

Preamble

# **The nature and extent of faith-based involvement in African pharmaceutical systems**



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**(JLLISA001)**

**Submitted in partial fulfilment of the requirements for the degree**

**MASTER OF PUBLIC HEALTH**

**(Health Systems Specialization)**

**At**

**UNIVERSITY OF CAPE TOWN**

**February 2019**

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## **Abstract**

Within the context of health system strengthening and pharmaceutical systems development goals, a population must have equitable access to quality affordable medicines and pharmaceutical supplies. The utilization of the private (for-profit and not-for-profit) pharmaceutical sector actors by the public to promote universal access to quality medicines and related commodities is an increasingly common practice in resource poor settings. Faith-based drug supply organizations (FB-DSOs), as a component of the private-not-for-profit (PNFP) sector, are increasingly involved in the supply of pharmaceuticals to complement public sector efforts in wider coverage of communities in Africa. However, their role in the pharmaceutical system in Africa is not well defined. This paper presents the results of a systematic review conducted to map out the organization of pharmaceutical systems and establish the role of faith-based health care providers in the pharmaceutical supply chain in Africa.

For this study, a scoping review was first conducted to map the literature on pharmaceutical supply chains in low- and middle-income countries (LMICs), understand the challenges facing pharmaceutical supply chains in LMICs and the role faith-based health care providers play in the pharmaceutical supply chain. After this, a qualitative systematic review was conducted across multiple electronic databases to identify documents that contain information on faith-based involvement in pharmaceutical supply chain in Africa. Citation tracking was used to identify further relevant articles. Included materials were analyzed using thematic narrative analysis and synthesized.

The public pharmaceutical supply chain in Africa is faced with challenges including drug stock outs and irregular supplies, shortage of trained pharmacy personnel and lack of system for drug regulation and quality assurance. Faith-based health care providers involved in pharmaceutical supply chain do exist extensively as drug supply organizations or as a Christian Health Association with a pharmaceutical supply chain. They have been in existence in Africa for a very long time now contributing to the national pharmaceutical system in Africa. The review revealed that faith-based involvement in pharmaceutical chains tended to improve access to the general population and inserted additional pharmaceutical supplies into the national pharmaceutical system – which tended to strengthen the broader public private partnership between faith-based health providers and the public sector. This analysis confirmed that African pharmaceutical supply systems continue to face challenges. There is a major evidence gap relating to PNFP contribution to pharmaceutical systems – as is evidenced by this study on faith-based contributions to African pharmaceutical systems (which can be understood as a tracer for a broader concern). There is a particular lack of evidence about the national supply chain, and how faith-based PNFP engagement contribute or detract from the national pharmaceutical supply chain. FB-DSOs complement the public pharmaceutical system by improving access to medicines and related commodities in Africa.

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## **Acknowledgements**

First and foremost, I would like to thank God Almighty for His constant provision, guidance and wisdom.

I would like to express my sincere gratitude to my supervisors, Associate professor Jill Olivier and Ms. Eleanor Whyte, for your guidance, support, time and patience during this research project.

I would like to thank the librarians at the University of Cape Town Health Science Library for the technical advice and the role you played in getting this work done.

I would like to thank the Health Policy and Systems Division (HPSD) and the Faculty International student bursary (FISB) at UCT for providing the funding for this thesis.

I would also like to thank my friend Lucy, for the moral support and encouragement. To my family, I would like to express my appreciation for their constant love, support and prayers.

Finally, I would like to express my endless love and appreciation to my husband Dr. Alhaji Alusine Jalloh for providing me with unfailing support and for the endless sacrifice throughout my years of study. And to my sons Munjuru and Ibrahim for their love, patience and for understanding when mummy was busy. This accomplishment would not have been possible without you.

## Abbreviations

AIDS	Acquired Immune Deficiency Syndrome
AMFA	Affordable Medicine for Africa
ART	Antiretroviral therapy
ARVs	Antiretrovirals
BUFMAR	Bureau des Formations Médicales Agréées du Rwanda
CDC	Catholic drug centre
CHAG	Christian Health Association of Ghana
CHAK	Christian Health Association of Kenya
CHAM	Christian Health Association of Malawi
CHAN	Christian Health Association of Nigeria
CHASL	Christian Health Association of Sierra Leone
CHAZ	Christian Health Association of Zambia
CINAHL	Cumulative Index to Nursing and Allied Health Literature
CMS	Central medical store
ECE-DOM	Eglise du Christ au Congo - Direction des Oeuvres Médicales
EEC	Eglise évangélique du Cameroun, EEC
EPN	Ecumenical Pharmaceutical Network
FB-DSOs	Faith-based drug supply organizations
FBHPs	Faith-based health care providers
HIV	Human immunodeficiency virus
HPSR	Health Policy and Systems Research
JMS	Joint Medical Stores
KEC	Kenya Episcopal Conference
LMIC	Low and middle-income countries
MEDS	Mission for Essential Drugs and Supplies
MEMS	Mission for Essential Medical Supplies
MOU	Memorandum of understanding
NGO	non-governmental organization
PEPFAR	The United States President's Emergency Plan for AIDS Relief
PFP	Private-for-profit
PNFP	Private-not-for-profit
PPP	Public private partnership
SPHFM	School of Public Health and Family Medicine
TB	Tuberculosis
UCMB	Uganda Catholic Medical Bureau
UPMB	Uganda Protestant Medical Bureau
UCT	University of Cape Town
WHO	World Health Organization
ZACH	Zimbabwe Association of Churches Health services

## Glossary of key terms

This glossary clarifies key terms.

Christian Health Association	These are national networks of faith-based health providers that are common in Africa. Pharmaceutical supply is part of the services that are provided by CHA
Faith-based drug supply organization	These are faith-based organizations involved in the pharmaceutical supply
Faith-based organizations	These are organizations whose values are based on a faith. For this review the faith-based organizations are those of the Christian faith
Pharmaceutical supply chain/ drug supply chain	This the process through which drugs and medical supplies travel from the manufacturer to the wholesalers who then distributes to the central or regional medical stores, retail pharmacy outlet, hospitals, clinics, dispensaries to the patients.
Pharmaceutical systems	The pharmaceutical system comprises of the actors in the pharmaceutical sectors and how they interact with the other building blocks health systems to ensure access to quality affordable medicines (Hafner et al 2016)

Source; Author, (drawing on and adapting commonly held definitions)

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## PART A PROTOCOL

### The nature and extent of faith-based involvement in African pharmaceutical systems

#### Introduction

The pharmaceutical sector is central to the building blocks of every health system (World Health Organization 2007). The value of a dedicated drug supply chain cannot be underestimated in achieving a sound and effective health care outcome. A health system is defined as the combination of all organizations, people and actions with primary intent to promote, restore or maintain health (World Health Organization 2007). A strong relationship between the pharmaceutical sector, medicines and technology and the other building blocks are of utmost importance in realizing improved health outcomes, quality care and financial protection (World Health Organization 2007). However, existing evidence from Low and middle-income countries (LMICs) indicates that little attention is paid to strengthening this relationship, resulting in a large proportion of LMIC populations being unable to access much-needed pharmaceutical medical supplies (Bigdeli *et al.* 2012; Cameron *et al.* 2009). The World Health Organization (WHO) states that key components of “well-functioning health system emphasizes universal equitable access to essential medical products, vaccines and technologies of assured quality, safety, efficacy and cost-effectiveness, and their scientifically sound and cost-effective use” (World Health Organization 2007). Evidence has also shown that user fee exemptions, including no fee on prescribed medication for elderly patient on chronic medication treatment has promoted access greatly, and can enhance health outcomes and strengthen the health system as a whole (Mwita *et al.* 2017; Prinja *et al.* 2015).

The ‘pharmaceutical sector’ as part of the health system is broad – and similarly to other health sectors can be divided into public and private sectors. The private pharmaceutical sector includes those pharmaceutical organizations that are not run by the government, including private for-profit (PFP) and private not-for-profit (PNFP) organizations (Patouillard *et al.* 2007). PFP organizations includes wholesale and retail pharmacies and drug stores, and drug manufacturing companies. The PNFP organizations include local and international non-governmental organizations (NGOs) and faith-based health care providers<sup>1</sup> (FBHPs) (McCabe 2009; Trouiller *et al.* 2002). A strong public health sector is likely to offer a better pharmaceutical supply services to LMIC patients and to improve their experience when seeking health care (Bigdeli *et al.* 2012; World Health Organization 2007). However, the public health sector in most LMIC settings is generally challenged and influenced by circumstances that make the pharmaceutical stock levels in the health facilities of LMICs unreliable with resultant irregularities of pharmaceutical supplies in health facilities (Cameron *et al.* 2009).

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<sup>1</sup> Faith-based health care providers- refers to all the different health care services provided by faith-based organizations while FB-SOs is only for those involved in the pharmaceutical supply chain

These circumstances include poor financing, lack of infrastructure and resource availability, as well as several factors linked to the relationship between the public health sector and the private pharmaceutical sector (Bigdeli *et al.* 2012; Cameron *et al.* 2009; Chuma *et al.* 2010; Wales *et al.* 2014). Existing evidence from LMICs has shown that patients are compelled to buy pharmaceutical supplies from the private pharmaceutical sector, usually at a higher cost that is not affordable to many patients (World Health Organization 2004). Moreover, others resort to private pharmacies and chemist either because they cannot afford to pay, or they want to avoid paying user fees (Berman *et al.* 1995a). Several studies indicated that out of pocket payment for pharmaceutical supplies account for over 50% of the total expenditure on health in LMICs (Bennett *et al.* 1997; Berman *et al.* 1995b; Bigdeli *et al.* 2015).

Unfortunately, few efforts are made to resolve this issue in LMICs and the lack of medicines and pharmaceutical supplies in public health facilities is increasingly accepted as a norm, negatively influencing health seeking behaviors and equity for its population (Goudge *et al.* 2009; Wales *et al.* 2014; Workneh *et al.* 2016). In LMICs, 66% of prescribed medicines can be found in private facilities as compared to 35% in the public sector - although medicines from the private sector are often costly and unaffordable by the poor (Bloom *et al.* 2014; Cameron *et al.* 2009). International efforts have played a role in the mobilization of much-needed funds for health systems strengthening, in which drug supply chain strengthening is a part (Clinton & Sridhar 2017). Broader public sector literature also provides evidence that most LMICs do not have pharmaceutical manufacturing companies, and the state usually procures medicines from private international pharmaceutical companies (McCabe 2009). Yet, little or no support is in place to empower the few countries with local pharmaceutical manufacturing companies, including pharmaceutical supply wholesalers - which is one step forward in ensuring such an industry thrive and expand with a ripple effect to those countries without (McCabe 2009).

In Africa and LMICs in general, developing the capacity of the governments to regulate the pharmaceutical sector and market is crucial (Bate *et al.* 2008; Bloom *et al.* 2014; McCabe *et al.* 2011). Government regulation differs from country to country and this hinders building trusting relations with regards to the quality and flow of medicines in the market (McCabe 2009). Evidence from multiple studies shows that monitoring and regulatory control of the pharmaceutical sector in LMICs is weak across all parts of the pharmaceutical supply chain including delayed selection of essential medicines; calculations of quantities to purchase; ability of hospitals and pharmacies to purchase medicines; and warehousing and distribution of medical products (Berman & Hanson 1993; Bigdeli *et al.* 2012; Brugha & Zwi 1998; Gilson *et al.* 1994; McCabe 2009). This weakness in regulatory control could be one of the reasons for the difficulty in monitoring the private sector with regards to how resources received from government are been used (Gilson *et al.* 1994), and also the high flow of medicines in the informal sector (Bloom *et al.* 2011).

The private sector has led efforts to improve pharmaceutical systems in developing countries with programs in supply chain management and medicines quality assurance systems strengthening (Bennett *et al.* 1997). These efforts have encompassed the development of innovative approaches and tools and addressed disease programs and cross-cutting issues such as medicines safety, pharmacovigilance and post market surveillance (Mounier-Jack *et al.* 2010; Warren *et al.* 2013; Windisch *et al.* 2011). One crucial priority is to strengthen the pharmaceutical supply chain to ensure the supply of quality-assured medicines and related commodities (Hamilton *et al.* 2016). This is a serious challenge for LMICs and ineffective and flawed practices are common with private pharmacies assuming roles to treat common and childhood diseases (Berman *et al.* 1995a; Berman *et al.* 1995b) which, although flawed, may be the only access for ill members of the community having to cover long distances to get to health facilities and clinics. The private sector in the form of PNFP pharmaceutical sector actors can increase and enhance services for the poor and vulnerable communities in rural and hard to reach areas (Berman *et al.* 1995a; Gilson *et al.* 1994). The pharmaceuticals supplied to patients by the PNFP organizations are in most cases cheaper than at PFP because NGOs and mission organizations purchase medicines at subsidized rates from government central medical stores or through donations (Gilson *et al.* 1994).

A strong pharmaceutical system has established leadership and governance; effective regulation, robust financing for products and their management; a well-trained workforce and a well-run organization (from national institutions to local drug shops); reliable product and patient information; medical products and technologies available when and where needed; and services that promote rational use and protect safety (Bigdeli *et al.* 2012; Bigdeli *et al.* 2014; World Health Organization 2007).

It is evident from the literature that in LMICs, partnership between the public and private pharmaceutical sector have helped positively in health systems strengthening through improved access to medicines and related commodities (Bennett *et al.* 1997; Chirwa *et al.* 2013). For example, the Medicine Transparency Alliance (MeTA) initiative in developing countries supported a mix of government and private stakeholders to aid access to affordable quality essential medicines (McCabe 2009). The government can partner with the private sector by creating the enabling environment for them through tax exemption on medicines for services offered by NGOs and FBHPs (Gilson *et al.* 1994), promoting the sale of generic medicines in private sector, and duty-free entry on pharmaceutical raw materials for essential medicines (Bennett *et al.* 1997). For example, in Malawi, the Christian Health Association Malawi (CHAM) procures pharmaceuticals from the central medical store at cheaper subsidized prices, and the Christian Health Association Ghana (CHAG) are exempted by the government from paying import duties on medicines and medical supplies (Gilson *et al.* 1994). This will translate into having a committed private sector and increased access to medicines and hence improved health outcomes (Gilson *et al.* 1994). In addition, working as a team and collaborating with other stakeholders both locally and internationally is of utmost importance in achieving the desired health outcomes (Bennett *et*

*al.* 1997). For example, in South Africa the Antiretroviral therapy (ART) programmes emerged through collaboration and support by government, NGOs, schools and local business (De Waal & Nakedi 2005). Partnership between the government and FB-DSOs are seen to be of utmost importance as they provide services to poor and vulnerable (Banda *et al.* 2006), therefore can fill in the gap due to inefficiencies of the government (Green 2008).

Faith-based health providers (FBHPs) are PNFP organizations associated with or inspired by religion or religious beliefs (Chatters *et al.* 1998; DeHaven *et al.* 2004). They play an important role in the medicine supply chain in many LMICs (Banda *et al.* 2006; Olivier *et al.* 2015). The services provided by FBHPs are usually done in agreement with the government (World Health Organization 2008) and complement government services, often the only service available in rural and remote areas where government services are less accessible (Banda *et al.* 2006; Berman *et al.* 1995b). Governments often rely on FBHPs as a partner in service provision for a wider coverage of the population in need, through alignment of priorities, contracts and service-level agreements (Whyle & Olivier 2017). However, the contributions of FBHPs in pharmaceutical supplies chains are largely unknown, and these services are often rendered outside of the mainstream of the national government (Banda *et al.* 2006; World Health Organization 2008). Several studies have suggested that communities trust FBHPs to provide medicines and services of good quality (Asenso-Okyere 1995; Banda *et al.* 2006; Gilson *et al.* 1995; Kelly *et al.* 2010; Shojo *et al.* 2012). Their close links to communities and influence over them provide FBHPs with an ideal opportunity to promote confidence and address cultural factors contributing to morbidity and mortality (Chatters *et al.* 1998). The financial resourcing of FBHPs is diverse and could take the form of financial support from central government and or drug donations (Ascroft *et al.* 2011). In Malawi, for example, FBHPs are affiliated with government (Dowling 2011) and provide services inclusive of free medicines supply to the poor and hard to reach areas (Chirwa *et al.* 2013), subsidized by government. When compared to the public sector, it is argued that FBHPs have been as (if not more) effective in outreach, nourishing community trust and participation, and providing cost effective and quality care for the marginalized and poor (Berman *et al.* 1995a; Kelly *et al.* 2010; Rookes 2010). However, the above perceived qualities are over-shadowed by perceived characteristic weaknesses such as lack of human resource, doubtful financial sustainability, poor record keeping and preferential service (Banda *et al.* 2006; Gilson *et al.* 1995; Grimaud 1998). Other reported weaknesses were in the deficiency of system management and control of medicine supply chains (Banda *et al.* 2006), with some FBHPs lacking adherence to rational drug use, as having poor storage facilities, as well as nonadherence to supply and distribution systems and policies on drug donation (Banda *et al.* 2006). Even in instances where medicines are supplied for free, the consultation or hospital admission fees often charged by FBHPs can act as a barrier to access the service. For example, as reflected in a Zambian case where patient turnout at FBHPs for TB services was low, despite free anti-tuberculosis medicines, as patients had to pay fees for consultations (Berman *et al.* 1995b). CHAM was

contracted by government to provide services to the poor at no fee - but this was challenged by unreliable and irregular supply of medicines at the central medical stores. As a last resort they procured medicines from private pharmaceutical companies as a result patient had to pay for medicines and related commodities (Chirwa *et al.* 2013). This resulted in strained relations between government and CHAM, which negatively influenced drug availability in the facilities, with worsened health indices (Chirwa *et al.* 2013).

FBHPs also play an important role in strengthening national LMIC health systems – and therefore possibly also in strengthening their national pharmaceutical systems (Berman *et al.* 1995a; Gilson *et al.* 1994; Olivier *et al.* 2012a; Olivier & Wodon 2012b; Olivier *et al.* 2012b). However, evidence of the contribution by FBHPs is fragmented (Olivier *et al.* 2015). There is little information on FBHPs as non-profit providers in the health sector, and almost nothing relating to pharmaceutical systems or even just a basic assessment of drug supply (McCabe 2009; Olivier *et al.* 2015). To fully understand the role of FB-DSOs in pharmaceutical systems in Africa and respond to these knowledge gaps, we need to be able map and understand FB-DSO pharmaceutical systems (the presence of services, and supply chain contribution).

### **Research question**

What private-not-for-profit faith-based pharmaceutical supply chains exist in Africa; do they have shared characteristics; and what is their function within their national pharmaceutical systems?

### **Objectives**

- To map and explore the nature and extent of FB-DSOs supply chains in Africa
- To reflect on any characteristics or challenges shared by FB-DSOs pharmaceutical providers/systems
- To understand how FB-DSOs' fit within national pharmaceutical systems

### **Rationale for the study**

We will examine the health activities of FBHPs specifically related to pharmaceutical supply chain involvement. Also, we will examine the published literature on FB-DSOs services as related to pharmaceutical supply chain management, to ascertain the nature and function of these activities. The study is not intended as an exhaustive review of health service activities in FB-DSOs; but rather, as a very initial exploratory step to highlight faith-based pharmaceutical supply chains that exist in Africa.

To the best of our knowledge, this is the first review of its kind to look at the nature and function of FBHPs in the pharmaceutical supply chain of Africa. We therefore aim to initiate the closing of a significant knowledge gap. The review should also identify opportunities for further research and inform policy formulation on pharmaceutical supply in Africa – as well as public private partnership.

## **Methodology**

This is a systematic review study. Systematic review is useful in identifying and analyzing existing evidence to gain a better understanding and make connections between similar topics (Cooper 2010; Cooper 2015). This systematic review study will consist of two parts. The first part will consist of a scoping review, which will inform the qualitative systematic review that follows – and will provide a better understanding of pharmaceutical systems and private providers in LMICs (see Part B). The second part, a qualitative Systematic review, will focus on a more narrowly defined research question (as defined in Part B), focused on faith-based involvement in the pharmaceutical supply chain in Africa (Part C). A systematic review is a research method that pulls together the research of other people on a particular topic over a period of time with the aim of giving a comprehensive picture of that topic through assessment of the studies (Campbell Collaboration 2014; Hannes *et al.* 2007). The systematic review will be shaped by themes developed in the scoping review.

This review study is framed as a Health Policy and Systems Research (HPSR) project, seeking to map out the involvement of FBHPs in pharmaceutical supply chains and its role in health systems strengthening in Africa. HPSR is multi-disciplinary in nature and commonly integrates data/information from different sources, as is necessary in this exploratory study (Gilson 2012).

### *Phase 1: Scoping review*

The scoping review will help in mapping out available literature which will be used to develop a more focused search strategy over a specified period (Roehrich *et al.* 2014). This will provide a clear concept of the topic by being able to synthesis and analyze the available information including published, unpublished and non-researched material (Davis *et al.* 2009). Scoping review methods are suitable for studies comprising of work done in LMICs and are used in HPSR to systematically synthesize data and advice policy makers, health workers and researchers in decision making based on evidence for the health system (Tricco *et al.* 2017).

From the scoping review key words and search terms will be developed from the available literature that will be used for conducting the systematic review study (Hammerstrøm *et al.* 2010; Tranfield *et al.* 2003). As part of the scoping review, key word searches in PubMed, Medline, EBSCOhost, Scopus, Web of science and grey literature from Google and Google Scholar search will be done. We anticipate that search terms for this phase will include 'cold chain', 'drug distribution', 'supply chain', 'drug supply', 'ART', 'Medicine', 'Medicine price', 'procurement', 'dispensary', 'health', 'hospital', 'clinic', 'health system', 'health care system', 'health service', 'policy', 'NSP', 'non-profit', 'not-for-profit', 'PPP', 'private', 'public', 'faith-based' and 'mission'. The scoping review search will not be restricted to a specific period. Relevant citations from selected articles will be searched and included in the study. The search in this phase will focus on documents and information relating to all LMICs - and this search will be limited to literature in English. Both grey literature and published literature will be included in the scoping review phase.

*Phase 2: systematic review*

This phase of work will be the qualitative systematic review of the faith-based involvement in pharmaceutical supply chains in Africa. This method is appropriate for studies looking to put together available literature for the purpose of evidence-based policy and decision-making (Mulrow 1994). This review needs to include a rigorous, unbiased and objective search that is reproducible (Lefebvre *et al.* 2008). A range of databases will be utilized to improve the value and effectiveness of this work (Akobeng 2005), including: PubMed, Africa Wide, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science and Google Scholar. These databases were selected based on their appropriateness for the research topic and to ensure that the full range of available evidence is included (Cronin *et al.* 2008). Google will also be searched to capture further grey literature.

Search terms for the systematic review phase will be guided by key words identified in the scoping review phase. The identification of these search terms will be done carefully to ensure that relevant information to answer the research question will be identified (Cronin *et al.* 2008). As such standardized subject terms, synonyms and related terms will be included and accounted for to ensure that relevant documents are identified (Lefebvre *et al.* 2013). A Health Sciences Faculty Librarian will be consulted for input and assistance to clarify and finalize the search terms (Bown & Sutton 2010; Lefebvre *et al.* 2008). This review will use three sets of search terms – pharmaceutical, non-state provider and region – and each of these sets will include standardized subject terms, synonyms and variations, as recommended by Lefebvre *et al.* (2008). The terms will be joined by the Boolean operators ‘OR’ and ‘AND’ (Lefebvre *et al.* 2008). Terms within each of the three sets will be joined by ‘OR’ and then these sets will be joined by ‘AND’. The review will include literature written in English and will not be limited to any specific time frame. The reference list of the studies identified will be searched for additional relevant studies (Hammerstrøm *et al.* 2010). The records of all search terms, databases and results will be kept (Lefebvre *et al.* 2008). The search strategies used for each database will be included in the Appendix. Duplicates will be removed from the results of the database searches and the remaining documents will be screened based on title and abstracts to retrieve the relevant documents to be included for full detail reading and analysis.

This qualitative systematic review will seek to include all types of data, qualitative and quantitative – as a synthesis approach is necessary given the exploratory research question (Dixon-Woods *et al.* 2006). This study will take cognizant of the challenges associated with the synthesis and review of qualitative data to ensure rigor (Dixon-Woods *et al.* 2006).

**Data extraction**

Following the systematic review process, documents that meet the selection criteria will be analyzed. The initial scoping review will identify themes that will be taken into the systematic review (and provide further

clarity on what data would be most relevant for the research question). This is a useful approach as deciding on appropriate extraction approaches can be a challenge in systematic reviews (Thomas & Harden 2008). A data extraction table will be applied to minimize bias and increase rigor, by ensuring the review process is standardized throughout. The data extraction table will be used as a guide for the analysis process and facilitate data management which can be used by future researchers (see Appendix A).

### **Data analysis**

Thematic analysis and synthesis will be applied across the whole review study. In the systematic review part (as is standard in qualitative systematic review), the analysis of the data begins after the systematic search is completed. All the articles that met the selection criteria will be analyzed in the same way so that enough information will be gathered to be able to answer the research question as accurately and completely as possible. The quality and heterogeneous nature of the data determines the method to use in the analysis and synthesis of the data (Strong *et al.* 1997). Data synthesis applied to the stage at which the data is extracted from all the documents included in the review is combined (Mays *et al.* 2005). Narrative synthesis is an approach used in systematic review studies to synthesize evidence from multiple sources (Mays *et al.* 2005). Narrative synthesis method allows researchers to summarize and interpret evidence from published and other sources of information and is a method widely used in systematic reviews (Mays *et al.* 2005).

Thematic analysis is “a method for systematically identifying, organizing and offering insight into patterns of meaning (themes) across a data set” (Clarke & Braun 2014). It is a data analysis method widely used in qualitative research. Thematic analysis is commonly used in narrative approaches to data synthesis (Mays *et al.* 2005). Thematic analysis is also one of the methods to use when doing a research in an area that is under-researched (Braun & Clarke 2006). Patterns are identified by the analyst during the process of data familiarization and data extractions which are then developed into themes (Braun & Clarke 2006). According to Braun & Clarke (2006) there are six steps in doing thematic analysis: Step one consists of data familiarization through reading and re-reading of the documents to become aware of the content information. Step two consists of code production from the data through the familiarization. The codes are reflective of the features of the documents reviewed in terms of relevance and interest to the analyst. The entire dataset must be coded because this needs to come together at the end for the analysis (Braun & Clarke 2006). Step three is that of searching for themes through codes examination. The codes are sorted into themes ensuring that all the relevant codes are within an identified theme (Braun & Clarke 2006). Step four consists of refining themes, this is wherein the initial themes are checked against the entire dataset to ensure that they are reflective of the data and that the research question has been answered (Braun & Clarke 2006). Step five is the defining and naming the themes. Step six is the write up. This is the stage wherein the researcher analytically narrates the story the data told in the context of the existing literature (Braun & Clarke 2006). Thematic analysis will be

applied at several stages of this study – including the scoping review and in the final synthesis phase of the systematic review.

### **Rigor**

Rigor must be maintained throughout the research process to ensure reliability and add credibility to the findings. According to Mays et al (2005), to ensure rigor in a systematic review the following mechanisms must be included: clearly describing the aim of the review, careful description of the methods in detail such that another researcher could repeat the review using the same methods, choice of method made must be justifiable, and, the sources of evidence used in the review are appropriate to the research question. As stated earlier, to ensure rigor of the study multiple databases (EBSCOhost, PubMed, Web of Science, Google Scholar and google) will be searched with search terms and table checking by supervisors and a librarian at health sciences library. The inclusion of grey literature and multiple database searches will guard against publication bias and is necessary given the general paucity of information on FBHPs' involvement in pharmaceutical systems.

### **Risks and benefits**

As a systematic review this study has little or no risk. This study should be beneficial for researchers, policy makers and health system actors – including public sector and PNFP/FBHP stakeholders.

### **Study limitations**

This systematic review study is most significantly limited by the (anticipated) absence of robust evidence and published literature relevant to FBHP pharmaceutical supply chains. Even though this study is intended and designed to be an initial exploratory study (adequate for mini-thesis purposes), the fact that this is a sector that has remained largely 'invisible' for decades (Banda *et al.* 2006), means that we anticipate that the evidence will also be limited and limiting. In addition, as is standard in such review approaches, the researcher's understanding, and perspective might influence the assessment and judgement of suitability of the selected studies which can lead to bias. This will be managed through the application of a critical appraisal tool and checklist (Mays *et al.* 2010), and selections will be double-checked by study supervisors. This review is also limited by the fact that it only includes English-language publications, which might result in exclusion of relevant documents published in other languages (although this is less likely, given the general paucity of literature on this topic generally). This review is also limited by the scoping review being conducted by the researcher only. The LMIC and Africa focus of the later systematic review also creates limitations – although a broader scope would also be limiting, since this limitation at least allows for comparison across similar health system contexts. The literature search is limited to databases that are accessible through the University of Cape Town (UCT), although the researcher will make significant efforts to access any further materials by direct communication with authors or requesting materials from publishers.

## Ethics

This study will be using a systematic review methodology and as such a formal ethical approval from an ethical review board is not required. All documents that will be used in this study are publicly accessible.

## Dissemination of findings

The full thesis will be publicly available through the University of Cape Town open access platform. Part C of this thesis will be submitted for publication in an academic journal. Summaries of relevant results will be shared with key health system actors in Africa (public and FBHP).

## Timeline

Table 7: Timeline of systematic review study

Component	Activity	Timeline
Part A protocol	Subject formulation	November 2017 to February 2018
	Draft	February 2018
	Edits	April 2018
Part B scoping review	Research	November 2017- March 2018
	Draft	May 2018
	Edits	September 2018
Part C Systematic review	Draft	October 2018
	Edits	November 2018
	Intention to submit	December 2018
	Submission	February 2019

Source; Author

## Budget

This study is funded through bursaries from the Health Policy and Systems Division (HPSD) and the Faculty International Student Bursary (FISB) fund at UCT.

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## PART B: Scoping review

### The organization of pharmaceutical systems in low and middle-income countries: a scoping review

#### Introduction

According to the World Health Organization (WHO), a well-functioning health system ensures that the population have equitable access to quality medicines and related commodities at affordable cost (World Health Organization 2007) – and a well-functioning pharmaceutical system the same:

*A pharmaceutical system consists of all structures, people, resources, processes, and their interactions within the broader health system that aim to ensure equitable and timely access to safe, effective, quality pharmaceutical products and related services that promote their appropriate and cost-effective use to improve health outcomes (Hafner et al. 2016, p.572).*

Pharmaceutical systems are considered to be a ‘subsystem’ of their health systems - playing a key role in health system functioning (Hafner et al. 2016). Medical products, vaccines and technologies is considered as one of the key building blocks of the health system as it play an important role in achieving improved health outcomes and health systems strengthening (World Health Organization 2007). The relationship between medical products, vaccines and technology and the rest of the building blocks of the health systems is very important in achieving the desired health outcomes and financial protections for the health service users (De Savigny & Adam 2009; World Health Organization 2007).

Like health systems, pharmaceutical systems are made up of a mix of public and private actors and entities. Private entities (actors and institutions) that are not run/owned by the government (Patouillard et al. 2007) - and inclusive of private-for-profit (PFP: such as pharmaceutical importers, manufacturers, wholesalers and retail outlets), and private-not-for-profit (PNFP, such as: local and international non-governmental organizations, faith-based health providers<sup>1</sup> (FBHPs) and charity organizations) (McCabe 2009; Trouiller et al. 2002). However, no pharmaceutical system can be purely ‘public’ as all pharmaceutical supply chains include some private input or involvement – such as pharmaceutical companies producing medicines, or logistics companies transporting medicines (Bennett et al. 1997; Mackintosh et al. 2011; McCabe 2009).

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<sup>1</sup> Faith-based health care providers- refers to all the different health care services provided by faith-based organizations while FB-SOs is only for those involved in the pharmaceutical supply chain

## Part B: Scoping review

In many low- and middle-income countries (LMICs), patients mostly pay for medicines, even when other services such as consultations, are free of charge (McKee *et al.* 2006). This is because health facilities ultimately procure medicines from the private sector (Bennett *et al.* 1997; McKee *et al.* 2006) – even if it is the government procuring from the private sector through central medical stores. And also due to frequent (normalized) stock outs in the public sector (Harding *et al.* 2013). In many LMICs, the private pharmaceutical sector continues to serve as the main source of care for the poor and vulnerable groups (Berman *et al.* 1995a; Patouillard *et al.* 2007; Smith 2009), and in many contexts, services are provided by local pharmacies, wherein patients must pay a fee (Smith 2009). In addition, studies have shown that some patients prefer and utilize the private pharmaceutical sector over the public pharmaceutical sector (Chalker *et al.* 2005; Chuma *et al.* 2007; Khuluza & Heide 2017; Mills *et al.* 2002). For example, patients preferred private pharmacies and dispensaries over those of the government because of the reported poor attitudes of the service providers and lack of trust in the public sector in handling patients (Chuma *et al.* 2007).

It has been noted that the private health sector is often more efficient than the public sector in most LMICs – both PFP and PNFPs (Chalker *et al.* 2005; Khuluza & Heide 2017). One explanation, for PNFPs, is that the PNFP sector receives support from different organizations both locally and internationally (Olivier *et al.* 2015). It is in this light that many LMIC governments are recognizing the role of the private sector through public private partnerships (PPP) to improve the drug supply chain, strengthen the pharmaceutical sub-system, and thereby strengthen national health systems more broadly (Bennett *et al.* 2005; Bennett *et al.* 1997; Chirwa *et al.* 2013).

### **Scoping review method**

A scoping review was conducted to review the evidence on faith-based PNFP pharmaceutical supply chains in LMICs. The review seeks to examine and highlight the available literature on the different types of pharmaceutical sectors and suppliers, challenges and possible interventions in LMICs more broadly – and then consider the role of FBHPs in these pharmaceutical systems in LMICs.

The review was conducted from November 2017 to March 2018. The literature search included academic articles and grey literature using PubMed, Medline, EBSCOhost, Scopus, Google and Google Scholar search. Search terms used included ‘cold chain’, ‘drug distribution’, ‘supply chain’, ‘drug supply’, ‘ART’, ‘Medicine’, ‘procurement’, ‘dispensary’, ‘health’, ‘hospital’, ‘clinic’, ‘health system’, ‘health care system’, ‘health service’, ‘policy’, ‘NSP’, ‘non-profit’, ‘not-for-profit’, ‘PPP’, ‘private’, ‘public’, ‘faith-based’ and ‘mission’ ‘Africa’, ‘Low and Middle-income countries’, ‘LMIC’, ‘sub Saharan Africa’ (and the associated countries).

## Part B: Scoping review

The search was limited to publications in English and did not apply any publication year limitations – in order to capture as much relevant information as possible. Reference lists of included articles were searched, and relevant documents were identified and included in the review. In addition, documents from institutional websites including the WHO, the World Bank, and known FBHP pharmaceutical institutions were also searched and relevant documents included in this study.

### **Types of important actors in LMIC pharmaceutical sector**

The WHO defines the pharmaceutical sector as

*...the various actors (e.g., government, private for-profit organizations, private not-for-profit organizations) engaged in the 'medicine chain', which includes research and development; clinical trials; filing patents; manufacturing; registration; selection, procurement and distribution of essential medicines; inspection of manufacturers and distributors; prescribing; dispensing; pharmacovigilance; and the control of promotion (World Health Organization 2009).*

This definition is a little different to the understanding of a pharmaceutical system (above) and focuses on the practices of actors within the sector. LMIC pharmaceutical sectors generally include the public/government pharmaceutical sector, PFP and PNFP institutions, see diagram below (Hafner *et al.* 2016; Kohler *et al.* 2014; Patouillard *et al.* 2007; Trouiller *et al.* 2002; World Health Organization 2009).

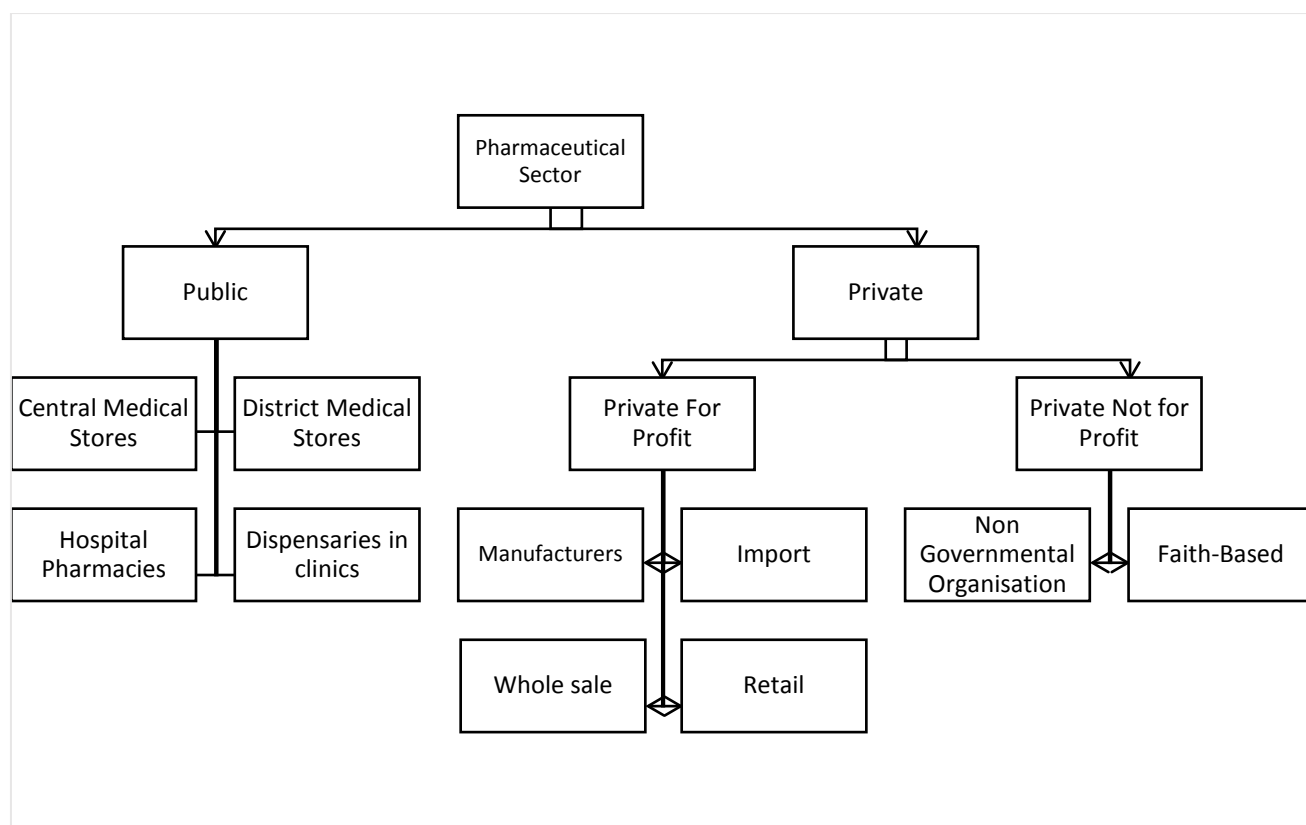


Figure 1: Pharmaceutical Sectors in LMICs (Source; Author)

*Procurement in public LMIC pharmaceutical sectors*

The public pharmaceutical sector is funded by revenue from tax and sometimes receives support from international organizations through donor funding (Cameron *et al.* 2009; Cameron *et al.* 2011; Trouiller *et al.* 2002). In some LMICs, for example Ghana, most medicines are manufactured locally (Asamoah *et al.* 2012) and then distributed to regional health facilities. For others, medicines are procured by the government from private companies within or outside the country and then supplied to the regional health facilities (Cameron *et al.* 2009; McCabe 2009).

*Procurement in private for profit (PFP) pharmaceutical sector*

PFP pharmaceutical companies are drug supply sector mainly focused on making profit these can be subdivided into wholesale and retail<sup>2</sup> (Vogel & Stephens 1989). The wholesale sector supply medicines to the public as well as private sector. For example, countries that do not manufacture medicines locally, procure medicines from these companies (Barnes *et al.* 2008; McCabe 2009). Also, wholesale companies supply medicines to private pharmacies and drug stores. In most African countries, most of the people receiving medicines from pharmacies pay out-of-pocket (Patouillard *et al.* 2007).

<sup>2</sup> Retail pharmaceutical sector comprise of pharmacies, drug stores and chemical sellers

*Private-not-for-profit (PNFP) pharmaceutical sector*

The services of FBHPs working in the pharmaceutical sector account for about 40% coverage in sub-Saharan Africa (Banda *et al.* 2006). In some African countries, FBHPs are the only health services available in rural and remote areas (Green 2008). For example, FBHPs in Malawi are affiliated with government (Dowling 2011) and provide services inclusive of free drug supply to poor and hard to reach areas (Chirwa *et al.* 2013).

Some PNFPs receive medicines from international donors or purchase medicines from the local manufacturing companies or the central medical stores (Dowling 2011). These donors<sup>3</sup> sometimes procure medicines from foreign pharmaceutical companies which delivers these medicines to the central medical stores of the recipient country, FBHPs facilities and other health centres (McCabe 2009).

*Public private partnership in the pharmaceutical sector*

In some LMICs the government has worked closely with the private pharmaceutical sector (PFP and PNFP) in improving access to medicines and related commodities (Bennett *et al.* 1997). It is evident from the literature that the collaboration between the public and non-governmental organizations (NGOs) has yield success in several countries (Berman *et al.* 1995a; Gilson *et al.* 1994; Zafar Ullah *et al.* 2006). In Bangladesh for example, the government worked in collaboration with an NGO in the treatment of tuberculosis (TB), and this improved the access to TB medicines and compliance (Zafar Ullah *et al.* 2006).

The Christian Health Associations (CHA)<sup>4</sup> have worked closely with the public sector in improving the pharmaceutical supply chain in many developing countries. Several studies have shown that most of these associations procure medicines from the ministry of health and private suppliers (Ballou-Aares *et al.* 2008; Grimaud 1998) or through the central medical stores at subsidized rates for these organizations to be able to provide medicines and other services to the population in need (Ballou-Aares *et al.* 2008; Gilson *et al.* 1994). For this partnership to be successful and yield the desired outcome, (Bennett *et al.* 1994) it is suggested that public health system must strengthen its regulatory systems to ensure that populations benefit from the resources that these providers receive from the government (McPake & Hanson 2016).

PPP also helps to strengthen the PNFP pharmaceutical sector, as evidence from several studies have shown that most PNFP pharmaceutical sector buy medicines at a subsidized rate, some benefit from

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<sup>3</sup> Example of donor organizations- Catholic Relief Services (CRS), PEPFAR, AIDS Relief, MeTA, Global fund

<sup>4</sup> Christian Health Association are national networks of faith-based health providers that are common in Africa

tax wavers on importation of medicines and other pharmaceuticals (Gilson *et al.* 1994; McPake & Hanson 2016) and others receive medicines and other support from the ministry of health to provide services to poor and vulnerable (Chirwa *et al.* 2013).

### **Types of pharmaceutical supply chains in LMIC**

There are many types of pharmaceutical supply chains in LMICs. These include the central medical stores, autonomous suppliers, direct delivery system, primary distributors and private suppliers. The main aim of the pharmaceutical system is to provide access to quality and affordable medicines (World Health Organization 2007; World Health Organization 2009). The following paragraphs will look at these supply chains individually.

#### *Central Medical Stores (CMS)*

The CMS can supply medicines and other pharmaceuticals that are procured by the government or from international donors to the regional or provincial districts, public hospitals and other health facilities. The medicines quality is being monitored by both the central medical stores and regulatory authorities (World Health Organization 2012). The CMS is financed through budget allocation and or donor funding (McCabe 2009; McCabe *et al.* 2011; World Health Organization 2012).

The CMS also serves as a storage warehouse in many LMICs, to store medicines before being distributed to other regions or districts (Yadav 2011; Yadav 2015). This is very helpful as most regional, and district medical stores do not have the correct infrastructure for the storage of medicines and other medical supplies (Yadav 2011). For example, the national medical stores in Uganda, oversees procurement, storage and delivery of pharmaceuticals to the national, regional and district referral hospitals, health and sub-health centers and the parish health centers (Trap *et al.* 2016).

#### *Autonomous supply agency*

In some LMICs, an independent supplier oversees procurement, storage and distribution of pharmaceuticals (Dickens 2011). The quality of medicines is being monitored by the drug regulatory authority and procurement team (World Health Organization 2012). This is an alternative to CMS wherein the management of the CMS is changed but they will still be working in the existing CMS structure (Ali & Omer 2011). In some LMICs, this system is also referred to as semi-autonomous central medical stores.

#### *Direct delivery system*

In this system, the supplier delivers the pharmaceutical products to the regional, districts and major health facilities after being contacted by the procurement team. The quality of the medicines is monitored by the procurement team and drug regulatory authorities (World Health Organization

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2012). For example, in some LMICs, the regional and district medical stores receive pharmaceuticals directly from the private suppliers and they in turn distribute these commodities to the hospital and other health facilities (McCabe 2009; McCabe *et al.* 2011; Yadav 2011).

### *Primary distributor system*

The pharmaceutical procurement team of the national government contract a primary distributor that is responsible for the storage and distribution of medicines and other pharmaceuticals procured from different pharmaceutical suppliers. The quality assurance of medicines is done by the drug regulatory authority (World Health Organization 2012). In this case the medicines and related commodities do not go through the CMS. For example, in Tanzania the Mission for Essential Medical Supplies (MEMS) receives medicines from different suppliers and distribute them to the health facilities in the country especially those in rural areas (White *et al.* 2013).

### *Private supply*

The procurement and distribution of pharmaceuticals is managed by the private supplier. The quality assurance is done by the national regulatory authorities (World Health Organization 2012). For example, in Ghana, the private pharmaceutical sector supply medicines and medical supplies to the public facilities, NGOs and faith-based health care providers (Seiter & Gyansa-Lutterodt 2009).

The pharmaceutical company is contacted to directly supply the hospitals, other health facilities and local pharmacies (Batliboi & Tambe 2014). In addition, private local pharmacies and drug stores supply medicines and medical supplies to a large proportion of the population in LMIC (Chua *et al.* 2013; Kagashe *et al.* 2011; Miller *et al.* 2016).

## **Key challenges facing the public and PFP pharmaceutical sectors in LMICs**

Pharmaceutical sectors in LMIC are facing a lot of challenges, including inadequate funding, irregular drug supply, shortage of trained pharmacy service providers, issues with regulating the pharmaceutical system and many more (unpacked below).

### *Access, availability and affordability*

In many African countries, irregular supply of medicines to health facilities is a common problem, and this has contributed to hindering the health system from achieving health equity for its population (Wales *et al.* 2014). Various studies have looked at the accessibility, affordability and availability of medicines in relation to health system outcomes (Bigdeli *et al.* 2012; Cameron *et al.* 2009; Hardon *et al.* 2006; Penfold *et al.* 2013). For example, a study found that in some African countries where antiretrovirals (ARVs) are free of charge, patients face barriers to access that include indirect cost like

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transport, loss of work hours and long waiting times – which affect patients' drug adherence and compliance (Hardon *et al.* 2006).

Furthermore, in some part of rural Kenya, patients must travel long distances to get to the health facilities and pharmacies whereas drug shops are very close to their homes (Chuma *et al.* 2010). Also, in some countries informal drug sellers can be the only available source of medicines (Chuma *et al.* 2010). In Kenya patients had to buy medicines from drug shops because of stock out from government facilities and facility operation times as these facilities were mostly closed when their services are needed (Chuma *et al.* 2010).

### *Drug stock out*

High inconsistency and unavailability of medicines in the health system has been reported by many studies (Bigdeli *et al.* 2012; Hardon *et al.* 2006; Schouten *et al.* 2011; Windisch *et al.* 2011). For example, stock out of ARVs in Malawi (Schouten *et al.* 2011), stock out of medicines in Uganda interrupted antiretroviral therapy (ARTs) supply and drug adherence (Windisch *et al.* 2011), and rates of high stock out of essential medicines in most facilities in developing countries (Harding *et al.* 2013) affected patients' drug adherence and negatively impacted the health system. Drug stock out can have negative impact on service delivery and the health system. For example, the maternity services in rural Tanzania was disrupted due to the lack of medicines in the facilities (Penfold *et al.* 2013) and Stock out of ARTs in public facilities impacts drug adherence and health outcome (Hardon *et al.* 2006).

### *Human resource and training*

Having trained and equipped pharmacy professionals is necessary for the effective management of the supply chain and improved health outcomes. However, evidence from research have shown that in most developing countries procurement and drug supply chain are managed by individuals with no pharmacy training (Mackintosh *et al.* 2018). In another study, dispensing error was found to be common, in most cases medicines were dispensed with incorrect administration time or with no directive information, in others some of the prescribed medicines were not dispensed instead non-prescribed medicines were dispensed (De Ar Rissato & Romano-Lieber 2013).

In Ghana there is a huge difference in the access to medicines and provision of related pharmacy services between urban and rural communities (Owusu-Daaku 2002). For example, trained pharmacy personnel and pharmaceutical outlets are usually concentrated in the urban areas with the rural communities left with no option but to buy medicines from drug chemist and drug peddlers (Owusu-Daaku 2002; Smith 2004).

### *Regulation*

Many studies show that regulating the private sector can be complex and challenging (Bloom *et al.* 2014; Green *et al.* 2010; McCabe 2009). This is of concern as most of population buy medicines from the private sector (Bigdeli *et al.* 2012). In addition, this can be seen in situations wherein international donors use NGOs procurement systems to supply medicines and related commodities to facilities and this may cause interruption in the supply chain resulting in delay, drug stock outs (Schouten *et al.* 2011), duplication of medicines and waste of resources (Buse & Harmer 2007). Also, some donor organizations in LMICs decide on the brand of drug to be used (Clinton & Sridhar 2017), in a situation wherein the government is procuring a different brand or different strengths and dosages forms of the same drug this may result in challenges with drug administration thereby negatively affecting the health outcome of service users.

In addition, in LMIC in some instances medicines donated can be close to expiration date or they may not (Van Dijk *et al.* 2011) be needed by the recipient country, so they are left piled up in the stores until they expire, and this can negatively affect health system (Berckmans *et al.* 1997; Bero *et al.* 2010; Igoumenidis *et al.* 2013; Van Dijk *et al.* 2011). It is therefore advisable for recipient countries to lay emphasis on things like county's essential drug list, medicines with long expiration date and quality assured medicines (Hogerzeil *et al.* 1997; Obua *et al.* 2017; Pinheiro 2008).

Finally, in some LMICs, the regulatory system is challenged with the lack of basic infrastructure, support for training and regulatory institutions such as laboratories of high-quality standards for quality assurance of pharmaceuticals (Mackintosh *et al.* 2018). Moreover, other studies have found that there is leakage of medicines from the private pharmaceutical providers to the informal sector (Brugha 2003) and this has raised concerns about the possibility of developing drug resistance such as antimicrobial and resistance to ARVs if the drug market is not controlled (Brugha 2003).

### **Common interventions to strengthen the pharmaceutical supply chain**

In the face of these challenges there have been suggested solutions to improve the access to quality medicines and strengthen pharmaceutical systems – we have grouped these in the same clusters as the challenges above, but there is some overlap.

#### *Increasing access, availability and affordability*

Some studies showed that the standardization of treatment guidelines can improve the access and affordability of medicines (Bigdeli *et al.* 2012), for example, in Uganda the prescribing pattern for chronic diseases varies from one prescriber to the other and this can affect the cost of the medications based on the brand prescribed (Green *et al.* 2010). In addition, medicines can be made affordable to

the public through partnership between the public and private sector. For example, incentives can be given to private pharmacies for selling generic medicines which are cheaper as compared to the branded products to patients (Dovlo *et al.* 2016).

#### *Increasing financial access by implementing medical insurance schemes*

Medical insurance schemes have also been shown to contribute to improving access to quality medicines in many LMICs (Faden *et al.* 2011). For example, some medical insurance schemes cover the unemployed, most cover primary care level for both in and out patients and some also include non-prescription medication in the package (Carapinha *et al.* 2011).

In addition, some authors suggest that medical insurance schemes can improve access to medicines by promoting generic medicines<sup>5</sup> prescribing and negotiating with suppliers for medicine prices that are affordable by the poor and vulnerable (Faden *et al.* 2011). Also, a study looked at medical insurance schemes for those outside the formal work force because in most developing countries the population formally employed is usually just a hand full compared to those in local sector or the unemployed (Bennett *et al.* 1998). The schemes considered in the review are those that cover a wide range of conditions including essential medicines through risk sharing of the cost to prevent catastrophic payment and promote improved health outcomes (Bennett *et al.* 1998).

#### *Increasing regulation*

Regulating pharmaceuticals in LMICs can be enhanced with international support. For example, a study in some East African countries showed that the support they received externally with regards to medicines regulation have contributed greatly in reduction in counterfeit and substandard medicines in the market and improved access to quality medicines (Mackintosh *et al.* 2018). Also, the regulatory system of pharmaceutical supply can be strengthened through pharmacovigilance and post market surveillance of medicines and related commodities by the regulatory authorities (Bate *et al.* 2008; Hamilton *et al.* 2016). For example, this process supported strengthening the pharmaceuticals in some African countries through post-market surveillance by testing quality of antimalarial medicines supplied to patients for identification of substandard and falsified antimalarials in the local pharmaceutical market (Bate *et al.* 2008). Evidence from such studies can also be used in educating patients on the dangers of counterfeit and substandard medicines (McCabe *et al.* 2011).

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<sup>5</sup> Generic medicine has the same dosage, strength, quality and route of administration of the brand name product.

*Human resource empowerment*

There have been multiple interventions relating to strengthening pharmaceutical human resources. In Ghana, the Pharmacy Council, as a regulatory body for pharmacy practice trained and certified chemists and other drug sellers to address the shortage of pharmacists in country (Smith 2004). Again, studies have shown some improvement in service delivery in the pharmaceutical sector by empowering the work force, training improve these service providers in skill and knowledge and therefore enabling them to follow standard prescribing patterns, dispensing medications in correct dosage forms and strength (Smith 2004; Smith 2009).

Table 1 presents a list of the documents included in the scoping review, as well as the challenges and interventions identified through each paper. This table is not comprehensive, and instead shows a selection of materials relating to LMIC pharmaceutical systems.

Table 1: Pharmaceutical sectors in LMICs (challenges and interventions)

Source; Author

Reference and Title	Country	Findings
Berman et al. 1993 Consultation on the Private Health Sector in Africa	Africa	-Government support to private sector to reach their target goals. -Access barrier due to high expenditure on health care for the poor -Patient education and counselling -Monitoring private sector on quality, cost, equity and efficiency of services. -Influence of public or private practice on prescribing pattern -Reduction of subsidy to private services which are not cost effective and do not reach the most vulnerable population
Gilson et al. 1994 The potential of health sector non-governmental organizations: policy options	LMIC	-Donated medicines supplied through NGOs -Some NGOs support the training of health workers -Services in hard to reach areas and target vulnerable groups -CHAM purchase medicines at a subsidized price from the CMS -CHAG exempted from import duties on pharmaceutical supplies
Berman et al. 1995 Non—governmental health care provision	Kenya	-Dispensaries a higher percentage of for PFP services -Community pharmacies key in rural areas (in immunization, common childhood illnesses and contraception)
Berman et al. 1995 Zambia: Non-governmental Health Care Provision	Zambia	-Training of private pharmacists by government -Government supply medicines to private facilities -Pharmacies provides services for common illnesses and contraception -Pharmacies restricted to urban areas -FBHPs concentrated in the rural areas than public services. -Huge amount of household expenditure on health care is on medicines
Bennett et al. 1997 Public -private roles in the pharmaceutical sector: Implications for equitable access and rational drug use	Global	-Improved access to essential medicines and rational drug use -Huge resources spent on medicines in LICs -Drug expenditure account for highest amount of out of pocket payment

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Brugha et al. 1998 Improving the quality of private sector delivery of public health services: challenges and strategies	Asia, Africa and Latin America	-Polypharmacy and antibiotics prescription -Prescription pattern dependent on whether it private or public -Lack of regulatory control in LMICs -Patients education and continuous training for service providers
De Waal et al. 2005 Turning of the tide: A Qualitative study of SACBC Funded antiretroviral treatment programmes	South Africa	-ARVs availability motivates service providers because of improved patient's health outcome -Patient capacity and vulnerability affect ARVs compliance
Buse et al. 2006 Seven habits of highly effective global public- private health partnerships: Practice and potential	Global	-Supply medicines for free or at a reduced cost to the communities -Poor transparency and effective communications -Poor harmonization resulting in waste and duplication of supplies -Vertical procurement of medicines by global fund and GAVI result in delay disbursement and stock out
Goudge et al. 2009 Affordability, availability and acceptability barriers to health care for the chronically ill: Longitudinal case studies from South Africa	South Africa	-Patients seek care from informal drug sellers and or traditional healers due prolong stock out at government facilities -Patients lost to follow up due to regular drug stock out
Kulkarni et al. 2009 Pharmacoeconomic: An emerging branch in health sciences for decision making	LMIC	-Relationship between cost of medicines and patient drug compliance -Educating prescribers on importance on cost effective prescribing on patient health outcomes -State subsidized medicines lower the cost of medicine in the market -Effect of various channels of drug purchase on drug cost
Carapinha et al. 2011 Health insurance systems in five sub-Saharan African countries medicines benefits and data for decision making	Ghana, Kenya, Nigeria, Tanzania & Uganda	-Some medical scheme caters for the unemployed -Non-prescription medicines being paid for by insurance schemes -Burden of cost sharing on patients -Delays in settling claims by insurance -Limitation to medicines benefits -Lack of transparency and fraud
Faden et al. 2011 Active pharmaceutical management strategies of health insurance systems to improve cost effective use of medicines in LMIC: A systematic review of current evidence	LMIC	-Insurance helps in improving access to pharmaceuticals in LMICs -Need to negotiate for lower drug prices with private suppliers -Need to promote generic prescribing
McCabe et al. 2011 Private Sector Pharmaceutical Supply and Distribution Channels in Africa: A Focus on Ghana, Malawi and Mali	Ghana, Malawi and Mali	-Regulation of pharmaceutical sector varies according country -Shortage of pharmacy personnel and lack training for health workers -Lack of resources to run pharmacy business -High informal drug market attributed to poverty, drug stock out and lack of knowledge on the dangers of counterfeit and substandard medicines by consumers
Bigdeli et al. 2012 Access to medicines from a health systems perspective	Global	-Increase in ownership of pharmacy outlet by health professionals. -Patients prefer the private health sector -Resources from sale of medicines used to fund the rest of the health system -Medicines availability build trust between health workers, patients and the community
Wigle 2013 Human papillomavirus (HPV) vaccine implementation in low and middle-income countries (LMICs): Health system experiences and prospects	LMIC	-Donors negotiating for lower vaccine prices to increase access in LMICs -Donors (GAVI Alliance and GAP) act as lobbyist
Bigdeli et al. 2014 Medicines in Health Systems: Advancing access, affordability and appropriate use	LMIC	-Strengthened accountability and transparency of pharmaceuticals -Rational drug use and improved equitable access. -Understanding the relationship between medicines and the other building blocks of the health system
Bloom et al. 2014	LMIC	-Poor regulation of medicines in the market and need for better regulatory system

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Innovation in regulation of rapidly changing health markets		-Protecting patients through price regulation and import restriction
Penfold et al. 2014 Staff experiences of providing maternity services in rural southern Tanzania – a focus on equipment, drug and supply issues	Tanzania	-Drug stock out negatively impacted health outcome of patients. -Reduced staff morale -Broken trust in the health system by service users
Russo et al. 2014 On the margins of aid orthodoxy: the Brazil-Mozambique collaboration to produce essential medicines in Africa	Mozambique	-Local drug production supported by international donors -Training pharmacy personnel in drug production -Improved access to ARVs
Wales et al. 2014 Stock-outs of essential medicines in Tanzania	Tanzania	-Regular drug stock out and poor access to essential medicines -Lack of funding for medicines and delay in disbursement in the public sector -Weak governance structure
Prinja et al. 2015 Availability of medicines in public sector Health facilities of two North Indian States	India	-High out of pocket payment for medicines -Regular stock out of medicines
Settumba et al. 2015 The health system burden of chronic disease care: an estimation of provider costs of selected chronic diseases in Uganda	Uganda	-Drugs supplied at no cost at public facilities. -Chronic medication drugs available at higher level health facilities only -Regular stock out of medicines -Patients buy medicines from private pharmacies when the facilities run out of medicines
De Jongh et al. 2016 Barriers and enablers to integrating maternal and child health services to antenatal care in low and middle-income countries	LMIC	-Training service providers on the use treatment guidelines -Stock out and irregular supply of medicines as a barrier to achieving health systems goals
Dolvo et al. 2016 Policy dialogue- the “bolts and joints” of policy-making: experiences from Cabo Verde, Chad and Mali	Cabo Verde, Chad and Mali	-Knowledge sharing and exchange of experiences -Incentives given to private pharmacies to dispense generic medicines -Promotion of equitable access to medicines
Hamilton et al. 2016 Public health interventions to protect against falsified medicines: a systematic review of international, national and local policies	LMIC	-Strengthened medicine regulatory authority in LMIC -Pharmacovigilance and post-market surveillance -Ongoing training and supportive supervision on drug quality assessment and management. -Consumer education on false and substandard medicines
Workneh et al. 2016 Assessment of health challenges and opportunities for possible integration of diabetes mellitus and TB services in South- Eastern Amhara Region, Ethiopia. A qualitative study	Ethiopia	-Drug stock out due to lack of coordination between stakeholders -Sell of households to sell possessions to pay for medicines -Inclusion of antidiabetic medicines in the essential medicines list
Mwita et al. 2017 Availability of prescribed medicines for elders at Sekou-Toure Regional Hospital in Mwanza, Tanzania	Tanzania	-Fee exemption policy for elderly patients on chronic medication improved compliance and health outcomes -Lack of knowledge about the free medication policy for elderly patients by the Tanzanians

## Conclusion

This review shows a set of key characteristics about different types of pharmaceutical systems in LMICs. The different types of sectors in pharmaceutical systems can generally be divided into public

and private, and the private is further subdivided into PFP and PNFP. These sectors are very important in health system strengthening because of their key roles in ensuring access to quality medicines and pharmaceutical services. Furthermore, the contribution of the different pharmaceutical actors in the supply chain and the interconnections between public and private (PFP and PNFP) pharmaceutical sectors shows that it is important for them to work in collaboration to achieve the desired health outcomes.

Common challenges include: inadequate funding, drug stock outs and irregular supplies, shortage of trained pharmacy personnel and lack of system for drug regulation and quality assurance. Possible (more common) interventions include the use of standardized treatment guidelines, implementation of medical insurance schemes to improve access to medicines and involvement of international donors to support in improving drug regulation. Also, the collaboration between government and the private pharmaceutical sector is seen to play a key role in improving access to quality affordable medicines.

Finally, the scoping review identified the important role PNFP drug supply chain potentially plays in patient health outcomes and health systems strengthening. It also showed that within the PNFP sector, there is a particularly interesting and potentially relevant cluster – the pharmaceutical supply chains and systems supported by FBHPs. There is a massive evidence gap (that is, they appear potentially important, but little is actually known about them). In addition, it is important to understand how these FB-DSOs pharmaceutical supply chains fit within their national pharmaceutical systems.

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## Part C: Journal Article

### Understanding the nature and extent of faith-based pharmaceutical supply chains and their functioning within African pharmaceutical systems: A qualitative systematic review

*Targeted journal: Health Policy and Planning*<sup>1</sup>

**Isatu Jalloh**<sup>2</sup>

#### **Abstract**

For the health system to function well, the population must have equitable access to quality affordable pharmaceutical supplies. Pharmaceutical systems in Africa are challenged by inadequate funding, drug stock outs and irregular supplies, a shortage of trained pharmacy personnel and a lack of systems for drug regulation and quality. Faith-based health providers, as a component of the private-not-for-profit sector, have long been involved in the supply of pharmaceuticals to complement public sector efforts in wider coverage of communities in Africa. However, their role in the pharmaceutical systems has never been examined or clarified. This study aims to examine the nature and function of faith-based health care providers in providing access to pharmaceutical supplies in the African context. We conducted an exploratory qualitative systematic review across multiple electronic databases to identify documents that contain information on faith-based involvement in pharmaceutical supply in Africa. Citation tracking was used to identify further relevant articles. The review identified 1550 documents. After removing duplicates and excluding articles (due to lack of access or relevance), 20 articles were included in the review. These were analyzed using thematic narrative analysis. The analysis revealed that there is a major evidence gap relating to private-not-for-profit, faith-based contribution to African pharmaceutical systems. Faith-based drug supply organizations are extensive and contribute to national pharmaceutical systems but there is very little known about them. They have been in existence for a long time providing pharmaceutical supplies to both rural and urban areas mainly targeting rural remote areas. The review found that faith-based drug supply organizations improved access to medicines and related commodities. There is also clear potential for a positive

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<sup>1</sup> Instructions for authors in Appendix E

<sup>2</sup> For the purpose of this thesis, the student is the sole and first author of the work

contribution in improving quality assurance of pharmaceuticals by FB-DSOs but in some cases, there is a lack of regulation. Faith-based involvement in pharmaceutical systems improved access for the general population and inserted additional pharmaceutical supplies into the national pharmaceutical system – thereby strengthening the broader public-private partnership between faith-based providers and the public sector. The analysis confirmed that faith-based involvement in pharmaceutical supply chains contributes to strengthening the national health system by complementing the public pharmaceutical system through improved access to medicines and related commodities in Africa.

**Key words**

Health system, pharmaceutical system, pharmaceutical supply, drug supply, medicine supply, supply chain, Africa, faith-based

**Key messages**

- Faith-based involvement in pharmaceutical supply chains in Africa is extensive and contributes significantly to national pharmaceutical systems.
- There is little evidence about how faith-based engagement in pharmaceutical supply chains contributes to or detracts from national supply chains.
- However, available evidence suggests that faith-based engagement in pharmaceutical supply chains contributes to national pharmaceutical supply chains and national health systems.
- Partnerships are needed between government and faith-based drug suppliers in the pharmaceutical sector to improve access, address financial challenges and create a sustainable source of financing for pharmaceutical systems in Africa.

**Introduction**

Pharmaceutical systems play an important role in health care delivery. Strengthening the pharmaceutical sector to meet the needs of the population is important in achieving positive health outcomes (Hafner *et al.* 2016; World Health Organization 2007). The low availability and reduced access to medicines and related commodities in low- and middle-income countries (LMICs) is of great concern (Bigdeli *et al.* 2012; Cameron *et al.* 2009; Chuma *et al.* 2007; Wales *et al.* 2014).

In Africa, pharmaceutical services are provided by public and private providers – the public services are usually provided by government, and the private services by a mix of private-for-profit (PFP) and private-not-for-profit (PNFP) providers – the latter including non-government organizations (NGOs),

local and international donors and faith-based health care providers<sup>3</sup> (FBHPs) (Patouillard *et al.* 2007) (see Figure 1 below). Recently, there has been much discussion on how working with the private pharmaceutical sector and incorporating their services into the national pharmaceutical services can improve access to quality affordable medicines (Palmer *et al.* 2003; Quick *et al.* 2002). However, the contributions of FBHPs in the pharmaceutical supply chain is not well recognized or well documented (Banda *et al.* 2006; Olivier *et al.* 2012b; Schmid *et al.* 2008). Isolated reports mention that the nature and function of FBHPs takes different forms from drug procurement, distribution (Lamberts & Hogerzeil 1984) dispensing (Rookes 2010) and quality assurance testing (Kawasaki & Patten 2002; Petersen *et al.* 2017), to name but a few. Understanding the various ways in which FBHPs are involved in drug supply chains in Africa is important for health systems strengthening. Across all LMICs, FBHPs are predominant in Africa – where about 23 of the 54 African countries are known to have substantial FBHP sectors (Dimmock *et al.* 2012; Dimmock *et al.* 2017; Olivier *et al.* 2015; Whyte & Olivier 2017). It is also in Africa where the most is known and published about FBHPs (in comparison with other LMICs). Within that literature, there is some mention of ‘faith-based’ pharmaceutical services, supply chains and networks. For example, Banda *et al.* (2006) produced an important report for the World Health Organization (WHO) on supply and distribution of pharmaceuticals by faith-based organizations in Sub-Saharan Africa. Schmid *et al.* (2008) have also noted the presence of pharmaceutical networks and stores in many African countries. Others have noted that missionaries were sometimes the first providers of basic pharmaceutical stores and services in the era before modern public health systems (Kawasaki & Patten 2002; Olivier *et al.* 2012b). However, initial scoping review shows an alarming absence of any substantive evidence about the current presence and functioning of this particular type of PNFP within African health systems (see Part B) – although It is commonly assumed they are substantial and important (Chirwa *et al.* 2013; McCabe *et al.* 2011; Rookes 2010). While research on FBHPs in relation to other aspects of health care services is growing (Duff & Buckingham 2015; Grieve & Olivier 2018; Olivier & Wodon 2012a), their specific role in pharmaceutical supplies is not well understood.

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<sup>3</sup> Faith-based health care providers- refers to all the different health care services provided by faith-based organizations while FB-SOs is only for those involved in the pharmaceutical supply chain

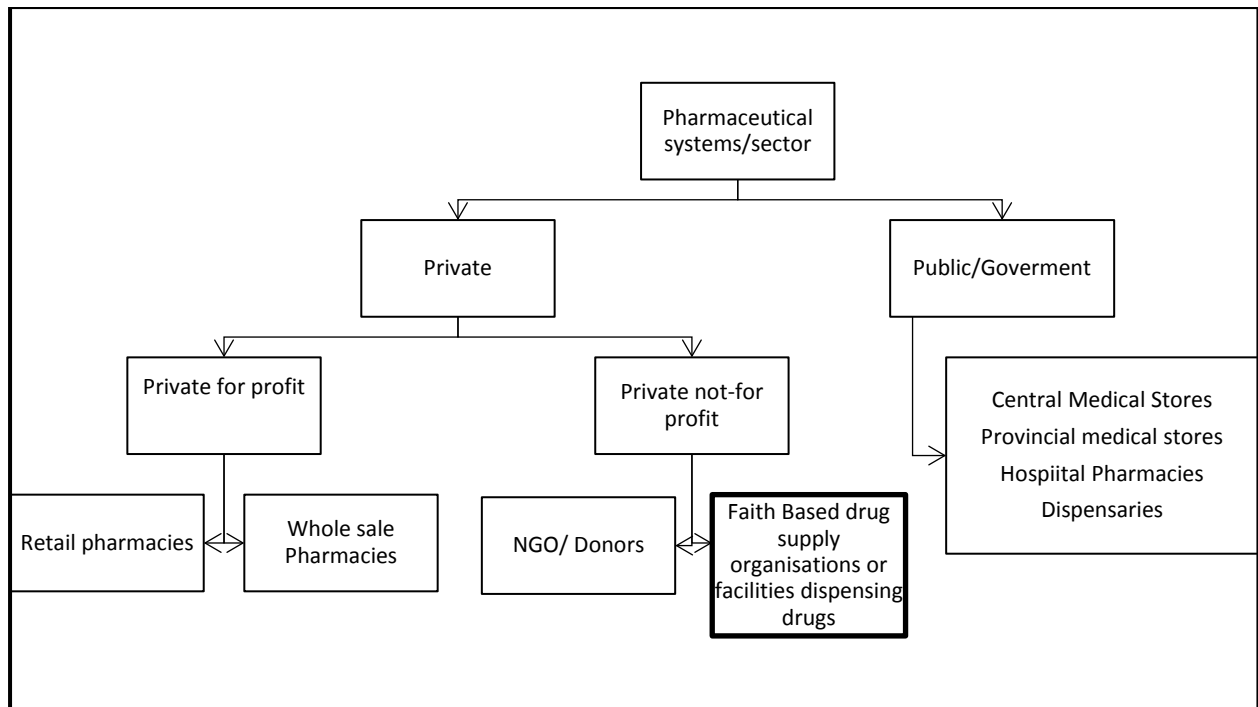


Figure 1: Nature of the pharmaceutical system showing the position of faith-based health care providers (Source Author)

In Africa, challenges faced by the public pharmaceutical sector<sup>4</sup> cannot be overemphasized, and this renders the sector ill-equipped to meet the needs of the population (Bigdeli *et al.* 2013; Harding *et al.* 2013; Hardon *et al.* 2006). Specifically, resource-poor settings are faced with unreliable funding, which leads to irregularity of drug supply, frequent drug stock-outs, lack of infrastructure and inefficient management with neglect of regulation of medicines and related commodities (Bigdeli *et al.* 2012; Harding *et al.* 2013; Kohler *et al.* 2012; Wales *et al.* 2014). When these challenges are not addressed, patient drug compliance and adherence drop, negatively impacting on health outcomes (Hamers *et al.* 2013; Kangwana *et al.* 2009; Reardon 2014).

It is evident in many African countries that irregular supply of medicines to government health facilities is a common problem, and this has contributed in holding back the health system from achieving health equity for its population (Wales *et al.* 2014; Chuma *et al.* 2010; Schouten *et al.* 2011). Stock out of medicines in most developing countries interrupted antiretroviral therapy (ARTs) supply and drug adherence in most facilities in developing countries thereby impacting the health system negatively (Schouten *et al.* 2011; Windisch *et al.* 2011; Harding *et al.* 2013). For example, a study in Tanzania revealed that drug adherence and patient health outcome was negatively impacted by the shortage of medicines in public health facilities (Penfold *et al.* 2013; Hardon *et al.* 2006). Also, in Kenya patients sometimes buy medicines from drug shops because of unavailability of

<sup>4</sup> The 'public pharmaceutical sector' includes drug supply chain entities owned by government and financed from tax revenue or through donor funding.

medicines from government facilities (Chuma *et al.* 2010) while in other instances informal drug sellers are the only available source of medicines (Chuma *et al.* 2010). These medicine stores have long operating times as compared to government facilities that are mostly closed when their services are needed (Chuma *et al.* 2010).

In another study, it was found that in some African countries where antiretrovirals (ARVs) are free of charge, patients are unable to benefit from the services due to barriers to access that include indirect cost like transport, loss of work hours and long waiting times (Hardon *et al.* 2006).

The shortage of pharmaceutical professionals in health facilities is also a cause for concern (Mackintosh *et al.* 2018), and may contribute to long waiting times at facilities, thereby discouraging patients from attending health facilities and increasing the likelihood of drug noncompliance and drug resistance (Hardon *et al.* 2006). The regulatory system in some LMICs lack basic infrastructure, high quality standard laboratories for quality assurance of pharmaceuticals and human resource expertise (Mackintosh *et al.* 2018). In another study it was revealed that medicines leak from the private pharmaceutical sector to the informal market in developing countries and this is of great concern as this will increase the chances of developing resistance to antimicrobials and ARVs (Brugha 2003).

It is important to note that no pharmaceutical system is a purely public entity because in every pharmaceutical supply chain there is some private entity involvement whether it is pharmaceutical companies producing medicines, or logistics companies transporting medicines (Bennett *et al.* 1997; Mackintosh *et al.* 2011).

The private pharmaceutical sector plays an important role in the drug supply chain (Bennett *et al.* 1997; Hanson *et al.* 2008). In LMICs, it is estimated that 66% of prescribed medicines are sourced from private facilities while 35% of prescribed medicines are found in the public facilities (Cameron *et al.* 2009). Pharmaceutical supply chains can be improved through partnerships between government and the private sector (Bustreo *et al.* 2003; Prata *et al.* 2005), and such partnerships can increase access to quality medicines at affordable cost (Bigdeli *et al.* 2014).

As noted earlier, there is a cluster of PNFP pharmaceutical providers in Africa that are defined as 'faith-based'. It has been argued in the literature (although not well evidenced) that these are important as they are known to have good access in remote and rural areas where there are few public services (Green 2008) – and are said to have different drug supply sources (often importing medicines from overseas through international nongovernmental organizations (NGOs) or purchasing medicines from the local manufacturing companies or the central medical stores (Dowling 2011).

Certainly, it is obvious from the literature that the public or government pharmaceutical sector cannot provide the needed medicines and medical supplies and associated services for the whole population (Berman & Hanson 1993; Berman *et al.* 1995a). Therefore, the government pharmaceutical sector must engage with faith-based drug supply organizations to improve access to quality affordable medicines (Chirwa *et al.* 2013; Gilson *et al.* 1994). This can be done through tax exemption on medicines, or the supply of free or subsidized drugs to faith-based organizations (Gilson *et al.* 1994).

However, the shortage of evidence on the exact extent, nature and function of FBHPs involved in pharmaceutical supply chains in Africa (noted above) hinders efforts to strengthen national pharmaceutical supply systems through engagement with FBHPs. The aim of this exploratory qualitative systematic review study is to begin to fill this evidence gap – collating and synthesizing descriptive qualitative and quantitative evidence from the published literature about, a) the (presence/extent) of FBHP-pharmaceutical supply chains, b) common characteristics of (diverse types of) FB-pharmaceutical supply chains, and c) how faith-based actors involved in pharmaceutical supply chains fit within their broader national pharmaceutical systems.

## **Method**

An exploratory qualitative systematic literature review was undertaken to explore the available literature on the extent, nature and function of faith-Based drug supply organizations (FB-DSOs) involved in pharmaceutical supply chains in Africa. The review included all types of data, qualitative and quantitative – as a synthesis approach was necessary given the exploratory research question. To strengthen this systematic review, an initial scoping review was done to understand the existing pharmaceutical systems in low- and middle-income countries (LMIC), and the challenges faced by these systems and possible interventions to improve their functioning.

The scoping review also served to inform the development of the search strategy for the systematic review. The search strategy was then refined based on previous searches. Standardized subject terms and natural language terms were used so that studies of the same concept using different relevant terminology will be included in the results (Hammerstrøm *et al.* 2010). Databases searched in this review included PubMed, EBSCOhost (Africa-wide information and Cumulative Index to Nursing and Allied Health Literature (CINAHL)) and Web of Science. These databases were included to minimize bias and to retrieve the full range of available documents. For adequate specificity and sensitivity, search terms were grouped into three categories using Boolean operators.

The main search terms for the systematic review are outlined in Appendix B. The search strategy for each database is found in Appendix C. The documents identified from these databases were then exported to Endnote and citation tracking of all included documents was done to capture all additional

relevant documents, and those found relevant to the study were included in the review. Only documents in the English-language which discussed the nature and function of FB-DSOs in drug supply chains were included in the study (Table 1). Both peer-reviewed and grey literature were included (McAuley *et al.* 2000; Shea *et al.* 2007). The inclusion of grey literature ensured that documents from non-academic sources were included while also minimizing bias (McAuley *et al.* 2000). The geographic area for this study is Africa and the names of all countries within the African continent were included. Only documents that provided information on financing, access<sup>5</sup>, regulations, human resource and training of FBDSOs in pharmaceutical supply chain in Africa were included.

Table 1: Systematic review inclusion criteria

Inclusion	Exclusion
Discuss the nature and function of FB-DSOs in pharmaceutical supply chain	Discuss FBHPs in healthcare but not pharmaceutical supply chain
Contains information on drug financing, access, regulation and human resources in FB-DSOs pharmaceutical supply chain	FB-DSOs and government pharmaceutical supply chain considered as one entity
Africa	Outside Africa
English	Non-English

Table 1: Systematic review inclusion criteria

The study aims to answer the research question by using thematic analysis to classify the data. From the scoping review in part B themes were identified and these themes will be used to inform the coding process.

A data extraction table was used to record and synthesize the information extracted from the papers (Tranfield *et al.* 2003) to minimize bias while ensuring that the process is standardized throughout. A draft of the data extraction table is found in Appendix A. The data extraction table was used as a guide for the analysis process and to facilitate data management which can be used for reference and by future researchers. All articles that met the selection criteria (Table 1) were read and analyzed in the same way to ensure that enough information is extracted to be able to answer the research question as accurately as possible. Thematic analysis is a method widely used and suitable for reviews, using wide range of source of information (Mays *et al.* 2005). This method is a good choice for this review since the involvement of FB-DSOs in pharmaceutical supply is not well researched (Braun & Clarke 2006).

<sup>5</sup> Access comprising of the availability, cost and stock-level of medicines and related commodities at facilities, dispensaries and warehouses.

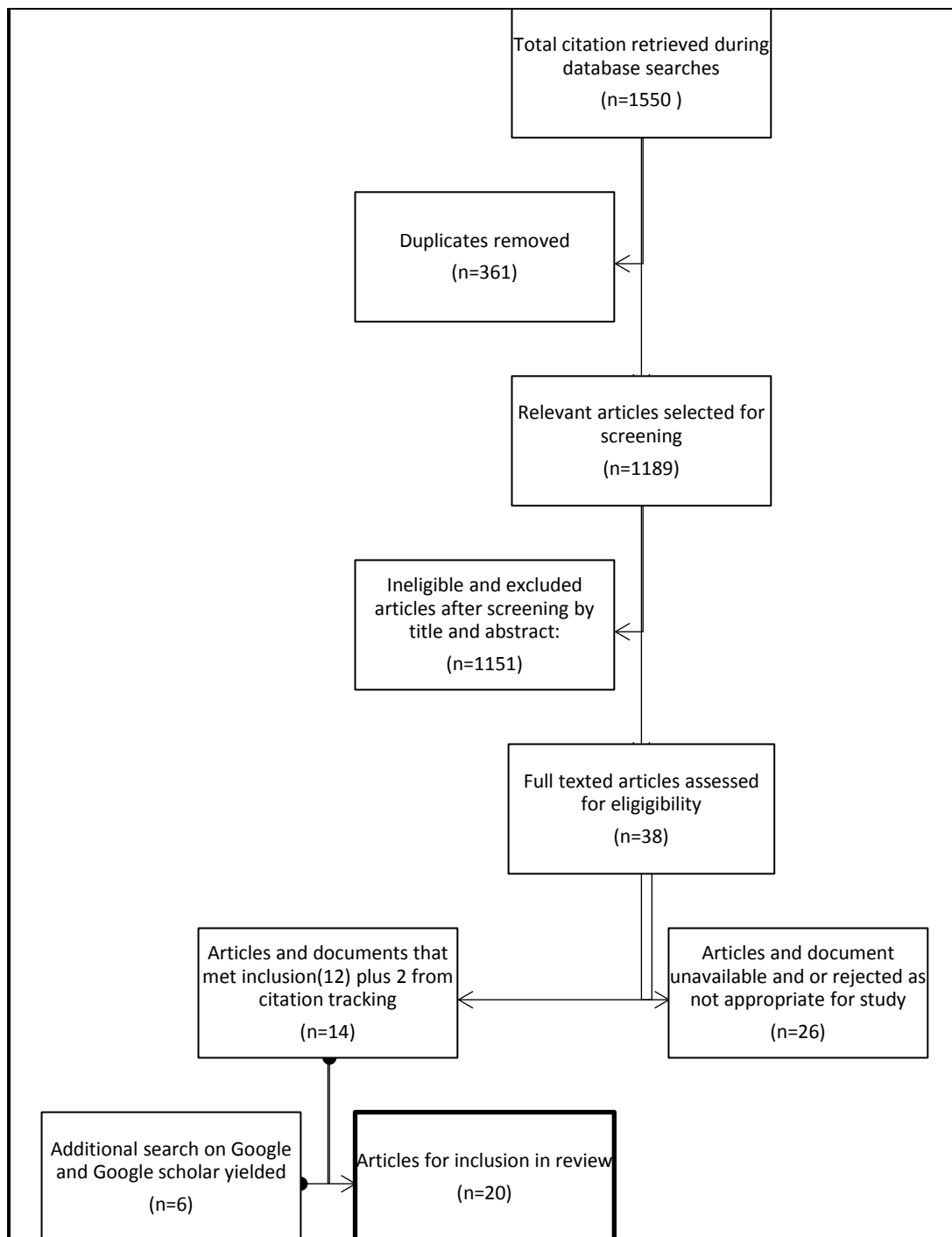


Figure 2: Search flow chart (Source Author)

### Results: Characteristics of included documents

The initial search of the different databases yielded 1550 documents in total. When duplicate items were excluded, this was reduced to 1189 documents. When the search was modified to screen citations by title and abstracts, 1151 documents were further excluded. These articles were excluded for lack of relevance to the study, particularly those from non-African countries. A total of 38 articles were finally selected for detailed reading and analysis.

Full text for six of the documents were unavailable and 20 were rejected because they were not appropriate for the study. These included studies that mentioned FB-DSOs in general but did not specifically comment on pharmaceutical supply and others, that considered faith-based and government drug supply services as a single entity. In total, 12 articles and documents met the inclusion criteria and two additional documents were retrieved from citation tracking resulting in a total of 14 documents. Further searches on Google and Google Scholar yielded six extra documents from grey literature, bringing the overall total to 20 documents included in this review (Figure 2). Given that this is a small number, a full presentation of each of these is provided (Table 3).

### *Geographic distribution of articles*

The review found a good representation of studies in Africa – studies from 14 countries (Burkina Faso, Cameroon, Ivory Coast, Mali, Malawi, Nigeria, Ghana, Zambia, Tanzania, Kenya, Uganda, Democratic Republic of Congo (DRC), Rwanda and South Africa) were eligible for inclusion. Ghana has the highest number of studies (6), followed by Malawi and Uganda (4), Cameroon (3), DRC and Nigeria (2), and the rest of the countries with one (Table 3). Two articles reported on multi-country studies: Banda et al. (2006) reported on Cameroon, DRC, Ghana, Kenya, Malawi, Nigeria, Rwanda, South Africa, Tanzania, Uganda, Zambia; and Petersen et al. (2017) reported on Cameroon, DRC, Nigeria, Kenya, Uganda, Ghana). One study reported on a case study in Kenya and Uganda (Kawasaki & Patten 2002), while two others reported on Africa in general (Ecumenical Pharmaceutical Network 2016; Kareen Shawa-Duran 2017). Another study considered developing countries (Rookes 2010). The geographic location of the studies according to region is shown in Table 2.

Table 2: Geographic distribution of included studies

Region	Number	Distribution within region
West Africa	11	Burkina Faso (1), Ghana (6), ivory coast (1), Mali (1), Nigeria (2),
Southern Africa	7	Malawi (4), South Africa (1), Zambia (2)
East Africa	4	Kenya (1), Uganda (4), Rwanda (1), Tanzania (1)
Central Africa	5	Cameroon (3), Democratic Republic of Congo (2)

Note: some studies reported on more than once country, hence the disparity in number

Source: Author

### Year, religion and research types

Studies included in the review span from 1984 to 2017, covering a period of 33 years, with similar findings and minimal differences in methodologies (Table 3). Figure 3 demonstrates that the bulk of the research was completed recently, indicating that this topic is increasingly being focused on and that there is a growing interest in faith-based programmes at community level. All the FB-DSOs in the review were of the Christian faith, with no information on organizations affiliated with Islam or other religions identified. Both qualitative and quantitative studies were identified for inclusion, with

### Part C – Journal Article

methods ranging from case studies, reports, surveys, laboratory testing, questionnaires, interviews, and observations.

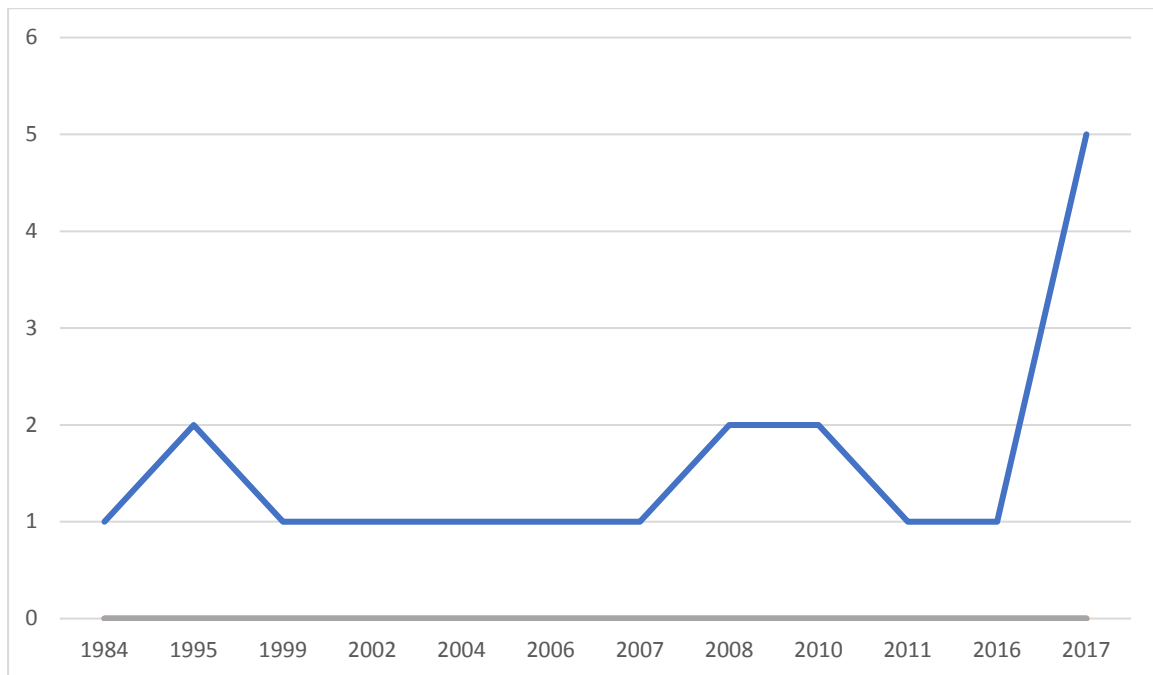


Figure 3: Included studies by year of publication

Table3: Summary of included studies (N=20)

Reference	Country / region	Role/position in pharmaceutical supply chain	Themes				
			Financing	Access, affordability and availability	Regulation and quality assurance	Human resource and training	Stock outs
Lambert et al. 1984	Ghana	Dispensing, procurement	Donor funding, drug sales	Supply in rural areas			
Asenso-Okyere 1995	Ghana	Medicines supplied in rural areas	Poor do not pay for medicines				
Gilson et al 1995	Tanzania	Dispensing	Not specified	High stock levels of medicines and medical supplies, no contraceptives		Understaffed	Irregular supply of vaccines
Grimaud 1998	Ivory Coast	Dispensing	Consultation fees, drug sales, reduced government support donor support	Decrease in patient turn out due to high cost			Drug shortages
Aids action 1999	Burkina Faso	Procurement dispensing	Donor funding	ARVs and related medicines dispensed for free			
Kawasaki et al. 2002	Kenya, Uganda	Procurement, supply	Donor funding, medicines sales	Good stock level, better access, expensive		Training by MEDS	
Andrews 2004	Ghana	Procurement, dispensing		Dispense for free for poor, dispense at affordable cost	Adheres to prescribing regulation		
Banda et al. 2006	Multi-country	supplied in rural areas	Donor funding, medicine sales	Medicines dispensed at affordable cost or free	Non-compliance with drug regulatory body		
Lum et al. 2007	Nigeria	ART, related medicines supply, home care visit	Donor funding	Medicines supplied for free			
Ballou Allou -Aaeres et al. 2008	Ghana, Zambia	Dispensing	Donor funding, Government support, medicines sale	Medicines supply in rural areas at no cost			
Carlucci et al. 2008	Zambia	Dispensing	Government support, donor funding	Supply ART free			
Njizing et al. 2010	Cameroon	Dispensing	Medicines sale	Supply ART and Cotrimoxazole			
Rookes 2010	Developing countries	Dispensing	Donor funding, government support, medicines sale	Medicines supplied at no cost			Irregularity of medicines supply
McCabe et al. 2011	Ghana, Malawi, Mali	Procurement, dispensing	Donor funding, government, medicines sale	Supply drugs free, co-payment by medical insurance schemes			

Part C – Journal Article

Reference	Country / region	Role/position in pharmaceutical supply chain	Themes				
			Financing	Access, affordability and availability	Regulation and quality assurance	Human resource and training	Stock outs
EPN 2016	Africa	Capacity building, advocacy		Supply medicines and related commodities to faith-based and public facilities at affordable cost	Quality assurance testing, on adherence to treatment guidelines	Training of pharmacy staff	
Kareem Shawa-Durand 2017	Africa	Training		Improved access to medicines due to increase trained personnel		Training of pharmacy personnel	
Khuluza et al. 2017	Malawi	Procurement, dispensing	Donor funding, medicines sales	High stock level, free medicines for poor, drug costly	Pass quality assurance test		Low stock of antibiotics, stocks out of quinine injection
Khuluza et al. 2017	Malawi	Quality assurance testing			Pass quality assurance test		
Kibira et al. 2017	Uganda	Stock level	Medicines sales	Medicines are supplied at a lower price than in government facilities			High number of stock outs
Petersen et al. 2017	LMIC/ multi-County	Quality assurance testing	Donor funding		Falsified and substandard antimalarial medicines found in Cameroon, DRC and Nigeria private sectors	Training of pharmacy personnel	

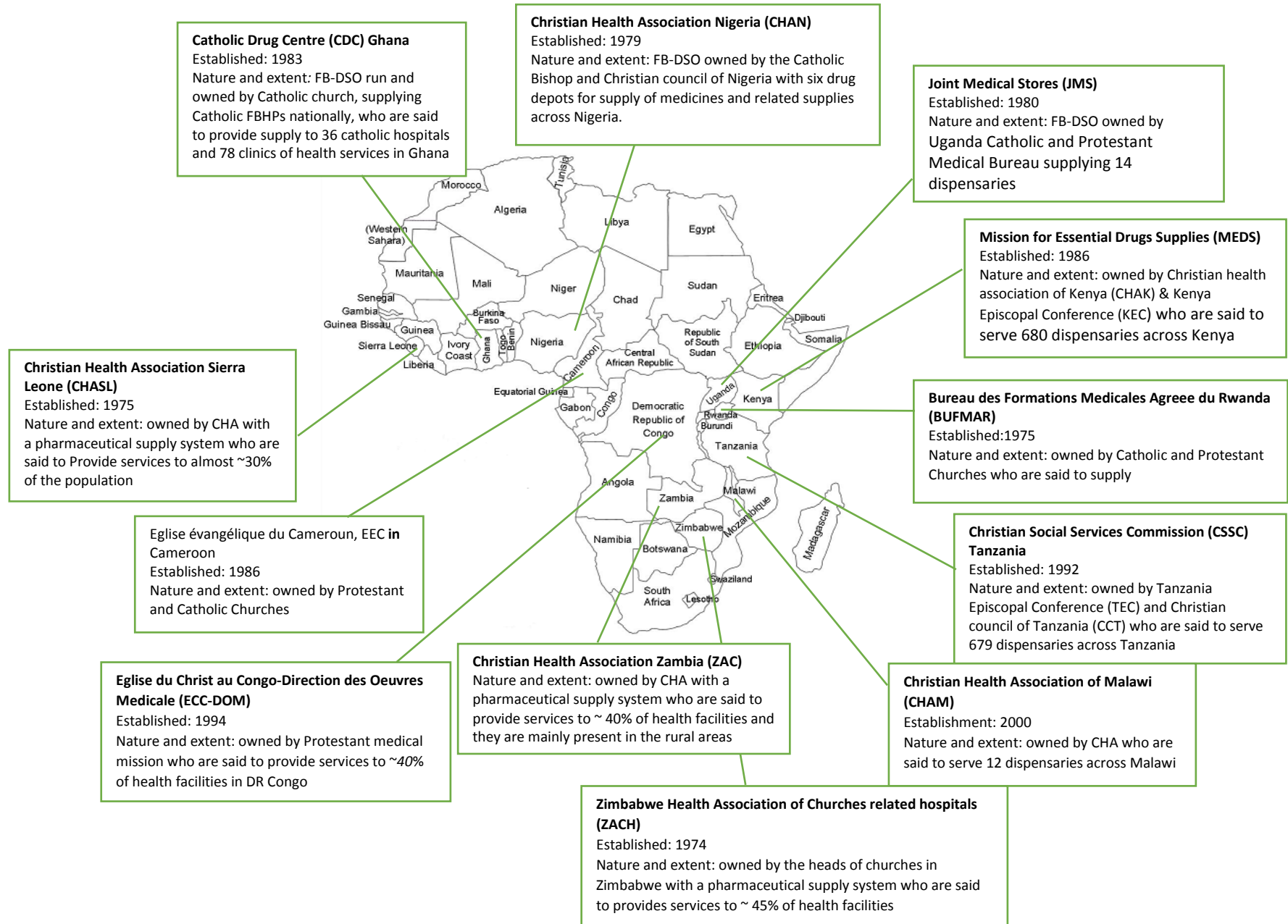


Figure 4: Mapping the DSOs in Africa

*Extent and characteristics of faith-based drug supply organizations (FB-DSOs)*

In this study these organizations are commonly referred to as faith-based drug supply organizations (FB-DSOs). Drug supply organizations are faith-based health care providers involved in the pharmaceutical sector only – procurement, supply, human resource training and quality assurance (Kawasaki & Patten 2002). FB-DSOs are drug supply organizations operating under or affiliated to a Christian Health Association (CHA). CHAs are national networks of FBHPs that are common in Africa. The supply of pharmaceuticals is part of the services that are provided by CHA. Some of the articles included in the review presented very little information on the extent of FB-DSOs because most of these articles were reporting on the health care service delivery as a whole (Table 2). The FB-DSOs identified in the review include Joint Medical Stores (JMS) in Uganda, Mission for Essential Drugs and Supplies (MEDS) in Kenya, Christian Social Services Commission (CSSC) in Tanzania, Catholic Drug Centre (CDC) in Ghana, Christian Health Association Malawi (CHAM), Christian Health Association Nigeria, (CHAN), Christian Health Association Zambia (CHAZ), Christian Health Association Sierra Leone (CHASL), Bureau des Formations Médicales Agréées du Rwanda (BUFMAR), Eglise du Christ au Congo - Direction des Oeuvres Médicales (ECC-DOM), Eglise évangélique du Cameroun (EEC) and Zimbabwe Association of Churches related Hospitals (ZACH) (Banda *et al.* 2006; Schmid *et al.* 2008) (Table 4 and Figure 4).

Some of these organizations are members of EPN (Ecumenical Pharmaceutical Network), a Christian organization supporting churches and church health systems in improving access to quality affordable pharmaceuticals while promoting the use of medicines rationally (Ecumenical Pharmaceutical Network 2016). EPN is reported to be involved in lobbying and advocacy, increasing access to antiretroviral drugs (ARVs), human resource empowerment, fighting against antimicrobial resistance through rational drug use and consumer education (Ecumenical Pharmaceutical Network 2016; Kareen Shawa-Duran 2017). For example, it is reported that EPN coverage on ARV services in Kenya decreased the viral load and improved patient's health outcomes (Green 2008). EPN has wide coverage of members including 32 CHAs and 18 FB-DSOs (Ecumenical Pharmaceutical Network 2016). Table 4 presents the FB-DSOs identified for this study.

The ownership of FB-DSOs varies and includes: Catholic and Protestant Churches of Malawi, Rwanda and Cameroon; Catholic Bishop, Christian Council of Nigeria and the North Medical Advisory Council of Nigeria; Ghana Catholic Bishops Conference, Christian council of Ghana and Ghana Pentecostal Council; Council of Churches in Sierra Leone; Medical Committee of the Christian Council and the health department of Zambia Episcopal Conference of Zambia; Tanzania Episcopal Conference and Christian council of Tanzania; Catholic and Protestant Medical Bureau of Uganda; Christian Health Association of Kenya and Kenya Episcopal Conference; Protestant medical mission of Democratic Republic of Congo; and Head of Christian Denomination in Zimbabwe (Kawasaki & Patten 2002; Odumosu *et al.* 2009; Schmid *et al.* 2008). Of the FB-DSOs outlined in Table 4 and Figure 4, nine were supported entirely through donor funds, while five also

received national government funding, and a further nine used sales of medicines as an additional revenue stream. Some FB-DSOs are networks owned by collaborations between different denominations (Olivier *et al.* 2012b). For example, CDC is owned by the Catholic Health Service of Ghana and supplies medicines to the hospitals and clinics owned by the Catholic denomination (Dimmock *et al.* 2017; Grieve & Olivier 2018).

Financial donations from (local and international) funders is a major source of funding for FBHPs in Africa (Olivier *et al.* 2015). This is also true for FB-DSOs as most of them benefit from donations (Table 4). In addition to donations some FB-DSOs have financed their supply chain through medicines sales (Kawasaki & Patten 2002; Olivier *et al.* 2015) and mark ups (Grieve & Olivier 2018). Again, many FB-DSOs also receive support from national government to improve access to medicines and related commodities (Table 4) (Kawasaki & Patten 2002; Khuluza & Heide 2017; Olivier *et al.* 2012b).

Some FB-DSOs have been in existence as far back as 1971, when ECC-DOM was established, while newer FB-DSOs were established as recently as 2000 (Banda *et al.* 2006; Schmid *et al.* 2008), (see table 4). Certain FB-DSOs run a pharmaceutical supply chain mainly for FBHPs facilities in a country, such as Malawi (McCabe *et al.* 2011; Rookes 2010); while others perform the functions of central medical stores, procurement organizations, and suppliers to public and private non-faith organizations (Kawasaki & Patten 2002; Odumosu *et al.* 2009). For example, JMS and MEDS in Uganda and Kenya respectively, are FB-DSOs with a wide customer coverage (Kawasaki & Patten 2002) and CHAN pharm in Nigeria supplies pharmaceuticals not only to FBHPs facilities but also to the public and the PFP pharmaceutical sector (Odumosu *et al.* 2009). The services of these FB-DSOs are present in both urban and rural areas (Banda *et al.* 2006; Rookes 2010) but they mainly target remote and hard-to-reach areas (Banda *et al.* 2006) and are therefore located in rural and remote areas where government services are not readily available (Banda *et al.* 2006; Grant *et al.* 2011). FB-DSOs are generally known to supply medicines and related commodities at no cost, or at no cost to the poor and at affordable prices for the rest of their patients (Asenso-Okyere 1995; KhuluzaFelix & Heide 2017; Rookes 2010). Six papers identified in this review supplied medicines at no cost, while five provided medicines free of charge only to the poor. However, the cost of pharmaceuticals supplied by some FB-DSO were reported to be higher than normal market price (Kawasaki & Patten 2002; Kibira *et al.* 2017).

Table4: Drug supply organizations in Africa

Name of network/ organization and country	Date of establishment	Ownership	Known pharma supply ( <i>default self-estimated market share of linked facilities</i> )	Funding sources (all partial)	References
Eglise du Christ au Congo - Direction des Oeuvres Médicales (ECC- DOM)	1971	Protestant medical mission	40% health services in DRC	Not specified	Aembe et al 2017

Part C – Journal Article

<b>DRC</b>					
Zimbabwe Association of Churches related Hospitals (ZACH) <b>Zimbabwe</b>	1974	Head of Christian denominations	<i>Provides 45% of health care services</i>	Donations, user fees and sale of medicines	Gwati 2015
Bureau des Formations Médicales Agréées du Rwanda (BUFMAR) <b>Rwanda</b>	1975	Catholic and Protestant Churches	Provides ~35% of health care in Rwanda	Donations, government	Mustapha et al 2009 Schmid et al 2008
Christian Health Association of Sierra Leone (CHASL) <b>Sierra Leone</b>	1975	Head of Churches in Sierra Leone	<i>Provides 30% of health care services</i>	Donations, drug sales	Witter et al 2012
Christian Health Association of Nigeria (CHAN Pharm) <b>Nigeria</b>	1979	Catholic Bishop's Conference, Christian Council of Nigeria, Northern Christian Medical Advisory Council	6 drug depots [400 mission hospitals, 4000 PHC facilities]	Donations, wholesales of essential medicines & supplies	Odumosu et al 2009 Larbi et al 2004
Joint Medical Stores (JMS) <b>Uganda</b>	1980	Uganda Catholic Medical Bureau (UCMB) & Uganda Protestant Medical Bureau (UPMB)	44 dispensaries	Donations, government, drug sale	Reinikka et al 2010 Kawasaki et al 2002
Catholic Drug Centre (CDC) <b>Ghana</b>	1983	Ghana Catholic Bishops Conference, Christian Council of Ghana Ghana Pentecostal Council	Supply medicines to 36 hospitals and 78 clinics	Donations, drug sales, mark-ups	Dimmock et al 2017 Gilson et al 1995 McCabe et al 2011
Mission for Essential Drugs and Supplies (MEDS) <b>Kenya</b>	1986	Christian health association of Kenya (CHAK) & Kenya Episcopal Conference (KEC)	680 dispensaries	Donations, government, drug sales	Kawasaki et al 2002 Blevins et al 2014
Christian Social Services Commission (CSSC) <b>Tanzania</b>	1992	Tanzania Episcopal Conference (TEC) and Christian council of Tanzania (CCT)	697 dispensaries	Donations, drug sales	Häfele-Abah & Neuhann 2010, Samwel 2015
Eglise évangélique du Cameroun, (EEC) <b>Cameroon</b>	1994	Evangelical Church of Cameroon	Serve 39 dispensaries	Not specified	Yadav et al 2011
Affordable medicines for Africa (AMFA) <b>South Africa</b>	1997	No evidence	AMFA work in partnership with RTT in providing medicines and related services for communities and townships outside cape town		Owens et al 2009
Christian Health Association of Zambia (CHAZ) <b>Zambia</b>	1999	Medical Committee of the Christian Council of Zambia and the health department of the Zambia Episcopal Conference	<i>[40% of health care in Zambia]</i>	Donations, drug sales	Yadav 2007 Ballou-Aaares et al 2008

Christian Health Association of Malawi (CHAM) Malawi	2000	Catholic and Protestant Churches in Malawi	12 dispensaries	Donations, In-country resource mobilization, drug sale	Khuluza et al 2017 Gilson et al 1995
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Note: The text in italics are estimates based on facility coverage. Due to the limitation of data we were unable retrieve validated data on actual coverage for some FB-DSOs.

### *Common characteristics of FB-DSOs*

This section discusses the findings with respect to access; availability; affordability; drug stock-outs; human resources and training; and regulation in relation to the nature and function of FB-DSOs in Africa.

#### Access, availability and affordability

Both JMS and MEDS are described as having better access to medicines since they usually have good stock-levels of medicines and related commodities (Kawasaki & Patten 2002). In Malawi, CHAM facilities dispense medicines for free to the poor and those who can afford to pay are charged less than what PFP facilities are charging (Khuluza & Heide 2017; McCabe *et al.* 2011; Rookes 2010). In addition, some FB-DSOs worked hard to improve the provision of antiretroviral therapy and related commodities to HIV-positive patients. For instance, in Burkina Faso, a small Christian organization worked with government and donor funding organizations to provide ARVs and other medicines used to treat opportunistic infections<sup>12</sup> for HIV-positive patients (AIDS action 1999). Another study in Zambia reported on FB-DSOs providing antiretroviral (ARVs) for HIV-positive patients whose drug adherence was tested on non-ART medicines (Carlucci *et al.* 2008). These patients were found to be compliant to follow-up appointments and adherent to ART, irrespective of the distance they had to cover (Carlucci *et al.* 2008). For example, based on the study on ART adherence in Zambia this is what Carlucci et al (2008) observed;

*Most patients travelled 3 or more hours each way, often on foot; yet, most were able to achieve optimal adherence in their first months of therapy (Carlucci et al. 2008, p. 6).*

Access to medicines and related commodities is critical in the vision of FB-DSOs and was found to be superior over most government facilities (Gilson *et al.* 1995; Khuluza & Heide 2017).

*Church facilities had significantly higher scores than other groups for drug availability. Thus, for example, there was a 90% chance of their having chloroquine, and a 70% chance of having penicillin constantly available (Gilson et al. 1995, p. 109).*

We noted minimal variations in the services provided by FBHPs. Given that FBHPs have funding support from multiple donors and national governments, they appear to be homogenous in their operations with better

<sup>12</sup> Opportunistic infections are infections occurring frequently and are more severe in people with weak or depressed immune systems.

access to medicines and related commodities than the government sector (Carlucci *et al.* 2008; Lum *et al.* 2007; McCabe *et al.* 2011). In Nigeria, for example, FBHPs were able to provide medicines and related HIV-services to patients as a result of the support from the President's Emergency Plan for AIDS Relief (PEPFAR) and other funding organizations (Lum *et al.* 2007). Again, in Malawi, CHAM facilities are sometimes supported by international donors or government, resulting in them being able to dispense medicines and related commodities for free to the poor or at a minimal cost (McCabe *et al.* 2011).

In general, medicines and related commodities are affordable and accessible at FBHPs because they usually have good stock levels and dispense medicines for free in most facilities. In some cases, the poor receive free supply and a minimal amount is paid by the rest of the population (AIDS action 1999; Asenso-Okyere 1995; Ballou-Aares *et al.* 2008; Carlucci *et al.* 2008; Ecumenical Pharmaceutical Network 2016; Lum *et al.* 2007; Rookes 2010). For example, Rookes 2010 study on FBHPs in developing countries revealed that;

*Treatment in (church health services) CHS facilities was in the past generally free for everyone, because the bulk of the funds came from overseas' churches (Rookes 2010, p. 256)*

However, the review revealed evidence of challenges faced by some FB-DSOs in providing accessible and affordable pharmaceuticals. For example, a reduction in support from government and donor organizations was found to result in patients paying for medicines and related commodities at FBHPs (Grimaud 1998; Kibira *et al.* 2017; Rookes 2010). A study in Burkina Faso found that the medicines dispensed, and services provided by some FBHPs were unaffordable for some categories of patients, especially the poor (Grimaud 1998). Similarly, patients seeking services at FB-DSOs in Malawi and Uganda were required to pay as a result of fluctuations in donor funding and irregular and insufficient support from government (Kibira *et al.* 2017; Rookes 2010). In another example, in the Ivory Coast, services provided by FBHPs were found to be negatively affected by dwindling donor support and irregular drug supply from governments (Grimaud 1998).

#### Regulation

Findings from the review showed that FBHPs are involved in motivating for medicines quality assurance ensuring that pharmaceuticals in their facilities and elsewhere are of good quality and comply with recommended quality standards (Kawasaki & Patten 2002; Khuluza *et al.* 2017; Petersen *et al.* 2017). For example, a study which conducted testing for falsified and substandard<sup>13</sup> medicines in the pharmaceutical market in Malawi, found that all the medicines in selected facilities of FBHPs in the were of acceptable quality (Khuluza *et al.* 2017). In another study, the FBHPs were involved in quality assurance testing of medicines in the pharmaceutical market in a few African countries (Petersen *et al.* 2017). This method of quality assurance

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<sup>13</sup> Falsified medicines contain the wrong pharmaceutical ingredients as specified by the manufacturer, while substandard medicines usually contain the correct pharmaceutical ingredients but not in the same quantity as specified by the manufacturer.

was able to identify falsified and substandard products in the pharmaceutical market in Cameroon, DRC and Nigeria (Petersen *et al.* 2017)

*Within the seven countries included in this survey, the highest proportion of substandard and falsified medicines was found in Cameroon (total 15 out of 212 samples = 7.1%), followed by the Democratic Republic of Congo (2.7%) and Nigeria (1.1%). As mentioned, the true number of poor-quality medicines is likely to be even higher than detected in this study (Petersen *et al.* 2017, p. 17).*

#### Human resource and training

Studies in the review found that providing training and supervision for the staff involved in the drug supply chain can yield positive results (Gilson *et al.* 1995). The review revealed that MEDS has worked with EPN to train pharmacy staff involved in the handling of medicines and related commodities (Kawasaki & Patten 2002). Also, pharmacists and pharmacy technicians working in FBHPs were trained on how to use minilab to test for falsified or substandard medicines locally (Petersen *et al.* 2017).

*“A German pharmacist acted as trainer in the first workshops, while in the subsequent trainings personnel from the previously trained organizations acted as trainers. The persons trained in the local drug supply organization for use of the Minilab were mostly pharmacists, pharmacy technicians or assistant pharmacists, and they were usually supported by an unskilled worker in the Minilab operation” (Petersen *et al.* 2017, p. 7).*

The EPN reported involvement in pharmaceutical capacity building processes to improve access to quality medicines and services and improved health outcomes (Ecumenical Pharmaceutical Network 2016). For example, it is reported that EPN promotes the empowerment of pharmacy personnel and other prescribers in improving rational drug use and addressing the issue of antibiotic misuse and antimicrobial resistance (Ecumenical Pharmaceutical Network 2016; Kareen Shawa-Duran 2017).

*Between 2011 and 2017 a total of 56 candidates from 9 countries, South Sudan, DRC, Cameroon, Kenya, Uganda, Tanzania, Ghana, Chad, and Zambia, have been supported by the ESP initiative. To date, over 90% of candidates from hospitals in disadvantaged areas were enrolled for training that led to successful completion and awarded a recognized pharmacy qualification (Kareen Shawa-Duran 2017, p. 3)*

#### Discussion

Our systematic review of the analysis of the role of FB-DSOs in the pharmaceutical supply chains in Africa found strengths and limitations for each of the themes on pharmaceutical supplies. FB-DSOs tend to lack published data on their role in pharmaceutical supplies in Africa, however, available evidence suggests that FB-DSOs in the pharmaceutical sector better serve poor and vulnerable populations and improve availability

of pharmaceutical supplies in difficult-to-reach areas. Our review indicated that FB-DSOs, as a component of the private pharmaceutical sector, play a key role in health service delivery through improved access to medicines and related commodities, thereby contributing to health systems strengthening. This section describes the ways in which FB-DSOs can and do contribute to strengthening national health systems, through their capacity to meet the challenges faced by national pharmaceutical systems. In addition, this section suggests some ways in which the contribution of FB-DSOs can be better harnessed to strengthen national pharmaceutical systems.

*Faith-based pharmaceutical system actors' role in meeting the challenges faced by national pharmaceutical systems*

We are now going to look at access, affordability and availability; human resources and extent of FB-DSOs, because of their important role in the national pharmaceutical supply and the health systems strengthening.

Access, affordability and availability

FB-DSOs embody unique strengths with respect to access, affordability and availability which can help to strengthen national pharmaceutical supply systems. However, they are also faced with challenges which curtail their progress. Many authors have highlighted that the public health sector in LMICs face numerous challenges including poor financing, inadequate resources and a lack of infrastructure, which contribute to unreliable pharmaceutical stock-levels in health facilities and irregularities in pharmaceutical supplies in health facilities (Cameron *et al.* 2009; Chuma *et al.* 2007; Chuma *et al.* 2010; Wales *et al.* 2014). The review showed that access to medicines and related commodities is critical in the vision of FB-DSOs and much of the evidence suggests that the faith-based sector provides better access than most government facilities (AIDS action 1999; Asenso-Okyere 1995; Gilson *et al.* 1995; Khuluza & Heide 2017). As a result, community members may be compelled to seek health care from FB-DSOs and avoid government facilities with high stock-out of pharmaceuticals (Hardon *et al.* 2006; Schouten *et al.* 2011; Wales *et al.* 2014).

In LMICs, patients often must pay for medicines and pharmaceutical supplies when other services in the facilities are provided at no cost (McKee *et al.* 2006) because medicines are being purchased from the local PFP pharmaceutical sector (Bennett *et al.* 1997; McKee *et al.* 2006) due to high stock out of supplies at government facilities (Harding *et al.* 2013). Significantly, the review found that while FB-DSOs do also purchase medicines and related commodities from the local PFP pharmaceutical sector, they often exempt the poor patients from paying for drug supplies (Khuluza & Heide 2017; Rookes 2010). For example, in Malawi and Ghana medicines and related commodities are purchased from the local private pharmaceutical sector when there is delay or interruption in supply and in such situations, the poor receive the medicines for free while the rest of the population pay for their medicine supply (Andrews 2004; Khuluza & Heide 2017; Lamberts & Hogerzeil 1984; Rookes 2010). This is important in achieving the desired health outcomes as existing evidence

from LMICs have shown that improving access to medicines through fees exemption improves patient drug adherence and strengthens the health system (Mwita *et al.* 2017; Prinja *et al.* 2015).

On the other hand, we found in this review that some patients would have to pay for medicines in some FB-DSOs facilities (Grimaud 1998; Kibira *et al.* 2017). Evidence in this review indicated that patients seeking health care at FB-DSOs in Burkina Faso and Uganda paid for medicines because donor funding and government support were insufficient to cover the running cost of the facilities (Grimaud 1998; Kibira *et al.* 2017). The review also found some evidence of medicines being sold at higher prices in FB-DSOs. While a study from Malawi found medicines prices at FB-DSOs were lower than the international reference price (Khuluza & Heide 2017), the cost of medicines at faith-based facilities in Uganda was found to be higher than the international reference price (Kawasaki & Patten 2002; Kibira *et al.* 2017). This is likely to hinder the contribution of FB-DSOs to the national health system because the cost of medicines will serve as a barrier to access due to unaffordability by the patients.

Some countries have already moved to free services provided by government health facilities (Abihiro *et al.* 2014; Chuma *et al.* 2009; Ridde & Morestin 2010), thus asking patients to pay for medicines and consultation fees does not align with the priority of most national governments. This can be problematic when patients cannot afford to pay, and FB-DSOs are the only form of health care service available, thereby limiting access to medicines for (mainly) poor patients (Gilson *et al.* 1994; Olivier *et al.* 2015). For example, in Uganda, FB-DSOs charge for medicines (Kibira *et al.* 2017) while medicines are dispensed for free in public health facilities (Ridde & Morestin 2010). Some studies found that the poor are benefiting from the FBHPs more than rich who can afford to go to the PFP sector (Nazerali *et al.* 2006; Ridde & Morestin 2010).

FBHPs have been recognized for their contribution to the management of HIV/AIDS in Africa, especially about the drug supply system (El-Sadr *et al.* 2012; Olivier *et al.* 2012b). Although this review did not focus on HIV/AIDS, a few studies in the review concentrated on FB-DSOs involvement in the supply of ARVs (AIDS action 1999; Carlucci *et al.* 2008; Lum *et al.* 2007; Njosing *et al.* 2010). This shows that FB-DSOs play an important role in providing ARVs during a time in which the African continent faces a high burden of disease because of the HIV/AIDS epidemic (World Health Organization 2013).

Faith-based health care providers contributed to improved access to maternal health medicines and related commodities. However, some health facilities had very small or irregular supply of medicines and related commodities for reproductive health (Kibira *et al.* 2017), while others did not stock contraceptive medicines or provide family planning services (Gilson *et al.* 1995). This can be attributed to religious views concerning contraception and the association of certain contraceptives with risky behaviours (EP Network 2016; World Health Organization 2008). Given that access to contraceptives is an important function of any health system, the failure of some FB-DSOs to ensure this, is a significant shortcoming.

## Human resources

This review found little information on human resource management, which is surprising because we know from other literature that this is an important issue (Mackintosh *et al.* 2018; Prata *et al.* 2005; Smith 2004; Smith 2009; Van Damme *et al.* 2008). In LMICs, the pharmaceutical supply chain is mostly managed by non-pharmacy professionals (Mackintosh *et al.* 2018), and this sometimes results in the wrong medicines being dispensed with errors in drug dosages and administration times (De Ar Rissato & Romano-Lieber 2013). Evidence shows that training of pharmacy personnel in knowledge and skills enables them to follow standard prescribing and dispensing patterns of pharmaceuticals to promote better service delivery (Smith 2004; Smith 2009). In this review, only five out of the 20 papers referred to the training of pharmacy personnel (Ecumenical Pharmaceutical Network 2016; Gilson *et al.* 1995; Kareen Shawa-Duran 2017; Kawasaki & Patten 2002; Petersen *et al.* 2017). Some papers had very little information on training, for example, a study on Tanzanian primary health care only made mention of supportive supervision and training being provided for pharmacy personnel annually (Gilson *et al.* 1995). This review noted that EPN is working with FB-DSOs to empower pharmacy personnel through training programmes in a number of African countries (Ecumenical Pharmaceutical Network 2016; Kawasaki & Patten 2002). This is a significant contribution, as a lack of trained pharmacy professionals contributes to the issue of irrational drug use and incorrect drug dispensing (Kareen Shawa-Duran 2017).

## Extent of FB-DSOs

It is commonly assumed that FB-DSOs make a significant contribution to overcoming national pharmaceutical system challenges because they are responsible for a large proportion of drug dispensing facilities. However, while some information in the review supports this claim, evidence is severely limited. The information on the extent or 'reach' of FB-DSOs in the included articles is relatively limited (Carlucci *et al.* 2008; Grimaud 1998; Kibira *et al.* 2017) since most articles reported on the general services provided by FB-DSOs and did not provide in-depth detail on medicine supply (Carlucci *et al.* 2008). It was also unclear whether these FB-DSOs were members of the FB-DSOs in their country as information about ownership and how long they have been operating was unavailable (AIDS action 1999; Carlucci *et al.* 2008; Grimaud 1998; Njozing *et al.* 2010). However, broader grey literature (not included in this review) provides further evidence of the extent of FB-DSOs activity. For example, we know that in Kenya and Tanzania 15.8% and 11% of dispensaries are served by FB-DSOs respectively (Blevins & Griswold 2014; Häfele-Abah & Neuhann 2010). FB-DSOs are known to serve a high proportion of dispensaries across different African countries (Table 4). There is also evidence from the grey literature that there are dispensaries, mostly in rural areas, across the different countries in Africa served by FB-DSOs (CHAM 2019; MEDS 2019; ECC 2019). The validated data for dispensaries served by FB-DSOs for some countries was unavailable because some countries use primary health care to comprise of health centres, dispensaries and health post and at the end a single figure is given for all of them (Dimmock *et al.*

2017; Lijdsman *et al.* 2004). In Rwanda, for example, it is reported that BUFMAR provides 35% of primary care service (Dimmock *et al.* 2017). Also, in Ghana, it was evident that CDC contributed greatly to the pharmaceutical supply chain, however, in the literature, we found figures for the number of hospitals and clinics (Dimmock *et al.* 2017; Grieve 2018; Yeboah & Buckle 2017). It is likely that the dispensaries are included in the number of catholic facilities stated in some of the literature (36 hospitals and 78 clinics). In Nigeria also, the literature was clearer on the number of drug depots (six depots) available across the country and then they further stated that the medicines and related commodities are supplied to the hospitals and clinics from these different depots based on catchment area (CHAN 2019).

Table5: Dispensaries served by public and FB-DSOs

Country	FB-DSOs dispensaries
Kenya	680
Malawi	12
Rwanda	39
Tanzania	680

Source (Blevins *et al.* 2014, Häfele-Abah & Neuhann 2010, CHAM, Reinikka *et al.* 2003).

Researchers could not find validated data for other countries

We also know that 42.5% of all ARVs, 15.6% for malaria services and 64.3% for TB services provided by FBHPs is funded by Global Fund (Haakenstad *et al.* 2015). FBHPs also provide a significant and well-coordinated programme for HIV positive patients that are on treatment in African countries facing a high HIV burden (Blevins & Griswold 2014). Therefore, while the extent of FB-DSOs is not verifiable in complete detail, the broader literature suggests that FB-DSOs are making a substantial contribution to improving access to medicines and related commodities and strengthening the pharmaceutical sub-system and the health system.

Faith-based organizations have contributed to several other programmes in addition to pharmaceutical supplies and health care delivery broadly. The training of health care personnel is one such programme which has assisted in strengthening the health work force through improved service delivery, thereby strengthening the health system. There are varying numbers of training facilities in different African countries: Nigeria (28), Kenya and Tanzania (24), DRC (20), Uganda (19), Zimbabwe (14), Zambia (9), and Cameroon (3) (Dimmock *et al.* 2017). We were unable to identify the availability and number of training institutions for Sierra Leone and Rwanda from the literature (Table 5). Zimbabwe has 14 mission hospitals for training nurses (ZACH 2019), while in Malawi, CHAM has well-established training institutions for health care providers, which account for approximately 80% of the human resource for health training in Malawi (CHAM 2019).

Table6: Faith-based training institutions training health workers in Africa

Countries	Number of faith-based training facilities
Cameroon	3
Democratic Republic of Congo	20
U Ghana	12
Kenya	24
Malawi	10
Nigeria	28
Rwanda	Not specified
Sierra Leone	Not specified
Tanzania	24
Uganda	19
Zambia	9
Zimbabwe	14

Source compiled by author based on data from Dimmock et al 2017 and CHA websites of the different countries

FB-DSOs are resilient and- continue to provide services in the face of health system shocks  
 FB-DSOs are working toward making medicines and related commodities accessible to the poor and marginalized populations (Olivier *et al.* 2012b; Schmid *et al.* 2008). For example, in Ghana, CHAG facilities are usually in operation when the national health system is on strike because they believe in providing a non-stop service for populations in need (Yeboah & Buckle 2017). In another instance, in Ghana, patients were referred to CHAG facilities by government stakeholders when government-employed pharmacists were on strike (Yeboah & Buckle 2017). This indicates that FB-DSOs can continue to provide services when the public sector is on strike. Furthermore, the services of FBHPs have been found to be in full operation when the public pharmaceutical supply chain is challenged with stock-outs. For example, a CHAM facility in Malawi decided to buy medicines from the PFP pharmaceutical sector when they could not receive their supply in time from the CMS, to have e medicines to dispense to patients (Chirwa *et al.* 2013). In Rwanda, in times of supply stockouts at the CMS, BUFMAR is viewed as the source of supply for the public pharmaceutical supply chain, thereby complementing the national pharmaceutical supply system (Lijdsman *et al.* 2004).

This paper has shown that FB-DSOs have the capacity to overcome the significant challenges faced by national pharmaceutical systems. In the following section, we present a few mechanisms through which this capacity can be better harnessed by national health systems –public private partnerships (PPP)s and improved regulation.

#### *The need for public private partnership*

Partnership between government and the private pharmaceutical sector (PFP and PNFP) is key in improving the pharmaceutical supply chain and strengthening the health system in LMICs (Bennett *et al.* 1997; Berman *et al.* 1995a; Bustreo *et al.* 2003; Gilson *et al.* 1994; Palmer 2000). Evidence from the literature shows that the collaboration between government and NGOs has been successful in several countries (Berman *et al.* 1995a; Gilson *et al.* 1994; Zafar Ullah *et al.* 2006). For example, in Bangladesh, improved access and

compliance to tuberculosis medicines was achieved through collaboration between government and an NGO (Zafar Ullah *et al.* 2006).

There is evidence that partnerships between government and FBHPs also helps to strengthen the pharmaceutical supply chains of FBHPs. For example, many PNFP pharmaceutical organizations buy medicines from government at subsidized rates, some PNFP organizations benefit from duty-free entry on importation of medicines (Gilson *et al.* 1994; McPake & Hanson 2016), and others receive medicines and other support from the ministry of health to provide services to poor and vulnerable populations (Chirwa *et al.* 2013).

This review found that partnerships between government and FB-DSOs should be viewed as crucial since FB-DSOs provide services to the poor and vulnerable by filling in the gap, where there are inefficiencies on the side of the public sector (Banda *et al.* 2006). It is also evident from the review that most of the FB-DSOs receive support from government and in most instances, this is in the form of medicines and pharmaceutical supplies. In other words, it is the partnership between the FB-DSOs and government that enables FB-DSOs to supply medicines for free (AIDS action 1999; Carlucci *et al.* 2008; Lum *et al.* 2007). For example, in Malawi, CHAM facilities dispense medicines received from government at no cost to the patient, while patients must pay for medicines procured from the private sector, except for the poor (Khuluza & Heide 2017). The review also found that in Ghana, FBHPs procure medicines from the CMS (Ballou-Aares *et al.* 2008; McCabe *et al.* 2011), enabling them to dispense these medicines to populations in need.

Available literature has shown that the informal sector is highly utilized by the poor, either because they are cheaper or the only available source of medicines that supply rural remote areas and operate for longer hours (Chuma *et al.* 2007). Partnerships between FB-DSOs and government may address the issue of the informal sector by ensuring that the services of FB-DSOs are available in rural and hard-to-reach areas as supported by this review (Asenso-Okyere 1995; Carlucci *et al.* 2008).

Evidence from several studies found that the private pharmaceutical sector is the main source of pharmaceuticals and preferred by most patients over the public pharmaceutical sector, in LMICs (Berman *et al.* 1995a; Patouillard *et al.* 2007; Smith 2009). Drug stock-outs are prominent in the public sector in LMICs with less than 35% of the prescribed medicines available in public facilities, while the rest is sourced from the private pharmaceutical sector (Cameron *et al.* 2009). As stated earlier, the review shows that FBHPs have better stock of pharmaceuticals (Gilson *et al.* 1995; Khuluza & Heide 2017). Therefore, partnerships between government and FB-DSOs pharmaceutical supply chain could improve access to pharmaceuticals, strengthen pharmaceutical systems and improve health outcomes.

*The need for improved regulation*

The published studies reported that regulatory standards can improve quality of care and efficiency (Mackintosh et al. 2011). In some LMICs, the pharmaceutical regulatory system is challenged by a lack of basic infrastructure, a shortage of expertise or training facilities, and a scarcity of high-quality standard laboratories for quality assurance of pharmaceuticals (Mackintosh et al. 2018). However, some evidence collected in this review indicates that the faith-based pharmaceutical sector can help national systems to overcome these challenges.

For example, MEDS demonstrated involvement in quality assurance of medicines and other pharmaceutical products supplied to their customers and patients (Kawasaki & Patten 2002). In another study in the review, FBHPs participated in quality assurance of medicines in the local private pharmaceutical sector in a few African countries with support from international donors (Petersen et al. 2017).

Evidence from the broader literature has also shown that regulating the private pharmaceutical sector is a huge task (Green et al. 2010), and this review showed that FB-DSOs have similar weaknesses in record keeping, quality assurance of medicines and compliance with drug regulatory bodies (Banda et al. 2006; Njosing et al. 2010). The review also found that none of the FBHPs dispensing pharmaceuticals reported that these products were tested for quality assurance before being dispensed to the patients, which is particularly problematic for facilities that source their pharmaceutical supplies directly from international donors (AIDS action 1999; Lamberts & Hogerzeil 1984). Strengthening government monitoring and regulatory systems to ensure that essential drug lists are adhered to, medicines are quality assured and resources received by health care providers are accounted for, is vital (Bennett et al. 1994; Hogerzeil et al. 1997; McPake & Hanson 2016; Obua et al. 2017; Pinheiro 2008). Detailed assessment of the quality of the medicines supplied at FBHPs facilities is essential to ascertain the quality of medicines patients receive, and this will help inform policy makers and other stakeholders in decision-making in order to provide the required support to maintain and improve the drug supply chain.

Finally, memoranda of understanding are an important mechanism to regulate the relationship between partners. However, none of the studies in the review reported on the existence of a memorandum of understanding or contract between government and FB-DSOs or between FB-DSOs and international donors. This is problematic because the presence of a contract usually specifies the duties and expectations of both parties and this makes it possible to keep track of implementation processes (Rookes 2010).

### **Limitations**

This review is limited by the fact that it only includes English-language publications, which might have led to the exclusion of relevant documents published in other languages.

The focus on Africa excludes literature on FB-DSOs involved in pharmaceutical supply systems from the other contexts such as Asia (India) and the Oceania (Papua New Guinea). Findings, from this review cannot be generalized outside Africa, which highlights the need for more research in other regions.

This review did not include input from stakeholders or experts in the study area which would have been relevant as they would have been able to provide a perspective on the relationship between the policy makers and the FB-DSOs in Africa.

The literature search is limited to databases that are accessible through the University of Cape Town (UCT), although significant efforts were made to access unavailable materials by direct communication with authors or requesting materials from publishers. A few documents were rejected due to lack of access to the full text.

### **Conclusion**

Pharmaceutical systems play an important role in health systems strengthening. The pharmaceutical supply chains in Africa are challenged with inadequate financial resources, stock of pharmaceutical supplies, shortage of trained pharmacy personnel and lack of infrastructures and a system for the for proper functioning of the drug regulatory system. The supply chain can be strengthened through partnership between the public and PNFP (FB-DSOs) pharmaceutical sectors.

FB-DSOs play a key role in the provision of pharmaceutical supplies and related health care services (Banda *et al.* 2006; Schmid *et al.* 2008; World Health Organization 2007). However, very little evidence is available on their involvement in pharmaceutical supplies. This review identified a limited number of studies in countries known to have well-functioning FB-DSOs working in the pharmaceutical supply chain in Africa. The data describing the role and function of FB-DSOs in the pharmaceutical supply chain in Africa is limited, an indication that further research is needed on how the engagement with FB-DSOs can contribute to health system strengthening in Africa.

FB-DSOs exist and are making significant contributions to national pharmaceutical systems. Their supply services cover both urban and rural areas but are mainly focused on the rural and hard-to-reach areas. Also, the supply of pharmaceuticals is not limited to faith-based facilities but extends to the public and private pharmaceutical sector as well. FB-DSOs have good drug stock-levels with improved access to pharmaceutical supplies when compared to that of government facilities. They are therefore often able to supply pharmaceuticals at no cost, making their services well-trusted by a large proportion of the population. However, some FB-DSOs involved in the pharmaceutical sector are faced with challenges - including financial constraints from the global recession and dwindling support from international donors - compelling facilities to introduce fees for service with significant implications for availability, affordability and accessibility of pharmaceutical supplies. Further research on funding is required to look at the specific funding interests of

donors and to outline factors leading to donor fatigue and the impact of this on beneficiaries, particularly, in the context of pharmaceutical supplies in Africa.

FB-DSOs working in the pharmaceutical sector play an important role in empowering pharmacy personnel with the sole aim of improving access to medicines through proper prescribing, dispensing and promoting rational drug use. However, limited evidence on human resource management was noted, and this highlights the need for more research in this area, to provide answers on how human resources are managed within FB-DSOs.

Some FB-DSOs are seen to play a key role in supporting the quality assurance testing of medicines in the PFP pharmaceutical market in Africa. On the other hand, others were found to be deficient in record keeping, quality assurance of medicines and compliance with medicine regulatory bodies especially for the medicines dispensed by FB-DSOs, which are mostly received from international donors. Improved monitoring and regulation by government through partnerships with FB-DSOs and promoting rational drug use to ensure equitable and affordable access to quality medicines is critical. There is a need for further research into the quality of medicines dispensed to patients by FB-DSOs in Africa.

The review confirmed the important role FB-DSOs play in the pharmaceutical supply chain to complement the national pharmaceutical system by improving access to medicines and related commodities thereby contributing to national health system strengthening.

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## Appendices

### Appendix A: Review Data table

References	Country/region	Method	DSO involvement	Partnership involvement	Role/position in pharma supply chain	Financing	Access	Quality	Affordability	Regulation	Stock outs	Training
LAMBERTS et al 1984.	Ghana	Questionnaire	Yes	Not specified	Quantification, procurement and supply of medicines to mission hospitals and clinics.	Medicines donated by international donors. Facilities pay a minimal amount for the medicines to raise funds to purchase medicines	Procurement of cheap essential medicines that can be easily transported to remote areas increased access to medicines					
ASENSO-OKYERE, W. K. 1995	Ghana		Not specified	Not specified	Providing medicines in rural areas at an affordable cost or at no cost for the poor		The poor receive medicines and other services for free at mission facilities	known to provide good quality service	Mission facilities charge for the medicines dispensed but the poor are exempted from paying			
GILSON et al 1995	Tanzania	Quantitative analysis	Yes	Not specified	Dispense medicines and medical supplies		High stock levels of medicines and medical supplies in church dispensaries, no contraception services, Poor immunization services	Church dispensaries provides quality services			Irregular vaccine supplies	Church dispensary understaffed. Training for staff annually
GRIMAUD 1998. .	Ivory coast	Case study	Yes	Yes	Dispensing medicines	Consultation fees, drug sales, reduced government and donor support	Decrease in patients turn out due to cost	Was known to provide affordable, rational and quality health care service	High costs of medicines and other services		Medicine shortages	

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AIDS ACTION 1999	Burkina Faso	Report	Yes	Yes	Medicine procurement and dispensing	IPC (Initiative Privée et Communautaire de lutte contre le SIDA) fund the purchase of medicines	ARVs and related medicines dispensed for free					
KAWASAKI et al 2002.	Kenya and Uganda	Qualitative and quantitative	Yes	Not specified	Procurement and supply of medicines to mission facilities, NGOs and the public sector	JMS receives funding from international donors while JMS is self-sustaining	MEDS and JMS have good drug stock level and better access to medicines		Cost of medicines from both organizations are higher than that of MSH price guide, JMS medicines cost 13% higher than the price index, MEDS medicines is 1% higher	MEDS is involved in quality assurance to meet the demands of their customers.		MEDS work closely with EPN in training of pharmacy professionals
ANDREWS, E. 2004.	Ghana	Interviews	Yes	Not specified	Medicines procurement and dispensing		Medicines dispensed for free to the poor at mission facilities while the rest pay		Medicines and related commodities cost more at mission facilities compared to public sector	mission sector adheres to prescribing regulation		
BANDA et al 2006	Multi-country	Questionnaire	Yes	Yes	Supply of medicines in rural and remote areas in Africa	Faith-based drug supply organization involved in funding for most of the African population	Improved access because of medicines are dispensed at affordable cost or at no cost.	Patients trust faith-based drug supply organizations for quality medicines at affordable costs.	Cost of medicines are affordable	Weakness in quality assurance of medicines and compliance with drug regulatory body		
LUM et al 2007.	Nigeria	Retrospective study	Yes	Yes	Supply of ART and related medicines, Adherence monitoring through home care visits	Medicines supply funded by PEPFAR and private donors	Supply of medicines and other services at no cost		Medicines supply, and other services are free of charge.			

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BALLOU-AARES et al 2008.	Ghana and Zambia		Yes	Yes	Dispensing of medicines to the poor in remote and rural areas	Inadequate resources and delay in payments from NHI.	Medicines and related commodities accessible to the poor and those in rural and remote areas.		Faith-based facilities supply medicines at no cost in Zambia			
CARLUCCI et al 2008.	Zambia	Interview	Yes	Yes	Dispensing of ART to adherent HIV positive patients in rural Zambia	Receive ART from government and AIDS Relief, procured medicines from government medical stores and private sector.	ART supplied to adherent patients, serve almost half of the HIV positive population in the catchment area.		ART and related medicines are supplied at no cost			
NJOZING et al 2010.	Cameroon	Retrospective cohort study	Not specified	Not specified	Supply of ART and Cotrimoxazole preventive therapy to HIV positive TB patients		Almost half of HIV positive TB patients were enrolled on ART and cotrimoxazole preventive therapy at faith-based facilities.					
ROOKES, P. J. 2010	Malawi	Qualitative	Yes	Not specified	Dispensing medicines and related commodities	Purchase medicines from the private-for-profit sector because of the from government, sale of medicines	Faith-based facilities in Malawi charge for medicines to prevent over population		Faith-based facilities in Malawi do not charge the poor patients identified by the staff do not pay for medicines		Irregularity of medicine supply	

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MCCABE et al 2011.	Ghana, Malawi and Mali	Report	Yes	Not specified	Maintaining good medicine stock level and dispensing	Payment in full or copayment by health insurance schemes in Malawi, CHAM supported by government, international donations and medicines sales	Medicines and related commodities supplied at no minimal at mission facilities					
EP NETWORK 2016.	Africa	Report	Yes	Yes	Capacity building, advocacy and awareness raising	pharmaceuticals procured through bulk purchasing	Improving access to family planning commodity through EPN stakeholder engagement and empowering pharmacy personnel		Supply medicines and related commodities to faith-based and public facilities at affordable cost.	Non-adherence to treatment guidelines, support quality assurance testing.		Training of pharmacy staff.
KAREEN SHAWA-DURAND 2017	Africa	Report	Not specified	Not specified	Training of pharmacy personnel		Improved access to medicines due to increase trained personnel					EPN support training of pharmacy personnel
KHULUZAFELIX et al 2017	Malawi	Drug availability and price recorded	Yes	yes	Medicines procurement and dispensing	International donors fund purchase of malaria medicines, medicines sales at CHAM facility	High stock of medicines at CHAM facilities compared to government, Medicines from the government and donors dispensed free	All the medicines Passed quality assurance testing	Drug cost more at CHAM facility than that at private for-profit sector	All medicines at the CHAM facilities passed quality assurance test	Low stock of antibiotics and stock out of quinine injection in many CHAM facilities.	
KHULUZAFELIX et al 2017	Malawi	Samples collection survey	Yes	Not specified	Quality assurance of medicines at facilities					All the medicines at CHAM facilities passed quality assurance test		

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KIBIRA et al 2017.	Uganda	Survey	Not specified	Not specified	Stock level and cost of maternal and reproductive health at mission facilities	Medicines are expensive in Uganda compared to international reference price.	Good stock of Maternal reproductive health medicines at mission facilities compared to private-for-profit facilities		Medicines unaffordable due to high prices. Medicines cheaper at mission facilities compared to private for profit.		High stock out of medicines at mission facilities compared to government facilities.	
PETERSEN et al. 2017.	LMIC/ Multi-County study	Laboratory test	Yes	Yes	Use of faith-based drug supply organizations to test the quality of essential medicines in the pharmaceutical market.	Process funded by international donors		Medicine from Europe found to be of poor quality compared to those from Sub-Saharan Africa		Private pharmaceutical sector in Cameroon, DRC and Nigeria had Falsified and substandard medicines, Antimalarial medicines found to be the most falsified and substandard drug		Training of pharmacy personnel at the faith-based drug organizations were trained on how the instrument works.

## Appendices

### Appendix B: Search terms

Main term	Related terms
Pharma*	Cold chain OR Drug distribution OR Drugs distribution OR Drug supply OR Drugs supply OR ART OR Medicine OR Medicine price OR Drug Procurement OR Dispensary OR Drug system OR Pharmaceutical Services OR pharmacy services OR pharmaceutical supply OR medicine OR procurement OR medicines procurement OR medicine supply OR medicines supply
Non-state provider	NSP OR Non-state providers OR Non-profit OR Not-for-profit OR non-profit OR NPO OR Private-not-for-profit OR PNF OR Non-governmental organization OR NGO OR ngo OR faith community OR faith communities OR Charities OR Faith-based OR Faith OR Religious OR Religion OR mission OR church OR JMS OR Joint Medical Stores OR CHANPHARM OR Christian Health Association of Nigeria OR MEDS OR Mission for Essential Drug Supplies OR CDC OR Catholic Drug Centre OR MEMS OR Mission for Essential Medical Supplies OR CSSC OR Catholic Social Services Commission OR CBC OR Cameroon Baptist Convention OR CHAM OR Christian Health Association of Malawi OR CHAZ OR Christian Health Association of Zambia OR AMFA OR affordable medicines for Africa OR BUFMAR OR Bureau des Formations Médicales Agréées du Rwanda OR OSEELC OR Oeuvre de Santé de l'Église Évangélique Luthérienne au Cameroun OR EEC OR Église Évangélique du Cameroun OR CAP/EPC OR Centrale d'Approvisionnement en Médicaments de l'Église OR OCASC OR Organization catholique pour la Santé au Cameroun
Region	Africa OR African OR Algeria OR Angola OR Benin OR Botswana OR "Burkina Faso" OR Burundi OR Cameroon OR "Cape Verde" OR "Cabo Verde" OR "Central African Republic" OR Chad OR Comoros OR Comores OR Comoro OR Congo OR "Congo-Brazzaville" OR "Congo Republic" OR "Republic of the Congo" OR "Côte d'Ivoire" OR "Democratic Republic of the Congo" OR "DR Congo" OR DRC OR "Congo-Kinshasa" OR Djibouti OR Egypt OR "Equatorial Guinea" OR Eritrea OR Eswatini OR Ethiopia OR Gabon OR Gambia OR "The Gambia" OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR "Sao Tome and Principe" OR "São Tomé and Príncipe" OR Senegal OR Seychelles OR "Sierra Leone" OR Somalia OR "South Africa" OR "South Sudan" OR Sudan OR Swaziland OR Togo OR Tunisia OR Uganda OR "United Republic of Tanzania" OR Tanzania OR Zambia OR Zimbabwe

Appendix C: Search strategy

Database	Date searched	Terms	Results
PubMed	07/08/ 2018	Search (("Cold chain" OR "Drug distribution"[Title/Abstract] OR "Drugs distribution"[Title/Abstract] OR "Drug supply"[Title/Abstract] OR "Drugs supply"[Title/Abstract] OR "ART"[Title/Abstract] OR Medicine[Title/Abstract] OR "Medicine price"[Title/Abstract] OR "Drug Procurement"[Title/Abstract] OR Dispensary[Title/Abstract] OR "Drug system"[Title/Abstract] OR "Pharmaceutical Services"[Title/Abstract] OR "pharmacy services"[Title/Abstract] OR "pharmaceutical supply"[Title/Abstract] OR "medicine procurement"[Title/Abstract] OR "medicines procurement"[Title/Abstract] OR "medicine supply"[Title/Abstract] OR "medicines supply"[Title/Abstract])) AND (faith[Title/Abstract] OR charit*[Title/Abstract] OR relig*[Title/Abstract] OR mission*[Title/Abstract] OR church[Title/Abstract])) AND (Africa OR African OR Algeria OR Angola OR Benin OR Botswana OR "Burkina Faso" OR Burundi OR Cameroon OR "Cape Verde" OR "Cabo Verde" OR "Central African Republic" OR Chad OR Comoros OR Comores OR Comoro OR Congo OR "Congo-Brazzaville" OR "Congo Republic" OR "Republic of the Congo" OR "Cote d'Ivoire" OR "Democratic Republic of the Congo" OR "DR Congo" OR DRC OR "Congo-Kinshasa" OR Djibouti OR Egypt OR "Equatorial Guinea" OR Eritrea OR Eswatini OR Ethiopia OR Gabon OR Gambia OR "The Gambia" OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR "Sao Tome and Principe" OR "Sao Tome and Principe" OR Senegal OR Seychelles OR "Sierra Leone" OR Somalia OR "South Africa" OR "South Sudan" OR Sudan OR Swaziland OR Togo OR Tunisia OR Uganda OR "United Republic of Tanzania" OR Tanzania OR Zambia OR Zimbabwe)	657
EBSCOhost Africa-wide Information 426 CINAHL 22	08/08/2018	TI ( "Cold chain" OR" Drug distribution" OR "Drugs distribution" OR "Drug supply" OR "Drugs supply" OR "ART" OR Medicine OR "Medicine price" OR "Drug Procurement" OR Dispensary OR "Drug system" OR "Pharmaceutical Services" OR "pharmacy services" OR "pharmaceutical supply" OR "medicine procurement" OR "medicines procurement" OR "medicine supply" OR "medicines supply" ) AND AB ( faith OR charit* OR relig* OR mission* OR church ) AND TX ( Africa OR African OR Algeria OR Angola OR Benin OR Botswana OR "Burkina Faso" OR Burundi OR Cameroon OR "Cape Verde" OR "Cabo Verde" OR "Central African Republic" OR Chad OR Comoros OR Comores OR Comoro OR Congo OR "Congo-Brazzaville" OR "Congo Republic" OR "Republic of the Congo" OR "Côte d'Ivoire" OR "Democratic Republic of the Congo" OR "DR Congo" OR DRC OR "Congo-Kinshasa" OR Djibouti OR Egypt OR "Equatorial Guinea" OR Eritrea OR Eswatini OR Ethiopia OR Gabon OR Gambia OR "The Gambia" OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR "Sao Tome and Principe" OR "São Tomé and Príncipe" OR Senegal OR Seychelles OR "Sierra Leone" OR Somalia OR "South Africa" OR "South Sudan" OR Sudan OR Swaziland OR Togo OR Tunisia OR Uganda OR "United Republic of Tanzania" OR Tanzania OR Zambia OR Zimbabwe )	448
Web of Science	09/08/2018	TITLE: ("Cold chain" OR" Drug distribution" OR "Drugs distribution" OR "Drug supply" OR "Drugs supply" OR "ART" OR Medicine OR "Medicine price" OR "Drug Procurement" OR Dispensary OR "Drug system" OR "Pharmaceutical Services" OR "pharmacy services" OR "pharmaceutical supply" OR "medicine procurement" OR "medicines procurement" OR "medicine supply" OR "medicines supply" ) AND TOPIC: (faith OR charit* OR relig* OR mission* OR church) AND TOPIC: (Africa OR African OR Algeria OR Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR Cape Verde OR Cabo Verde OR Central African Republic OR Chad OR Comoros OR Comores OR Comoro OR Congo OR Congo-Brazzaville OR Congo Republic OR Republic of the Congo OR Côte d'Ivoire OR Democratic Republic of the Congo OR DR Congo OR DRC OR Congo-Kinshasa OR Djibouti OR Egypt OR Equatorial Guinea OR Eritrea OR Eswatini OR Ethiopia OR Gabon OR Gambia OR The Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR Sao Tome and Principe OR São Tomé and Príncipe OR Senegal OR Seychelles OR Sierra Leone OR Somalia OR South Africa OR South Sudan OR Sudan OR Swaziland OR Togo OR Tunisia OR Uganda OR United Republic of Tanzania OR Tanzania OR Zambia OR Zimbabwe)	446

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### Appendix E: Instructions for authors: Health Policy and Planning

*Health Policy and Planning* improves the design, implementation and evaluation of health policies in low- and middle-income countries through providing a forum for publishing high quality research and original ideas, for an audience of policy and public health researchers and practitioners. *HPP* is published 10 times a year.

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- [Guidance](#)
  - i. [Improving chances of publication](#)
  - ii. [Manuscript format and style for all articles](#)
- [Types of papers](#)
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#### Guidance

##### Improving chances of publication

As well as the high overall quality required for publication in an international journal, authors should take into consideration:

- Addressing *HPP*'s readership: national and international policy makers, practitioners, academics and general readers with a particular interest in health policy issues and debates.
- Manuscripts that fail to set out the international debates to which the paper contributes, and to draw out policy lessons and conclusions, are more likely to be rejected, returned to the authors for redrafting prior to being reviewed, or undergo a slower acceptance process.
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- Public health specialists writing about a specific health problem or service should discuss the relevance of the analysis for the broader health system. Those submitting health policy analyses should draw on relevant bodies of theory in their analysis, or justify why they have not, rather than only presenting a narrative based on empirical data.
- Primarily focus on one or more low- or middle-income countries.

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Prepare your manuscript, including tables, using a word processing program and save it as a **.doc**, **.rtf** or **.ps** file. Use a minimum font size of 11, double-spaced and paginated throughout including references and tables, with margins of at least 2.5 cm. The text should be left justified and not hyphenated.

The **title page** should contain:

- Title - please keep as concise as possible and ensure it reflects the subject matter
- Corresponding author's name, address, telephone/fax numbers and e-mail address
- Each author's affiliation and qualifications
- Keywords and an abbreviated running title
- 2-4 Key Messages, detailing concisely the main points made in the paper
- Acknowledgements
- A word count of the full article

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For useful information on preparing your figures for publication, go to <http://cpc.cadmus.com/da>.

All **measures** should be reported in SI units, followed (where necessary) by the traditional units in parentheses. There are two exceptions: blood pressure should be expressed in mmHg and haemoglobin in g/dl. For general guidance on the International System of Units, and some useful conversion factors, see 'The SI for the Health Professions' (WHO 1977).

Manuscript file must include text body. Title Page, Figures and Tables should be uploaded separately.

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Page 1: Title Page – as above.

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Page 3: **Introduction**. The Introduction should state the purpose of the investigation and give a short review of the pertinent literature and be followed by:

**Materials and methods**. The Materials and methods section should follow the Introduction and should provide enough information to permit repetition of the experimental work. For particular chemicals or equipment, the name and location of the supplier should be given in parentheses.

**Results**. The Results section should describe the outcome of the study. Data should be presented as concisely as possible, if appropriate in the form of tables or figures, although very large tables should be avoided.

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**Abbreviations**. Non-standard abbreviations should be defined at the first occurrence and introduced only where multiple use is made. Authors should not use abbreviations in headings.

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Baker and Watts (1993) found...

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## Appendices

reference list must be typed double-spaced in alphabetical order and include the full title of both paper (or chapter) and journal (or book), thus:

Baker S, Watts P. 1993. Paper/chapter title in normal script. Journal/book title in italics **Volume number in bold:** page numbers.

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For the reporting of statistical analyses please consider the following additional points:

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- Provide information about participation and missing data.
- As much as possible, describe results using meaningful phrases (e.g., do not say "beta" or "regression coefficient", but "mean change in Y per unit of X"). Provide 95% confidence intervals for estimates.
- Report the proportions as *N* (%), not just %.
- Report *P* values with 2 digits after the decimal, 3 if <0.01 or near 0.05 (e.g., 0.54, 0.03, 0.007, <0.001, 0.048). Do not report *P* values greater than 0.05 as "NS".
- Always include a leading zero before the decimal point (e.g., 0.32 not .32).
- Do not report tests statistics (such as chi-2, T, F, etc.)."

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Checklists have been developed for a number of study designs, including randomized controlled trials (CONSORT), systematic reviews (PRISMA), observational studies (STROBE), diagnostic accuracy studies (STARD) and qualitative studies (COREQ, RATS). We recommend authors refer to the EQUATOR Network website (<http://www.equator-network.org>) for further information on the available reporting guidelines for health research, and the MIBBI Portal for prescriptive checklists for reporting biological and biomedical research where applicable. Authors are requested to

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