program (ICP)." World Bank, n.d. https://www.worldbank.org/en/programs/icp

"Joint Learning Network" n.d. http://www.jointlearningnetwork.org/.

"Making the Case for Open Contracting in Healthcare Procurement." UK: Transparency International, Crown Agents Foundation, and Open Contracting Partnership, 2017. http://ti-health.org/wp-content/uploads/2017/01/Making_The_Case_for_Open_Contracting_TI_PHP_Web.pdf.

"Medicine Prices in Nigeria - Prices People Pay for Medicines." World Health Organization, Health Action International, and Federal Ministry of Health, Nigeria, 2004. https://www.afro.who.int/publications/medicine-prices-nigeria-prices-people-pay-medicines.

"Policy Roundtables: Collusion and Corruption in Public Procurement." Organisation for Economic Co-operation and Development (OECD), 2010. https://www.oecd.org/competition/cartels/46235884.pdf.

"Price Declines after Branded Medicines Lose Exclusivity in the U.S." Washington DC: IMS Institute for Healthcare Informatics, January 2016. https://www.diigo.com/item/pdf/3swi8/ce6747ef?k=992a3e1ff2247f0019994e8541fb8254 .

"Purchasing Power Parities - Frequently Asked Questions (FAQs)." OECD, n.d. https://www.oecd.org/sdd/prices-ppp/purchasingpowerparities frequentlyaskedquestionsfaqs.htm#FAQ4.

"Quality Standards." International Medical Products Price Guide, n.d. https://mshpriceguide.org/en/how-to-use/.

"Tackling Wasteful Spending on Health." Paris, France: OECD Publishing, 2017. https://www.oecd.org/els/health-systems/Tackling-Wasteful-Spending-on-Health-Highlights-revised.pdf.

Armstrong, Reece. "How Covid-19 is affecting the pharma supply chain." European Pharmaceutical Manufacturer Magazine, March 25, 2020. https://www.epmmagazine.com/opinion/how-covid-19-is-affecting-the-pharma-supply-chain/.

Ball, Douglas. "Working Paper 3: The Regulation of Mark-Ups in the Pharmaceutical Supply Chain." WHO/HAI Project on Medicine Prices and Availability: Review Series on Pharmaceutical Pricing Policies and Interventions, May 2011. http://haiweb.org/wp-content/uploads/2015/07/Working-Paper-3-Regulation-of-Mark-ups.pdf.

Barham, John Adrian, et al. "Private Sector Pharmaceutical Distribution and Retailing in Emerging Markets." Washington, DC.: World Bank Group, 2017. http://documents.worldbank.org/curated/en/881571489040499129/Private-sector-pharmaceutical-distribution-and-retailing-in-emerging-markets-making-the-case-for-investment.

Berdud, Mikel, Kalipso Chalkidou, Emma Dean, Jimena Ferraro, Lou Garrison, Cassandra Nemzoff, and Adrian Towse. *The Future of Global Health Procurement: Issues around Pricing Transparency*. CGD Working Paper 507. Washington, DC: CGD, April 3, 2019. https://www.cgdev.org/publication/the-future-global-health-procurement-issues-around-pricing-transparency.

Blackburn, Marsha. "The coronavirus outbreak exposes the U.S.'s pharma supply chain vulnerability." *STAT*, February 14, 2020. https://www.statnews.com/2020/02/14/coronavirus-outbreak-exposes-weak-link-us-drug-supply-chain/.

Bown, Chad. "EU limits on medical gear exports put poor countries and Europeans at risk." Peterson Institute for International Economics (PIIE) (blog), March 19, 2020. https://www.piie.com/blogs/trade-and-investment-policy-watch/eu-limits-medical-gear-exports-put-poor-countries-and.

Chalkidou, Kalipso and Robert Hecht. "Why HTA and Pooled Purchasing Must Be at the Heart of Global Health Transitions." CGD (blog), January 23, 2020. https://www.cgdev.org/blog/why-hta-and-pooled-purchasing-must-be-heart-global-health-transitions.

Chalkidou, Kalipso, Janeen Madan Keller, and Daniel Rosen. "The State of Global Health Commodity Procurement: Moving from Data Points to the Bigger Picture." CGD (blog), May 1, 2018. https://www.cgdev.org/blog/state-global-health-commodity-procurement-moving-data-points-bigger-picture.

Chalkidou, Kalipso, Karl Claxton, Rachel Silverman, and Prashant Yadav, "Value-based tiered pricing for universal health coverage: an idea worth revisiting." *Gates Open Research*, 4:16 (2020): https://doi.org/10.12688/gatesopenres.13110.3.

Croker, Richard, Alex J Walker, Seb Bacon, Helen J Curtis, Lisa French, and Ben Goldacre. "New mechanism to identify cost savings in English NHS prescribing: minimising 'price per unit', a cross-sectional study." *BMJ Open*, vol. 8 iss. 2 (2018): e019643. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5829890/.

Dean, Emma Boswell. *Who Benefits from Pharmaceutical Price Controls? Evidence from India.* CGD Working Paper 509. Washington, DC: CGD, April 23, 2019. https://www.cgdev.org/sites/default/files/who-benefits-pharmaceutical-price-controls-evidence-india.pdf.

Dubois, Pierre, Yassine Lefouili, and Stéphane Straub. *Pooled Procurement of Drugs in Low and Middle Income Countries*. CGD Working Paper 508. Washington, DC: CGD, April 10, 2019. https://www.cgdev.org/publication/pooled-procurement-drugs-low-and-middle-income-countries.

Ewen, Margaret, Marjolein Zweekhorst, Barbara Regeer, and Richard Laing. "Baseline Assessment of WHO's Target for Both Availability and Affordability of Essential Medicines to Treat Non-Communicable Diseases." *PloS One* 12, no. 2 (2017): e0171284. https://doi.org/10.1371/journal.pone.0171284.

Gheorghe, Adrian, Kalipso Chalkidou, Amanda Glassman, Tomas Lievens, and Anthony McDonnell. "COVID-19 and Budgetary Space for Health in Developing Economies." CGD Note. Washington, DC: CGD, July 16, 2020. https://www.cgdev.org/publication/covid-19-and-budgetary-space-health-developing-economies.

Glassman, Amanda, Janeen Madan Keller, and Jessie Lu. "The Declaration of Alma-Ata at 40: Realizing the Promise of Primary Health Care and Avoiding the Pitfalls in Making Vision Reality." CGD Note. Washington, DC: CGD, October 25, 2018. https://www.cgdev.org/publication/declaration-alma-ata-40-realizing-promise-primary-health-care-and-avoiding-pitfalls.

Hogerzeil, Hans V., and Zafar Mirza. "The World Medicines Situation 2011: Access to Essential Medicines as Part of the Right to Health." Geneva: WHO, 2011. http://apps.who.int/medicinedocs/documents/s18772en/s18772en.pdf.

Kang, So-Yeon, Michael J. DiStefano, Mariana P. Socal, and Gerard F. Anderson. "Using External Reference Pricing in Medicare Part D to Reduce Drug Price Differentials with Other Countries." *Health Affairs*, vol. 38 no. 5 (2019): 804-811. https://www.healthaffairs.org/doi/abs/10.1377/hlthaff.2018.05207?journalCode=hlthaff.

Lord Carter of Coles, "Operational productivity and performance in English NHS acute hospitals: Unwarranted variations." UK: Department of Health and Social Care, 2016. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/499229/Operational_productivity_A.pdf.

Nemzoff, Cassandra, Kalipso Chalkidou, and Mead Over. "Aggregating Demand for Pharmaceuticals is Appealing, but Pooling Is Not a Panacea." CGD Note. Washington, DC: CGD, May 1, 2019. https://www.cgdev.org/publication/aggregating-demand-pharmaceuticals-appealing-pooling-not-panacea.

Newton, Paul N. and Katherine C. Bond. "COVID-19 and risks to the supply and quality of tests, drugs, and vaccines." *Lancet Global Health*, vol. 8 iss. 6 (June 2020): e754-e755. https://doi.org/10.1016/S2214-109X(20)30136-4.

Over, Mead. *The Impact of Pooled Purchasing and Local Market Concentration on Pharmaceutical Prices in Low- and Middle-Income Countries: Comment on Dubois, Lefouili and Straub.* Washington, DC: CGD, forthcoming.

Pisani, Elizabeth, Adina-Loredana Nistor, Amalia Hasnida, Koray Parmaksiz, Jingying Xu, and Maarten O. Kok. "Identifying Market Risk for Substandard and Falsified Medicines: An Analytic Framework Based on Qualitative Research in China, Indonesia, Turkey and Romania." *Wellcome Open Research* 4, no. 70 (April 16, 2019). https://wellcomeopenresearch.org/articles/4-70/v1.

Pisani, Elizabeth. "The COVID pandemic increases the chance that your other medicines won't work." Medium (Blog), March 29, 2020. https://medium.com/@elizabethpisani/the-covid-pandemic-increases-the-chance-that-your-other-medicines-wont-work-66b7e272bb20.

Rosen, Daniel and Sarah Rickwood. "Supply Chain Optimisation in Africa's Private Sector." IMS Health, 2017. https://marketbookshelf.com/wp-content/uploads/2017/06/IMS-Health-Supply-Chain-Optimisation-in-Africas-Private-Sector-160514-1.pdf.

Rosen, Daniel, Kalipso Chalkidou, and Janeen Madan Keller. "An Initial Estimation of the Size of Health Commodity Markets in Low- and Middle-Income Countries." CGD Note. Washington, DC: CGD, December 13, 2017. https://www.cgdev.org/publication/initial-estimation-size-health-commodity-markets-low-and-middle-income-countries.

Rosen, Daniel. "Solving pharma's supply chain issues in sub-Saharan Africa." PharmaPhorum (blog), May 12, 2014. https://pharmaphorum.com/views-and-analysis/solving-pharma-s-supply-chain-issues-in-sub-saharan-africa/.

Selvaraj, Sakthivel, Habib Hasan Farooqui, and Anup Karan. "Quantifying the financial burden of households' out-of-pocket payments on medicines in India: a repeated cross-sectional analysis of National Sample Survey data, 1994–2014." *BMJ Open* vol. 8 iss. 5 (2018): e018020. https://bmjopen.bmj.com/content/8/5/e018020.

Silverman, Rachel, Janeen Madan Keller, Amanda Glassman, and Kalipso Chalkidou. *Tackling the Triple Transition in Global Health Procurement.* Final Report of CGD's Working Group on the Future of Global Health Procurement. Washington, DC: CGD, June 17, 2019. https://www.cgdev.org/better-health-procurement.

Silverman, Rachel. *Projected Health Financing Transitions: Timeline and Magnitude.* CGD Working Paper 488. Washington, DC: CGD, July 10, 2018. https://www.cgdev.org/publication/projected-health-financing-transitions-timeline-and-magnitude.

Skinner, Jonathan, Elliott S. Fisher. "Reflections on Geographic Variations in U.S. Health Care." New Hampshire: The Dartmouth Institute For Health Policy & Clinical Practice, 2010. https://www.dartmouthatlas.org/downloads/press/Skinner_Fisher_DA_05_10.pdf.

Watkins, David A., Jinyuan Qi, Yoshito Kawakatsu, Sarah J. Pickersgill, Prof Susan E. Horton, Prof Dean T. Jamison. "Resource requirements for essential universal health coverage: a modelling study based on findings from Disease Control Priorities, 3rd edition." *Lancet Global Health*, vol. 8 iss. 6 (June, 2020): e829-e839. https://www.sciencedirect.com/science/article/pii/S2214109X20301212.

Yadav, Prashant. "Health Product Supply Chains in Developing Countries: Diagnosis of the Root Causes of Underperformance and an Agenda for Reform." *Health Systems and Reform*, 1:2, 142-154 (Apr 2015): https://www.tandfonline.com/doi/full/10.4161/23288604.2014.968005.

Yue, Xiao. *4+7 Drug Procurement Reform in China.* May 2019. Background note prepared for the CGD Working Group on the Future of Global Health Procurement. https://www.cgdev.org/global-health-procurement-background-research.

Annex 1. Notes on Data, Assumptions, and Definitions

- *Countries included:* We apply our estimates of potential savings to a group of 50 LMICs, where we calculated the total value of the health products market segmented by the government, donor, and private sectors. Specifically, this includes countries with a population over 10 million and GNI per capita less than $7,000 classified per the World Bank's income group categories for 2015. This group comprises the following countries (note, China is not included in this analysis):

    - 18 low-income countries: Afghanistan, Burkina Faso, Chad, Dem. Rep. of the Congo, Ethiopia, Guinea, Haiti, Madagascar, Malawi, Mali, Mozambique, Nepal, Niger, Rwanda, Senegal, Uganda, Tanzania, Zimbabwe

    - 25 lower-middle-income countries: Angola, Bangladesh, Bolivia, Cambodia, Cameroon, Côte d'Ivoire, Egypt, Ghana, Guatemala, India, Indonesia, Kenya, Morocco, Myanmar, Nigeria, Pakistan, Philippines, Sri Lanka, Sudan, Tunisia, Ukraine, Uzbekistan, Vietnam, Yemen, Zambia

    - 7 upper-middle-income countries: Algeria, Dominican Rep., Ecuador, Iraq, Peru, South Africa, Thailand

- *Timeframe:* The analyses presented generally cover data from 2015. A lack of regularly available figures on public-private sector split, procurement, and market share of local manufacturers required extrapolation from historical data points.

- *Price levels*: Prices are at Customs Insurance Freight or Freight on Board price, procurement price or CMS price, which are comparable within a few percentage points. The IMS Health data for Kerala State, Philippines, Senegal, South Africa, and Serbia is taken at the distributor sale price and thus include distribution and mark-up prices (except for the South African public depot data, which do not include distribution costs). We have removed an average mark-up in these cases to account for the distribution costs.

- *Health product procurement channels*:

    - Government sector includes: Central medical stores (CMS), ministries of health; regional medical stores, state/group of hospitals; social security programs

    - Donor/nongovernmental organization (NGO) sector includes: integrated procurement within government systems; multi-country NGO global tenders (e.g., Gavi, Pan-American Health Organization)

    - Private sector includes: Large hospitals or pharmacy chains (group purchasing organizations); private wholesalers and retailers; private distributors (e.g., Eurapharma / Laborex across French West Africa); government hospitals, clinics, pharmacies purchasing directly from domestic private-sector distributors

- *Categorization of products by brand and licensing status*:

    - Licensed Brands = products that are licensed by an originator company to a company located in another region or country

    - Licensing Not Assigned = products specific to that country or region (e.g., locally manufactured branded generic medicines) where the global IMS system does not recognize the brand or the data have not been recorded properly by the distributors supplying IMS with data

    - Original Brands = products developed by originator/innovator companies

    - Branded Generics = off-patent medicines sold under a brand name

    - Unbranded Generics = off-patent medicines marketed as the international non-proprietary name (INN) of the active ingredient(s)

Further, each specific savings estimate is calculated based on more detailed data available for smaller groups of countries and covering a specific basket of health products. Details for each approach are outlined in the table below.

Approach	**Sample of countries covered**	**Basket of products and other notes**	**Data source**	**Other notes**
2.1 Centralizing public sector procurement at the national level	7 countries: India (state of Kerala), the Philippines, Senegal, Serbia, South Africa (subset of three States: KwaZulu-Natal, North West and Eastern Cape), Tunisia, and Zambia	Basket covering drugs for 40 generic molecules; data are disaggregated by sector of purchaser between 2015 and 2017.	IQVIA	Estimates depend on analysis in Dubois et al. (2019) and Over (forthcoming) and working assumptions on the proportion of government purchasing that is currently centralized.
2.2 Switching to unbranded generics	15 countries: India, Philippines, Tunisia, Thailand, South Africa, and French West Africa which is an aggregation of 10 francophone countries (Cote d'Ivoire, Senegal, Cameroon, Burkina Faso, Benin, Togo, Chad, Mali, Guinea, and Niger)	Data include detailed information on the total value and volume of the pharmaceutical market by brand and licensing status.	IQVIA	All countries are equally weighted—other than French West Africa, which is counted as a single grouping—i.e., average of average prices is not weighted according to populations. Given we only had complete market estimates for the few countries in our sample, we felt it was reasonable to look at country averages individually. We also did not want the data points for India to skew the analysis.

2.3 Benchmarking prices to reduce the variability of prices for generic health products	13 countries: Brazil, Colombia, India (the State of Kerala), Kyrgyz Republic, Lao PDR, Philippines, Serbia, Senegal, South Africa, Thailand, Tunisia, Ukraine, and Zambia	Basket of 30 health products, covering the therapeutic areas listed below. Data include detailed price information for health products in the public (i.e., government and donor) sector. Therapeutic areas are as follows: asthma, diabetes, cardiovascular diseases, infectious diseases, central nervous system, pain/inflammation, ulcers, tuberculosis, malaria, hormonal contraceptives, HIV, anaemia/conjunctive therapy, deworming, diarrhoea, diabetes, oncology, vitamins and minerals and hepatitis C.	IQVIA, plus additional information that was either publicly available or shared by in-country respondents	The analysis is weighted according to the size of the market in each country (we essentially aggregated the health products from all the countries we have detailed detail for into a single basket, and then look at potential savings for each product across countries). In addition, the extrapolation is income category specific; countries with GNI PPP per capita < 5,000 in our sample were used to extrapolate to countries with GNI PPP per capita < 5,000 outside the sample.

More details are in Appendix D of CGD's report *Tackling the Triple Transition in Global Health Procurement*, available at, https://www.cgdev.org/better-health-procurement and in this CGD Note, https://www.cgdev.org/publication/initial-estimation-size-health-commodity-markets-low-and-middle-income-countries#edn3.

Annex 2. Policy Overlap Affects Each Reform's Contribution To, But Not the Total Amount Of, Savings

Table 3 estimates the total savings that could be obtained from implementing all three reforms net of the overlap in savings from two or more of the reforms that is depicted in Figure 10. Table A.1 presents the overlap between every pair of policies, calculated by applying the proportional relationships between the magnitudes of the savings depicted in Figure 10.

Table A.1. Estimated overlap between pairs of the three reform policies in billions of PPP dollars (In each cell, overlap between lower savings estimates is above the overlap for upper savings estimates)

	Centralizing	Benchmarking	Shifting to unbranded
Centralizing		0.83 3.08	0.75 1.50
Benchmarking			2.61 5.22

The policy overlap across all three reforms is $3.4 billion for the lower savings estimate and $8.3 billion for the upper savings estimates.

A consequence of the existence of policy overlaps is that the independent contribution of each of three reforms depends upon the order or sequence in which they are implemented. With three reforms there are six possible permutations of the implementation order. Table A.2 presents the calculations of the incremental contributions under each of the six permutations for both the lower and the upper savings estimates of Table 3.

In each of the two columns of Table 3, a given reform's largest incremental contribution to procurement savings occurs if that reform is implemented before the other two. Conversely, when any of the reforms is implemented after the other two, its incremental contribution is diminished. For example, on the right side of the table the estimates of the incremental contribution of the centralization reform varies from 3.9 billion, if it is implemented before any others, down to only 0.83 billion, if it is implemented last. Similarly, the contribution of benchmarking varies from $10.7 billion when it is implemented first down to $3.9 billion if last. And shifting purchases to unbranded generic drugs contributes $20 billion in savings if implemented first compared to $14.8 billion if implemented last. Of the three reforms, the one for which estimated savings is least affected by policy overlap with the other two is the shift to unbranded generics. This is because, unlike the other two reforms, the shift to unbranded drugs is modelled as affecting private as well as public sector procurement. Under the assumptions used here, the savings achieved by this reform in the private sector would not be duplicated by either of the other reforms.

Table A.2. The incremental savings achieved by each of three procurement reforms depend upon the implementation sequence

Lower savings estimates			Upper savings estimates	
Centralizing	1.00		Centralizing	3.90
Benchmarking	2.07		Benchmarking	7.62
Unbranded	7.39		Unbranded	14.78
Total	10.46		Total	26.31
Benchmarking	2.90		Benchmarking	10.70
Centralizing	0.17		Centralizing	0.82
Unbranded	7.39		Unbranded	14.78
Total	10.46		Total	26.31
Unbranded	10.00		Unbranded	20.00
Centralizing	0.25		Centralizing	2.40
Benchmarking	0.21		Benchmarking	3.91
Total	10.46		Total	26.31
Centralizing	1.00		Centralizing	3.90
Unbranded	9.25		Unbranded	18.50
Benchmarking	0.21		Benchmarking	3.91
Total	10.46		Total	26.31
Benchmarking	2.90		Benchmarking	10.70
Unbranded	7.39		Unbranded	14.78
Centralizing	0.17		Centralizing	0.83
Total	10.46		Total	26.31

Unbranded	10.00		Unbranded	20.00
Benchmarking	0.29		Benchmarking	5.48
Centralizing	0.17		Centralizing	0.83
Total	10.46		Total	26.31
Naïve total	13.90		Naïve total	34.60
Overlaps	3.44		Overlaps	8.29

Source: Authors' calculations.

Of course, other combinations are possible that mix larger savings form one of the reforms with smaller savings from others. For example, suppose that the centralization reform is implemented first and achieves its maximum savings, but is then followed by benchmarking and a switch to unbranded products, each of which achieve only their lower savings. In this case, after $3.9 billion of savings from centralizing, benchmarking would increase savings by $2.1 billion and the switch to unbranded products would save an additional $7.4 billion, for a total savings of $13.4 billion, an amount in between the $10.5 billion sum of the lower estimate and the $26.3 billion of the upper estimate.