



## Annotated Bibliography on Procurement in Low- and Middle-Income Countries

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***Disclaimer:** This document was drafted by Roxanne Oroxom in July 2017 as input to the first meeting of the Working Group on the Future of Global Health Procurement. This annotated bibliography does not account for all relevant reports and studies, given the extensive scope of the literature in this area. A more extensive list of potentially relevant studies were excluded due to time constraints.*

### Introduction

Inefficient procurement of vital health products can undermine the global community's ability to manage and prevent disease outbreaks. Inaccurate projections of future demand for medicines can result in an under or over supply of drugs, which in turn can lead to stockouts and spoiled medicines. Similarly, weak institutions can delay the release of funds for purchasing medicines or lead countries to pay for poor quality medicines. Where they exist, such inefficiencies waste money and place unnecessary pressures on health budgets that are already stretched thin. At the country level, many observed inefficiencies are driven by data and capacity gaps in national procurement offices (e.g., Ministries of Health or Central Medical Stores). These offices have had to take on a larger role in the procurement process as donors have transitioned away from in-kind donations of medicines. Donors and other procurement agents have at times set up parallel procurement systems that bypass national procurement offices, with both positive and negative implications for efficiency and long-term sustainability.

This annotated bibliography, drafted to inform the Center for Global Development's working group on the future of global health procurement, covers relevant literature to help answer three questions: What approaches to global health procurement exist? What do we know about the application and success of those approaches in low- and middle-income countries? And finally, what knowledge gaps persist?

### Approaches to Global Health Procurement

A variety of procurement mechanisms are available to countries, including direct procurement, indirect procurement, and pooled procurement (Ghoneim, Mpundu, Mabilirizi, & Nfor, 2016). Much of the recent literature has focused on the benefits of pooled procurement, which allows countries to aggregate their demand and share information more efficiently to obtain better contract terms.<sup>1</sup>

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<sup>1</sup> Pooled procurement can be further disaggregated into informed buying, coordinated informed buying, group contracting, and central contracting and purchasing. In informed buying, members in the pooled mechanism share their own research and data, but purchase and contract individually. In coordinated informed buying, members conduct joint research, but purchase and contract individually. In group contracting, members jointly negotiate prices via group contracts, but purchase individually with suppliers everyone agreed to work with. In central contracting and purchasing, members send out and award contracts through one organization or platform and that unit purchases on behalf of all the members.

There are several examples of pooled procurement at the national and regional levels. For example, Mexico, Jordan, and Brazil have implemented pooled procurement to combine demand across government entities and hospitals. Likewise, the Gulf Cooperation Council, Organization of Eastern Caribbean States Pharmaceutical Procurement Service, and the Association Africaine des Centrales d'Achats de Médicaments Essentiels (ACAME) serve regional clusters in the Middle East, the Caribbean, and sub-Saharan Africa. Framework agreements, long-term contracts that outline the terms, conditions, and time-period under which smaller orders may be issued periodically, allow procurers to combine several steps in the purchasing process for the same products. Framework agreements provide the benefits of pooled procurement, but also give purchasers greater flexibility in the use of suppliers and quantities ordered.

In addition to leading their own procurement, countries can participate in the procurement programs of other organizations, such as the Global Drug Facility or the Global Fund, or contract out their procurement to an independent entity like the IDA Foundation. Depending on the country or regional context, countries may have the opportunity to procure locally as well as internationally. Local procurement may be used where a country or countries want to support local producers, improve local agencies (e.g., laboratories for quality assurance), and create uniform access to medicines (as was the case for the Gulf Cooperation Council).

Procurement can also be affected by the legal environment. Countries may have access to cheaper generic medicines even in cases where patents are still active (Beall & Attaran, 2017). For example, if a patent covers the process for making a product instead of the drug's active pharmaceutical ingredient, it does not prevent other companies from using different methods to make similar products. Least-Developed Countries (LDCs) also have until 2033 to align their patent laws with the Trade-Related Aspects of Intellectual Property Rights (TRIPS) Agreement, which states that LDCs must actively enforce patents. Moreover, manufacturers of innovators can voluntarily license generics producers to supply their products in exchange for a royalty, or manufacturers can refrain from enforcing their patents for certain medicines. Finally, certain countries can use compulsory licensing to bypass patent protection entirely.

## The Evidence Around Different Procurement Models

Much of the literature on procurement is devoted to summarizing the status and challenges of procurement in low- and middle-income countries. Several reports noted that demand fragmentation, the result of substantial variation in treatment protocols and packaging, creates disincentives for manufacturers who would otherwise be interested in developing new products or revamping old ones. Empirical studies are largely focused on the Global Fund and use data from the Global Price Reporting Mechanism, though descriptive studies on individual country programs also exist. Newer studies have begun to incorporate data on incoterms and ex-works terms, as well as patent protections. Interestingly, recent analyses of pooled procurement schemes suggest that purchase volume is not consistently associated with lower prices, which suggests that other factors related to pooled procurement may be more important in driving down prices (Kim & Skordis-Worrall, 2017; Wirtz, Forsythe, Valencia-Mendoza, & Bautista-Arredondo, 2009). Whether a drug is an innovator or a generic continues to be a significant predictor of prices (Wirtz et al., 2009). Research on the Global Fund's voluntary pooled procurement system also suggests that inefficiencies within the Global Fund's program could benefit from complementary structures, such as bridge

financing, instant replenishment, or synchronized financing, all of which are meant to fill financing gaps caused by delays in obtaining funding.

### Remaining Knowledge Gaps

- How can the registration of new products or prequalification through the World Health Organization be more efficient?
- What is the relative effect of taking different approaches to the timing of product submissions (e.g. placing multiple orders at the same time versus following a schedule to time orders)?
- How can manufacturers be incentivized to develop fixed-dose combinations, pediatric formulas, and more affordable diagnostics?
- What are some examples of price negotiations that have failed to obtain lower prices?

### Conclusion

Advances in global health procurement will have ramifications that spread far beyond the health sector. However, progress hinges on greater accountability in the field. Namely, there must be consequences for suppliers of poor quality medicines and follow up with countries that fail to meet co-financing requirements. Greater transparency around product prices and tender terms must be prioritized. The importance of making price data publicly available is difficult to overstate and is evidenced by the frequency with which the rich Global Price Reporting Mechanism data is used in different studies. Fewer descriptive studies and more empirical assessments could also transform the field.

### 1. Do Changes to Supply Chains and Procurement Process Yield Cost Savings and Improve Availability of Pharmaceuticals, Vaccines or Health Products? A Systematic Review of Evidence from Low-Income and Middle-Income Countries (Seidman & Atun, 2017)

This review includes studies that report on the non-modelled effects of a program or policy related to supply chains or the procurement of health products in low- and middle-income countries. Selected studies also had to discuss the program or policy's cost implications or effects on product availability. Of the 25 references that touched on cost, 12 focused on the cost savings generated by centralized procurement or tendering. Several of the studies covered programs or policies that implemented multiple changes simultaneously, such as the National Essential Medicines Scheme China established in 2009. The financial benefits of pooled procurement were presented in two country studies, Jordan and Mexico, and studies on pooled procurement mechanisms, such as the Gulf Cooperation Council. None of the studies included in this review found that pooled procurement reduced stockouts or increased the availability of health commodities.

### 2. The Global Drug Facility: A Unique, Holistic and Pioneering Approach to Drug Procurement and Management (Matiru & Ryan, 2007)

This article reviews the procurement practices of the Global Drug Facility, which launched in 2001 and is administered by the Stop TB Partnership secretariat. GDF limits its grants to countries with an annual per capita gross national income of less than US \$3,000 and prioritizes countries with an annual per capita GNI of less than US \$1,000. GDF also requires that the drugs it supplies be provided to end-users for free. This policy reflects GDF's initial scope, which was meant to be temporary, and GDF's requirement that grant recipient countries allocate some of their own funding to TB control. In practice, domestic support for TB has not been consistent or has declined in some cases, and many countries simply substitute funding from other donors for GDF support. GDF also requires that the drugs it supplies be prequalified through the World Health Organization's prequalification program or be approved for supply by WHO pending prequalification. GDF is currently expanding its catalogue of products to include second-line drugs, pediatric drugs, and diagnostic kits. GDF works with the Green Light Committee, which is also part of the Stop TB Partnership, to ensure MDR-TB treatment programs have access to high quality drugs. Challenges confronting GDF include the slow prequalification process, the lack of geographic diversity in suppliers, and the limited number of suppliers manufacturing the active pharmaceutical ingredient needed for first-line drugs.

### 3. The Procurement Landscape of Pediatric Tuberculosis Treatment: A Global Drug Facility Perspective (Scott, Gardiner, & de Lucia, 2015)

This review examines the emergence of pediatric tuberculosis drugs and the role of the Global Drug Facility in facilitating access to such medicines. Out of 17 high tuberculosis burden countries eligible for UNITAID grants to cover pediatric treatments, 64 percent procured treatments from GDF at least once. Procurement from GDF was sporadic and the highest burden countries did not purchase via GDF (e.g., India). The 17 countries constituted 40 percent of the total number of estimated cases (as documented in each country's National Treatment Plan). Countries that did not procure via GDF used adult drugs for pediatric treatments or procured drugs locally. There are several constraints on the pediatric TB drug market, including the length of time it takes to obtain approvals, frequent

changes in treatment policies, and uncertain purchasing volumes, all of which drive the limited number of suppliers in the market.

#### 4. National Drug Stockout Risks in Africa: Analysis of the Global Fund Disbursement Process for Procurement from 2002 to 2013 (Gallien, Rashkova, Atun, & Yadav, 2014)

This study uses a discrete-event simulation model to answer three questions: How do the Global Fund's performance monitoring requirements affect the frequency of stockouts in their grant recipient countries? Is there geographic variation in the risk of stockouts in those countries? What are the potential effects on stockouts of the Global Fund switching to a different disbursement model?

The study covers stockouts of five product categories (anti-malarial drugs, anti-tuberculosis drugs, anti-retroviral drugs, malaria prevention products, and HIV prevention products) in 130 grant recipients across 53 African countries. The new disbursement models the Global Fund could potentially adopt are:

- Instantaneous replenishment from an international or regional buffer stock of supplies
- Bridge financing in the form of a loan from a third party equal in amount to the next anticipated disbursement when that disbursement is overdue
- Synchronized financing where disbursements cover one and a half reporting periods

The authors use data from the Global Fund's Price and Quality Reporting database to estimate and validate three models to create one overall model.<sup>2</sup> Per the main model, recipients with 90-day reporting periods face an estimated 28.7 percent stockout risk versus those with 180-day reporting periods, which face a 5.3 percent stockout risk. Recipients with 90-day (180-day) reporting periods in the West & Central Africa region have a predicted stockout risk of 21 percent (2 percent) compared to 49 percent in East Africa (11 percent), and these levels are consistent across types of products. With respect to the policy interventions, synchronized financing is the only intervention to substantially reduce the likelihood of stockouts (13 percentage points in West & Central Africa and 16 percentage points in North Africa) though additional simulations revealed that any gains would be time limited and that instantaneous replenishment may be a better option in such cases.

#### 5. Antiretroviral Procurement and Supply Chain Management (Ripin et al., 2014)

This review covers the stakeholders, operating models, donor policies, regulations, and key challenges in the procurement of antiretrovirals. The authors attribute the small number of global ARV manufacturers to the substantial capital required to launch production and donors' rigorous quality requirements (e.g., suppliers must be part of the World Health Organization's prequalification program). Moreover, regulations at many different levels affect ARV procurement, such export regulations in the country of origin, import regulations (e.g., products must be registered with the National Drug Regulatory Authorities), and international trade practices. Pre-shipment quality checks must also

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<sup>2</sup> The first model estimates procurement lead times using variables for the product category, the geographic region of the recipient (as defined by the Global Fund) and whether the country is landlocked. The second model estimates the time between two consecutive disbursements using the length of the reporting period (90 or 180 days), the country's Global Fund-designated region, and the principal recipient's rating in the previous reporting period (which local fund agents mark as A, B1, B2, or C with A being the best and C being the worst). Finally, the third model estimates successive ratings for each principal recipient.

consistent of a physical test or a physical and laboratory test, and labs must either be prequalified by the World Health Organization or accredited by other organizations. Like other health products, demand fragmentation, spurred by the high number of formulations, plagues ARV procurement. The authors list six ways to address such fragmentation:

- Place multiple orders at the same time
- Aggregate orders into a single order
- Place orders per a pre-set schedule
- Standardize packages to remove differences in labelling and pack size
- Improve forecasts
- Deliver smaller quantities more frequently
- Streamline the registration process

#### 6. Can Voluntary Pooled Procurement Reduce the Price of Antiretroviral Drugs? A Case Study of Efavirenz (Kim & Skordis-Worrall, 2017)

This study uses data from the WHO GPRM to estimate the effect of purchasing 600 mg generic Efavirenz through the Global Fund's voluntary pooled procurement scheme. Specifically, this study applies a difference-in-difference analysis to examine the introduction (or non-introduction) of VPP in 25 treatment countries and 82 control countries, using incoterms and ex-works prices as dependent variables. The results showed that VPP reduced both the ex-works price and the incoterms price of Efavirenz by 16.2 percent and 19.1 percent, respectively, and that the price of Efavirenz decreased over time. The effects of other independent variables, such as HIV prevalence, transaction volume, and the number of generic manufacturers in the market were not statistically significant.

#### 7. Surmounting Challenges: Procurement of Antiretroviral Medicines in Low- and Middle-Income Countries: The Experience of Médecins Sans Frontières (MSF) (Médecins Sans Frontières, World Health Organization, & UNAIDS Secretariat, 2003)

This report describes MSF's experiences with the procurement of antiretroviral medicines. The authors identify three main enabling factors for efficient ARV procurement: a national strategy that includes ARVs, enabling entities, such as a strong procurement agency, local drug producers, and dynamic private-sector distributors; and more clarity around a number of issues, such as the number of registered ARV products, whether generics or originators, clarity around their patent status, more policies around generics, limited information available about internationally received prices, and countries eligibility for differential prices from pharmaceutical companies.

The authors also suggest several policy changes to enhance ARV procurement:

- Taxes, duties, and markups on ARVs should be lowered or abolished
- Least-Developed Countries should capitalize on the leeway in patent enforcement afforded to them by the Doha Declaration on TRIPS and Public Health
- ARV procurers should consider both price and quality when purchasing ARVs
- Manufacturers should develop fixed-dose combinations, pediatric formulas, and more affordable diagnostics
- Manufacturers should also participate in the World Health Organization's prequalification program and introduce differential pricing schemes

## 8. Factors Influencing Global Antiretroviral Procurement Prices (Wirtz et al., 2009)

How did the price of twelve antiretrovirals (first- and second-line) change between 2005 and 2008? Using data from the Global Price Reporting Mechanism and price per active pharmaceutical ingredient from other research, the authors analyzed differences in the median price per patient per year and whether the price of a drug was higher than the lowest and highest direct manufactured cost per patient per year (LDMC and HDMC, respectively). The results showed that despite the availability of pricing mechanisms meant to increase access, the prices of innovator products continue to be higher than that of generic products. Innovator status was strongly associated with price. Purchasing volume, on the other hand, is not consistently associated with price, which is in line with other literature, but stands in contrast to the assumptions about the benefits of bulk procurement. Upper middle income countries paid more than the lowest and highest direct manufactured costs giving weight to concerns about the purchasing capabilities of countries that are no longer eligible for price lowering mechanisms. Procuring through a third party, in this case CHAI, was not consistently associated with lower prices.

## 9. A Method for Understanding Generic Procurement of HIV Medicines by Developing Countries with Patent Protection (Beall & Attaran, 2017)

To what extent do patent protections limit the procurement of generic medicines? Where it is still possible to obtain generics, what facilitates such access? The authors created a database of patents applicable in the exporting and importing countries for 12 ARVs and linked that data to the Global Price Reporting Mechanism database, which has information on what company exported and imported the medicine, as well as whether the product was an innovator or a generic. The study found that even though a limited number of patents applied to developing countries, the population sizes of those countries meant that the potential effects of the patents on medicine access could affect more people. However, the study also found that developing countries were still able to access medicines under patent and that this was often the case for ARVs that only had active patents in exporting countries. Voluntary licenses had the potential to be applied to the greatest number of medicines in this sample.

## 10. Compulsory Licensing Often Did Not Produce Lower Prices for Antiretrovirals Compared to International Procurement (Beall, Kuhn, & Attaran, 2015)

How do the prices of antiretrovirals obtained via compulsory licensing compare to the prices obtained via collective price negotiations? Comparisons of the median international procurement price showed that international procurement achieved lower prices in 19 out of 30 cases and did so by more than 25 percent in 17 of those cases. In contrast, compulsory licensing obtained prices that were lower by more than 25 percent in only 5 cases. Restricting the sample to exclude licenses issued in 2003, exclude cases from Brazil and Thailand, and separate countries by Human Development Index upheld the favorable findings for international procurement. However, the benefits of international procurement were reduced when the median international procurement price was recalculated to only consider countries with an applicable patent (compulsory licensing was then cheaper) and when compulsory licensing prices were compared to international procurement prices from the previous year (essentially no difference between the two mechanisms).

## 11. Comparative Assessment of Medicine Procurement Prices in the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA) (Ewen et al., 2014)

This study compares the prices of medicines procured in 2010 by UNRWA to the prices obtained by various other procurers, including a national agency (Jordan's Joint Procurement Department), a regional organization (the Gulf Cooperation Council), and an international non-profit supplier (the IDA Foundation). In addition, it compares all those prices to the prices listed in Management Sciences for Health's International Drug Price Indicator Guide.

The study found that prices were relatively similar across procurers and the price guide in the aggregate, but UNRWA paid notably more or notably less for a handful of medicines. Disaggregating UNRWA's purchases by those procured centrally or those procured locally by field offices revealed that local procurement resulted in higher prices for Lebanon and the West Bank, but lower prices for Syria. Based on their findings, the authors recommend that:

- UNRWA should try to purchase 5 specific medicines at the prices obtained by one of the other procurers, either by joining their tenders or rethinking its own policy of not negotiating prices (UNRWA can, however, terminate a contract if it finds lower prices elsewhere).
- UNRWA should expand its pool of potential suppliers to pre-qualified suppliers from outside Europe and the Middle East.

## 12. Strategic Contracting Practices to Improve Procurement of Health Commodities (Arney, Yadav, Miller, & Wilkerson, 2014)

A framework agreement is a long-term contract that outlines the terms, conditions, and period under which small orders may be issued repeatedly. Framework agreements allow procurers to combine several steps in the purchasing process for the same products. Framework agreements also allow procurers to aggregate their demand to obtain the benefits of pooled procurement, while also giving them the flexibility to purchase different quantities at different times from different suppliers. In a single-supplier framework agreement, one supplier may receive numerous orders based on one contract. In a multiple-supplier framework agreement, many suppliers are contracted to deliver the same product or service. Suppliers can receive orders based on the outcome of a secondary bidding process, an arbitrary rotation, or a rotation that is informed by each supplier's capacity. Order amounts for different suppliers may also be outlined in the initial contract.

ChileCompra, Chile's e-procurement system, negotiates multi-year contracts that all government agencies can order against. Ghana has framework agreements for the procurement of antiretrovirals. Similarly, 93 and 45 percent of UNICEF's<sup>3</sup> and UNFPA's procurement takes the form of a framework contract, respectively. Both organizations require the use of framework contracts to purchase certain goods.

One argument against framework agreements suggests that they could deter new manufacturers from entering the market while the agreement is in place. However, it is possible to account for such changes. UNICEF considers adding new pre-qualified entrants if there was previously only one supplier available, the current supplier's performance is

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<sup>3</sup> UNICEF further differentiates LTAs into target value LTAs and time-bound LTAs. Target-value LTAs expire when the desired amount is reached or the date of the contract is reached. Time-bound LTAs expire when the date of the contract is reached.



poor, or the current supplier's stock is insufficient to cover UNICEF's needs. The lack of a standard methodology for calculating the costs and benefits of framework agreements constrains their use. Furthermore, though the UN Commission of International Trade Law (UNCITRAL) Model Law on Procurements of Goods, Construction and Services of 2011 explicitly defines circumstances under which framework agreements may be used (e.g. need for a product is expected to be needed on a "repeat, indefinite, or urgent basis during a given period"), country procurement laws or other official guidelines do not routinely comment on the legality of their use.

### 13. Addressing Contraceptive Stock-Outs Caused by Procurement Delays in Tanzania (Advance Family Planning, 2014)

The Government of Tanzania began using a framework contract to procure three types of contraception in 2013. Inefficiencies in the purchasing process (e.g. the time it took to gather and select bids, time those bids to funding cycles, and have purchasing funds released by the government) drove the shift away from annual tendering, the traditional procurement method. The framework contract was selected as opposed to the Pledge Guarantee for Health since the pledge only covers family planning commodities and the Ministry of Health and Social Welfare felt the broader issue of inefficiencies required addressing. The final commodities selected – an injectable, implant, and male condoms – were selected because stocks of them were low, funding was available to purchase the needed supplies, and the Medical Stores Department declared them were eligible for procurement. Framework contracts are supposed to help supplier plan long term needs and reduces the administrative burden by letting countries only deal with one contract.

### 14. Drug Procurement, the Global Fund and Misguided Competition (Tren, Hess, & Bate, 2009)

This article presents two cases in which purchasing based solely on price or from not yet prequalified suppliers, as allowed by the Global Fund, gave way to stockouts and delays. In May 2008, Kenya Medical Supplies Agency awarded a million-dollar tender to Ajanta Pharma, whose bid was reportedly around 40 percent less than the next lowest bidder. The authors stipulate that despite delays driven by the Kenya Government and the need for batch testing, Ajanta did not manage its own supply well. As a result, Ajanta's first delivery was 3 months late, the amount delivered was far below the expected amount, and some of the delivered products were only partially filled. In addition, even though the World Health Organization issued a Notice of Concern to Ajanta Pharma in March 2009, Uganda managed to award it a contract shortly thereafter. The authors recommend reexamining whether NOCs should report on the ability of manufacturers to deliver drugs and that donors should issue clear procurement guidelines that stress price as well as quality. Other recommendations push for the Global Fund to conduct a global audit of its tenders and that the all the details of tenders should be made public.

### 15. Does Pharmaceutical Pricing Transparency Matter? Examining Brazil's Public Procurement System (Kohler, Mitsakakis, Saadat, Byng, & Martinez, 2015)

The Brazilian government introduced the Banco de Precos em Saude (BPS) in 1998 as a way to increase transparency around the cost of medicines and other medical products. Linear regressions were run using the log of unit price for 19 drugs procured in the states of Sao Paulo and Paraiba as the dependent variables and time as the primary linear predictor. The results showed that the unit price of 5 out of 19 medicines changed significantly over time (4

decreased and 1 increased) in Paraiba while no drugs decreased in price and only 1 increased in price in Sao Paulo. Essentially, the database didn't influence drug prices in those two states. It is possible that the lack of consequences for sellers falling on the higher end of the price distribution may have been a reason for its lack of effect.

## 16. Procurement of Medicines (Kaplan & Mathers, 2011)

This chapter in the World Medicines Situation Report describes procurement in low- and middle- income countries.

Country-level procurement can be led by a variety of government bodies, such as a centralized government agency, a department within a Ministry of Health (MOH), or an agency that is wholly or partially overseen by the government, but has the autonomy to regulate itself.<sup>4</sup> In addition, country-level procurement can be led by an agency that is managed by an independent group that reports to the government<sup>5</sup> or an outside procurement agent, such as a private-sector company, UN agency, or international NGO supplier.<sup>6</sup> Districts or municipalities can also oversee the purchasing process in decentralized systems, while regional bodies can manage procurement for several countries within the same geographic area.

Donor support for the procurement of healthcare commodities has transitioned away from donated medicines and bilateral aid to the increased use of Sector-Wide Approaches and basket funding. In addition, donors have supported new procurement and pricing platforms.<sup>7</sup> Countries' limited capacity to evaluate bids, manage contracts, and monitor the quality of procured medicines has become more apparent as they've received more budgetary support for procurement.<sup>8</sup> The World Health Organization's Prequalification Programme helps with the monitoring constraint as it assesses the quality, safety, and efficacy of various medicines using site inspections and other evaluations. Some donors and multilateral agencies, the Global Fund for example, incorporate the program's "stamp of approval" into their purchasing requirements. At the same time, concerns persist about the quality of essential medicines purchased outside of donor- and multilateral agency-supported platforms.

Apart from quality assurance and capacity gap issues, regulatory, data, and funding challenges exist. Some laws encourage purchasing based solely on the lowest priced bid, rather than simultaneously considering price and quality. National laws may also limit the ability of some countries to pursue international tendering/procurement. Such laws may

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<sup>4</sup> For example, the Kenya Medical Supplies Agency (KEMSA).

<sup>5</sup> For example, the Medical Stores Depot (MSD) in Tanzania.

<sup>6</sup> The International Dispensary Association (IDA) Foundation and Imres are two examples.

<sup>7</sup> Examples of procurement platforms at the international level include GAVI, the Global Drug Facility, the Global Fund, and UNITAID. At the regional level, efforts include PAHO's Expanded Program on Immunization Revolving Fund, the PAHO Strategic Fund, the Organization of Eastern Caribbean States Pharmaceutical Procurement Services, and the Gulf Cooperation Council Group Purchasing Program. The Accelerating Access Initiative, the Clinton HIV/AIDS Initiative, and the Affordable Medicines Facility for Malaria are examples of new pricing platforms.

<sup>8</sup> To further address the capacity gap, USAID and PEPFAR have supported procurement-specific programs (the Deliver Project and the Supply Chain Management System Project, respectively) and other organizations have put forth documents outlining best practices for procurement. The OECD and the World Bank set up the Round Table on Strengthening Procurement Capacities in Developing Countries in 2002 and the OECD/DAC established the Joint Venture for Procurement in 2005. Additionally, the Global Fund provides technical assistance to grant recipients in three areas: quantification/forecasting, procurement planning, and logistics management. The Global Drug Facility also provides technical support to train staff on the procurement and management of drugs to combat tuberculosis.

even place additional costs, such as value added tax and tariffs, on medicines, driving up their price. Poor stock and consumption data hamper quantification and forecasting efforts. There are also few evaluations of supplier performance, though data on the prices paid for healthcare commodities and e-procurement systems have helped reduce corruption in public-sector procurement. With respect to the funding challenge, donor financing does not always align to government procurement cycles, which leads to higher costs, and the release of domestic procurements funds is often delayed.

## 17. Healthcare Supply Chains in Developing Countries (Dowling, 2011)

The World Health Organization's framework for medicine access identifies four key ingredients for ensuring access to medicines: 1) rational selection and use of medicines, 2) affordable prices, 3) sustainable financing mechanisms, and 4) reliable delivery systems. Public-sector or parastatal organizations typically handle procurement in low- or middle income countries. Usually these organizations are called Central Medical Stores. Central Medical Stores usually store and distribute medicines though Regional Medical Stores also exist. Orders are typically placed on a monthly or quarterly basis depending on the country. Two models exist for making orders: a push model or a pull model. In a push model, the CMS determines how much to order when, but in the pull model orders quantities are facility-led. The number of commercial distributors is important. Where there are a lot of local distributors there will be shorter lead times and a reduced need to hold lots of inventory. Parallel delivery systems are created because of concerns about the existing system. Private non-profit organizations often procure medicines through agents such as IDA Foundation or MissionPharm and typically rely on donor funding to purchase medicines or in-kind products. When it comes to procurement functions in developed countries versus developing countries, the latter has many more limitations. For example, in developed countries, forecasting is the responsibility of manufacturers as they must plan future production, but in LMICs forecasting is the responsibility of CMSs. Additionally, in developed countries, framework contracts allow for flexible purchasing based on real-time data. In contrast, developing countries used fixed volume procurement model that are based on annual estimates. Moreover, developing countries have a limited ability to procure products in emergencies, deal with counterfeit medicines, and conduct in-country testing. In the US, 95 percent of orders are filled within 24 hours of an order being placed. Pharmaceutical outlets in the US carry little inventory and so they must place orders frequently. Data on order fill rates hard to come by; in Cameroon, order fill rates for the CMS were 69.5 percent while in Senegal they stood at 65 percent.

## 18. Results-Based Financing in Mozambique's Central Medical Store: A Review After 1 Year (Spisak et al., 2016)

Mozambique began implementing a one-year results based financing (RBF) program in 2013 to improve the performance of the country's Central Medical Store. The program included 5 indicators in 3 areas: supply planning, distribution planning, and warehouse storage. The indicators covered the timeliness and quality of planning documents, order and inventory accuracy, and the speed with which orders were processed. At the end of the program, the supply planning indicator – the submission of an annual quantification plan or quarterly updated supply plans for each product group – was met every quarter, except the first. Performance on the indicators related to warehouse storage improved over time, but inconsistently achieved the quarterly targets.

## 19. A New Entity for the Negotiation of Public Procurement Prices for Patented Medicines in Mexico (Gómez-Dantés, Wirtz, Reich, Terrazas, & Ortiz, 2012)

The creation of the Coordinating Commission for Negotiating the Price of Medicines and Other Health Inputs allowed three government agencies in Mexico to negotiate prices as one and made the negotiated prices available to all government institutions. For most patented medicines, the negotiations in 2008, 2009, and 2010 resulted in lower prices every year. The CCPNM's annual reports estimate that total savings reached about US \$355 million. Challenges that persist include the slow preparation of background materials, such as patent data; the lack of political support for the CCPNM; the absence of indicators for explicitly measuring CCPN's progress; and the lack of transparency around the accuracy of its forecasts or case studies where negotiation failed to obtain lower prices.

## 20. Using Technology to Fight Corruption in Pharmaceutical Purchasing: Lessons Learned from the Chilean Experience (Cohen & Montoya, 2001)

This paper describes the transformation of CENABAST, a government agency in Chile, from a purchaser and distributor of medical products into a "mediator of pharmaceutical purchases." CENABAST's purchasing and distribution responsibilities were delegated to other agencies with the aim of reducing the likelihood of collusion. An electronic bidding system was also put into place, making the price of the lowest bid visible to all bidders. CENABAST also started guaranteeing the purchases made through the electronic bidding system to encourage bids. Finally, there was an information and communication campaign that targeted pharmaceutical executives to get them to use the new system. CENABAST's new structure allows centralized purchasing to generate savings, but also lets hospitals and centers have a choice in their suppliers.

## 21. One-Year Assessment of Joint Procurement of Pharmaceuticals in the Public Health Sector in Jordan (Al-Abbadi, Qawwas, Jaafreh, Abosamen, & Saket, 2009)

Prior to the launch of a joint purchasing platform in Jordan in 2006, the Royal Medical Services (RMS), Jordan University Hospital (JUH), King Abdullah University Hospital (KAUH), and Ministry of Health procured medicines separately. This study compares the prices of several antibiotics, HIV medicines, and tuberculosis medicines in 2006 and 2007. All four institutions contributed price data, and the researchers surveyed a sample of local producers and importers for information on any upticks or declines in the prices of raw materials for those products.

The estimated savings from the joint procurement of 174 medicines purchased in 2007 and 2006 (assuming the same quantities were purchased in both years) equaled 241,809 Jordanian dinars (about US \$340,000). Looking specifically at 9 products that were innovators in both 2007 and 2006 or generics in both years, savings across the four organizations equaled 16.19 percent of the 2006 expenditure on the same products. Excluding a drug that saw a marked increase in the cost of raw materials increased the estimated savings to 845,832 Jordanian dinars (about 8.9 percent of the 2006 spend). In addition to providing savings, joint procurement provided a reason for the four organizations to converge on one set of eligibility criteria for potential bidders.

## 22. Kazakhstan Can Achieve Ambitious HIV Targets Despite Expected Donor Withdrawal By Combining Improved ART Procurement Mechanisms With Allocative And Implementation Efficiencies (Shattock et al., 2017)

This study used the Optima model to explore various policy levers and how those shifts could affect Kazakhstan's progress toward its national HIV/AIDS targets. For example, if Kazakhstan's programs continue as is, the HIV budget would have to increase by 32 percent. Without a budget increase, Kazakhstan could reach its national targets if it reduces management costs by 44 percent or obtained a 32 percent decrease in ART unit costs. A 21 percent reduction in management costs and a 20 percent decrease in ART costs could also be enough to secure its national targets by 2020.

## 23. Harmonized Monitoring and Evaluation Indicators for Procurement and Supply Management Systems (WHO, 2011)

This document lists and operationalizes 12 indicators to monitor and evaluate the procurement and supply management of antiretrovirals, tuberculosis drugs, and malaria medicines at the national level. Six measures (forecasting, consumption, supplier performance and port clearance, distribution, inventory control, and minimum stock level and inventory control) serve as early warning indicators. The remaining indicators are - product selection, prescribing and use, procurement efficiency, quality control, loss, and availability.

## 24. Reforming Antiretroviral Price Negotiations and Public Procurement: The Mexican Experience (Adesina, Wirtz, & Dratler, 2013)

This study assesses the effect of the Inter-Institution Commission, which was created in 2008 to improve public procurement in Mexico. Between 2004 and 2008 there was an average price decrease of 9 percent. The average price decrease reached 39 percent in the first round after the creation of the commission (and after one manufacturer provided a global discount for one drug). The average price decrease reached 8 percent in the second round. Comparisons of the absolute difference between Mexico's paid prices and international procurement prices showed that Mexico was paying much more, on average prices 6 times higher. Furthermore, even though ARV prices paid by upper-middle income countries decreased between 2007 and 2008, the prices paid by Mexico did not decline as much (45 percent to 38 percent). Supplemental interviews also revealed that stakeholders felt the Commission lack clear performance goals and relied solely on purchasing volume and Mexico's economic status to negotiate prices.

## 25. Quality Assurance of Medicines Supplied to Low-Income and Middle-Income Countries: Poor Products in Shiny Boxes? (Giralt, Schiavetti, Meessen, & Ravinotto, 2017)

The World Health Organization's Model Quality Assurance System (MQAS) provides a framework for assessing the safety, efficacy, and quality of products delivered by distributors. This study assesses the degree to which Central Medical Stores in Africa or International Humanitarian Distributors (IHDs) from Europe and Africa comply with MQAS guidelines. Analyses of data from Quality Medicines for All (QUAMED), which assesses groups against the MQAS model using a 0 to 4 scale, demonstrated that IHDs generally outperformed CMSs and that the lowest scores across distributors were in

prequalification, quality control, and reassessment. Only two African distributors performed any prequalification activities and their compliance was poor (mean score of 1.2), while European distributors were partially compliant (mean score of 2.5) and the IHDs were sufficiently compliant (mean score of 3 or above).

## **26. Health Product Supply Chains in Developing Countries: Diagnosis of the Root Causes of Underperformance and an Agenda for Reform (Yadav, 2015)**

In low- and middle-income countries, procurement duties are typically concentrated within Central Medical Stores or Ministries of Health. Purchases are infrequent, generally once a year or once every two years. CMSs may use a push or a pull model to determine order quantities. In the former, CMSs conduct analyses to determine how much to order, whereas health facilities are responsible for such analyses in the latter. Issues include uncertainty around the release of funds for purchasing medicines, a shortage of high-skilled workers like pharmacists, poor quality data on medicine consumption, and a lack of performance metrics for supply chain workers. Potential solutions could include increasing the frequency of supply replenishments so forecasts do not have to cover such long periods, decentralization to provide competition for the Central Medical Store, and using more and better integrated data.

## **27. Evaluation of Country Level Constraints in Addressing Financing for the Procurement of Nationally Funded MNCH Commodities (Financing for Development Corp & Dexis Consulting Group, 2015)**

Governments typically fund maternal, newborn, and child health commodities from their own budgets. Financing for Development Corp. surveyed experts from Ministries of Health, Ministries of Finance, and Central Medical Stores about a range of procurement, financing and health programming items. Many of the respondents noted that there is a mismatch between procurement and national funding cycles. Delayed funding is another significant problem. Commodities procured via national budget funds are more likely take place at the last minute and thus cost extra. Moreover, International Procurement Agencies (IPAs) typically require payments upfront, which can be difficult to guarantee as national procurement agencies do not know when the appropriate funds will be released. Thus, even though the respondents were eager to procure via IPAs, their funding requirements made it essentially infeasible. Governments also have a hard time assessing bids and typically award contracts based on price, rather than a combination of price and quality. The reality of the funding situation is that even when quality forecasts are developed they might need to be revised downward to ensure that orders fall within the actual budgets.

## **28. Group Purchasing of Pharmaceuticals and Medical Supplies by the Gulf Cooperation Council States (Khoja & Bawazir, 2005)**

The Gulf Cooperation Council was set up so that countries (originally Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) in the region could have a unified drug policy to increase control over the importation of drugs and build up local drug manufacturing capabilities. In addition, the GCC was meant to promote overall and coordinated medical research, as well as potentially make use of established drug control laboratories in Saudi Arabia and Kuwait. A 0.5 percent fee is levied on each member state. Each country purchases no less than 60 percent of what was in the original tender and 20 percent of locally produced items. Member states also have to justify why they did not buy items in the tender.

## Search Strategy

*Sources and search terms used:*

Source	Search terms	Number of results
WHO Essential Medicines and Health Products Information Portal	Title OR chapter title “procurement” AND keyword “procurement”	114
Google Scholar	Procurement pooled purchase commodities drug medicine price technologies "Global Fund" OR UNITAID OR "Gulf Cooperation Council" OR OECS	702
PubMed	((procurement[Title]) AND ("drug"[Title/Abstract] OR "pharmaceutical"[Title/Abstract] OR "medicine"[Title/Abstract] OR "health technologies"[Title/Abstract] OR "procurement software"[Title/Abstract] OR "medical devices"[Title/Abstract])) NOT ("organ" OR "tissue" OR "food" OR "clinical trial")	83
USAID Development Experience Clearinghouse	“procurement”	835

*Excluded documents:*

- Discuss procurement of unrelated products, such as food or military personnel, or unrelated medical items, such as organs
- Focus on procurement by end-users or hospitals
- Are in a language other than English

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