PSA TRANSFORMING
THE SUPPLY CHAIN

The Role of the Health Supply Chain in Facilitating Universal Health Coverage Across East Africa

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Acronym Table

AMPATH	Academic Model Providing Access to Healthcare
BSC	Balanced Scorecard Framework
CBHI	Community-based Health Insurance
CCM	Community Case Management
CHAI	Clinton Health Access Initiative
CHW	Community Health Workers
ERP	Enterprise Resource Planning
GDP	Gross Domestic Product
HSCM	Health Supply Chain Management
HSSP	Health Sector Strategic Plan
IAEG	Inter-agency and Expert Group
KEMSA	Kenya Medical Supplies Authority
MoH	Ministry of Health
MPPD	Medical Production and Procurement Division
MSD	Medical Stores Department
MTSP	Medium-term Strategic Plan
NCD	Non-communicable Disease
NGO	Non-governmental Organisation
NHIF	National Health Insurance Fund
OOPP	Out-of-pocket Payments

PHC	Primary Health Care
PiH	Partners in Health
RFP	Revolving Fund Pharmacy
SC4CCM	Supply Chain for Community Case Management
SCALE	Supply Chain Alternatives for Last Mile Equity
SDG	Sustainable Development Goal
SF	Substandard or falsified
TFDA	Tanzania Food and Drugs Authority
UHC	Universal Health Coverage
UN	United Nations
USAID	U.S. Agency for International Development
VP	Vertical Programme
VSP	Vital Signs Profile
WHO	World Health Organisation

Acknowledgements

1. Executive Summary

1.1 Introduction

This paper provides a case-study comparison of the role of the health supply chain in achieving Universal Health Coverage (UHC) in three countries of the East African Community: Kenya, Tanzania and Rwanda. It examines the best practices and challenges of these countries' respective health supply chains and uses evidence-based research gleaned from desk literature reviews and semi-structured interviews with key informants. This research paper aims to approach the following research questions:

1. What are some of the initiatives that have been implemented in the health supply chain to increase UHC?

2. What are some of the main bottlenecks health supply chains face when aiming to facilitate UHC?

3. What information can a cross comparative analysis of three East African countries provide for supply chains in other LMICs aiming to achieve UHC?

In 2015, the United Nations (UN) set the Sustainable Development Goals (SDGs) for 2030 to address the breadth of challenges facing humanity and the planet. Goal 3 of the 17 Sustainable Development Goals specifically targeted health, aiming to ensure healthy lives and promote well-being for all, at all ages (United Nations, 2015). At the heart of this goal is the achievement of UHC, which requires that all people have access to essential health services and medicines, from health promotion to prevention, treatment, rehabilitation and palliative care, without incurring financial hardship. Whilst Sub-Saharan Africa's score on the UHC Service Coverage Index doubled from 22 to 42 between 2000 and 2017, Sub-Saharan Africa still reports an Index score below average and has the second lowest score across all regions. In Low- and Middle-Income Countries (LMICs), Out Of Pocket Payments (OOPPs) disproportionately affect those in the lowest socioeconomic groups. Reducing the high proportion of OOPPs experienced by LMICs is a key challenge that must be overcome to increase financial risk protection and facilitate the achievement of UHC. Further, challenges have recently been exacerbated by the pandemic. In particular, a recent modelling study predicted that LMICs, especially in Africa, are especially vulnerable to the indirect effects of COVID-19 on supply chains across all industries (Roberton et al., 2020).

This research adopts a broad view of health supply chains to align with the goals of UHC, recognising the critical role of health supply chain management for facilitating UHC and noting the lack of literature

discussing this. Understanding the current challenges and successes of the health supply chain is therefore essential to recognise its role in UHC.

1.2 Methodology

This research uses a healthcare supply chain management framework to identify barriers and enablers to the achievement of UHC. It adopts a comparative, policy-oriented approach, examining the health supply chain challenges and practices of three East African countries (Kenya, Tanzania and Rwanda) in their efforts to expand healthcare coverage. To improve cross-comparability, a preliminary data analysis framework was created (see Table 2). This was guided by the World Health Organisation (WHO) Building Blocks framework and Steele's definition of the 7 supply chain functions and is used throughout the paper to identify how the health supply chain is facilitating UHC (WHO, 2010; Steele et al., 2019).

For all case studies, a review of literature was conducted from a range of online sources. Two semi-structured interviews were conducted with professionals with expertise in their country's approach to UHC for Kenya and Tanzania respectively. The Rwanda case study utilised a more in-depth literature review (a coded qualitative study using NVivo) instead of a Key Informant interview.

1.3 Findings: Rwanda, Kenya and Tanzania

1.3.1 Rwanda

In Rwanda, the procurement of health supplies is coordinated at the national level by the Medical Production and Procurement Division which acts as a Central Medical Store. At the local level, other actors such as health facilities, community health workers or individual patients also perform procurement activities. Rwanda's health system is characterised by political decentralisation and the national government has progressively decentralised health financing. Rwanda uses a type of community-based health insurance scheme (named *Mutuelles*) which subsidises premiums and co-payments for health services provided at contracted healthcare facilities. These have provided a pro-poor benefit package and have played an important role in increasing rates of health services utilisation.

Rwanda has benefited from high foreign investment and the government has leveraged earmarked funding towards strengthening Rwanda's whole health system. The national government established a national health information system to inform policy priority setting and support a culture of data-driven policymaking. Other

areas of strength include mobile penetration, the development of mHealth programmes and the use of drones to deliver health supplies.

Whilst Rwanda has a decentralised health system, the national government retains most decision-making power. However, research has shown that high levels of autonomy in decision-making at the local level could be useful. Other challenges include 'brain drain' and skills gaps amongst workers, gaps in medicine selection for the treatment of non-communicable diseases (NCDs), delays by decision-makers at the policy implementation stage and issues with medicine availability at community level. As the great majority of Rwanda's population lives in rural areas, the location of specialised Health Centres and referral hospitals also constitutes a barrier to patient access. The low availability of medicines in public or faith-based sectors also often forces patients to buy from the private sector at higher cost and with no Community-Based Health Insurance scheme coverage. Despite the above challenges, Rwanda has shown gains in key health indicators such as increased life expectancy and declines in maternal mortality. A key remaining challenge is the availability of NCD-related and generic medicine, though researchers note Rwanda fares slightly better than its counterparts in this area.

1.3.2 Kenya

The President of Kenya, Uhuru Kenyatta, made a commitment in 2018 to achieve UHC in Kenya by 2022. This led to the creation of a (now dissolved) Department of Universal Health Coverage, which worked horizontally across all ministries and demonstrated the strong political will for UHC. Kenya has a pluralistic healthcare system, with public and private healthcare facilities in almost equal measure. The Kenya Medical Supplies Authority (KEMSA) and the National Health Insurance Fund (NHIF) are the key players when considering the role of supply chains in achieving UHC.

In Kenya, multiple contracting during procurement has been a pivotal reform. KEMSA has also implemented an e-procurement system and created an expanded list of essential medicines. Regarding quality assurance and substandard or falsified medicines, Kenya is a Centre of Excellence in Pharmacovigilance. KEMSA implemented an e-mobile service and created Community Health Volunteers who initiate dialogue about services to help ensure the needs of all individuals are being reflected. Kenya also uses a Revolving Fund Pharmacy, based on a Drug Revolving Fund Model, which works in collaboration with the Ministry of Health (MoH) and KEMSA, and has been adaptive in the wake of the COVID-19 pandemic.

The NHIF has been a central part of Kenya's goal to achieve UHC and offers prepaid mechanisms to reduce OOPPs, with mandatory membership for all formal sector workers. However, there are problems with the

implementation of the system, including passive purchasing practices, high administrative costs, regressive premium rates, pro-urban and pro-private bias, delayed payments, and a lack of communication about changes to the NHIF services. Other challenges Kenya faces within its health supply chain for UHC include fragmentation of the legal system, a recent corruption scandal concerning funds for COVID-19 supplies and a reliance on donor funds and OOPPs for funding health services.

1.3.3 Tanzania

The Medical Stores Department (MSD) functions autonomously to acquire medical supplies and disseminate them to the national, regional and district hospitals. More broadly, the Ministry of Health and Social Welfare has implemented Health Sector Strategic Plans (most recently the HSSP V, 2021-2026) to spearhead efforts towards universal health access. Core recent supply chain enhancements at MSD include modernised warehouse construction, fleet acquisition and the installation and integration of an electronic logistics management information system. Pharmacovigilance is also conducted and is guided by the Tanzania Food and Drugs Authority.

The Ministry of Health, through the Tanzanian National Health Insurance Fund and Community Health Fund, provides additional sources for healthcare financing. The NHIF has the main objective to increase wider accessibility to healthcare services and is mandatory for all public servants (with extended services to private institutions, children and farmers). It includes access to primary health care, essential medicines and medical products, though covers a small minority and caters less for individuals in the informal sector. The Community Health Fund helps to bridge gaps by prioritising coverage for individuals in the rural informal sector through a cost-sharing model. There are also Vertical Programmes focusing on particular disease groups and funded by donors. A large proportion of the essential medicines procured by MSD are directly funded by Vertical Programmes (VPs).

Ongoing challenges in Tanzania include a lack of pricing regulation resulting in unpredictable price mark-ups, unimproved order fill rates and continued reliance on the donor community. Tanzania's vital signs profile also highlights a high frequency of stockouts and a lack of a skilled workforce.

2. Introduction

In 2015, the United Nations (UN) set the Sustainable Development Goals (SDGs) for 2030 to address the breadth of challenges facing humanity and the planet. Goal 3 of the 17 SDGs specifically targeted health, aiming to ensure healthy lives and promote well-being for all, at all ages (United Nations, 2015). At the heart of this goal is the achievement of Universal Health Coverage (UHC), which requires that all people have access to essential health services and medicines, from health promotion to prevention, treatment, rehabilitation and palliative care, without incurring financial hardship.

Since 2000, improvements in UHC have been reported across all regions and income groups; increasing globally on the UHC Service Coverage Index from an average of 45 out of 100 in 2000 to 68 in 2019 (WHO, 2021). Progress has been greatest in lower income countries, often starting from a lower base and with interventions able to have a greater impact. The region demonstrating the strongest progress was Sub-Saharan Africa, with the index score almost doubling from 22 to 43 from 2000 – 2017. Despite this, Sub-Saharan Africa still reports a UHC Service Coverage Index score below the average, the second lowest score across all regions (United Nations, 2021). The comparison of the UHC Service Coverage index across different regions in 2017 is shown in Figure 1.
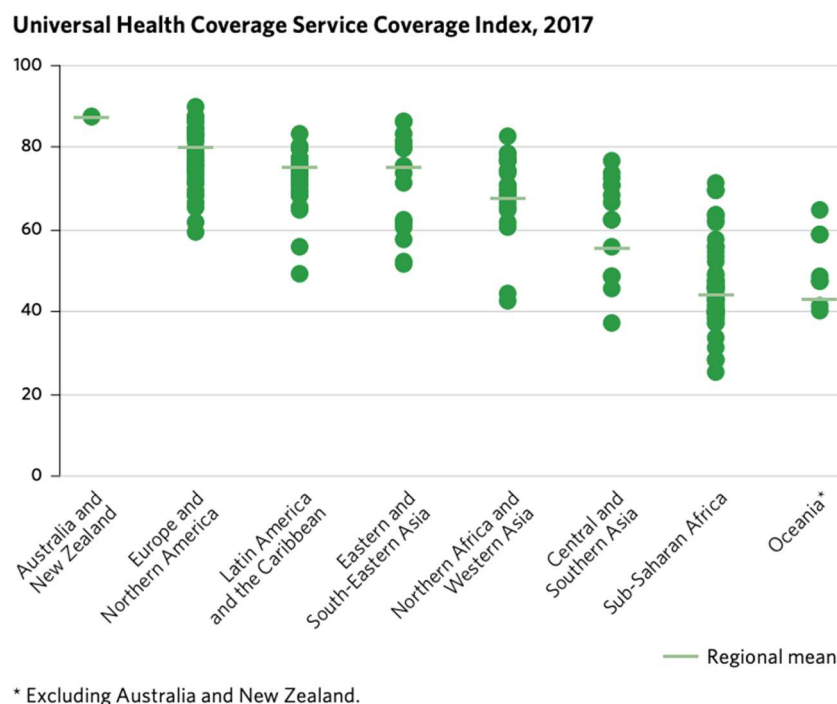

Figure 1 United Nations, 2021

Notable from this figure is the large range of scores across the region of Sub-Saharan Africa, highlighting the need for specific country analysis when determining future needs for the realisation of UHC.

The role of the health supply chain in aiming to achieve UHC is undeniable. It acts as a key foundation to a successful healthcare system within a country, with key activities including the procurement of quality medicines at affordable prices, the successful transportation and tracking of medicines, safe storage, and distribution of medicines to every individual no matter their location or income. Nevertheless, literature discussing the role of the health supply chain for UHC is minimal, providing little research or guidelines for regions hoping to achieve the SDG's health goals.

The nature and challenges of a health supply chain is highly country dependent, impacted by geographic, economic and social factors. Recently these challenges have been exacerbated by the COVID-19 pandemic, with progress towards the goal of UHC having been stalled or even reversed, meaning that health inequalities have been amplified both nationally and internationally (United Nations, 2021). In particular, a recent modelling study predicted that low and-middle-income countries (LMICs), especially in Africa, are particularly vulnerable to the indirect effects of COVID-19 on supply chains across all industries (Roberton et al., 2020). Understanding the current challenges and successes of the health supply chain is therefore essential to recognise its role in UHC.

This paper provides a case-study comparison of the health supply chain when aiming to achieve UHC in three countries of the East African Community; Rwanda, Kenya and Tanzania. In particular, this research aims to go beyond health insurance schemes as the main method to improve access to healthcare by examining best practices and challenges of the countries' respective health supply chains. By using evidence-based research gleaned from desk literature reviews and semi-structured interviews with key informants, this research paper aims to approach the following research questions:

1. What are some of the initiatives that have been implemented in the health supply chain to increase UHC?

2. What are some of the main bottlenecks health supply chains face when aiming to facilitate UHC?

3. What information can a cross comparative analysis of three East African countries provide for other LMIC supply chains in aiming to achieve UHC?

3. Literature Review

This section provides an overview of key terms, namely that of universal health coverage (UHC), health supply chains and health supply chain management (HSCM). In doing so, the framework used for the papers and country specific findings is detailed.

3.1 Universal Health Coverage as a Global Goal

Universal Health Coverage (UHC) was declared a development target under the 17 UN's SDGs.

Goal 3.8 states: 'achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all' (United Nations, 2015).

Following this commitment and based on the recommendations of the UN Inter-agency and Expert Group (IAEG), the need to define and measure UHC with greater specificity was highlighted. Two indicators, 3.8.1 and 3.8.2, were created and confirmed in 2017.

Indicator 3.8.1: Coverage of essential health services (defined as the average coverage of essential services based on tracer interventions that include reproductive, maternal, newborn and child health; infectious diseases; noncommunicable diseases; and service capacity and access; among the general and the most disadvantaged population).

Indicator 3.8.2: Proportion of population with large household expenditures on health as a share of total household expenditure or income (IAEG, 2017).

The construction and rationale of these indicators is provided in greater detail by the UN (United Nations Statistics Division, 2021) and the 2017 Global Monitoring Report, collaboratively produced by the World Health Organisation (WHO) and the World Bank (WHO and the World Bank, 2017).

While UHC is a broad term with many facets and measurable outcomes, goal 3.8 and its indicators highlight that the two key recognised elements of UHC are: 1) service coverage, and 2) financial risk protection.

The incidence of catastrophic health expenditure, which refers to medical expenses posing a threat to a household's maintenance, increased every year between 2000 and 2015 (WHO, 2019). According to the WHO, the percentage of the population impoverished by out-of-pocket payments (OOPPs) for health increased from 1.8% in 2000 to 2.5% in 2015 (ibid.). While this decline was common across all regions, countries who invest more of their Gross Domestic Product (GDP) tend to experience fewer effects. Furthermore, it is well

documented that in LMICs OOPPs disproportionately affect those in the lowest socioeconomic groups and can lead to worsening of poverty and the widening of inequalities. Reducing the high proportion of OOPPs experienced by LMICs is a key challenge to increase financial risk protection and facilitate the achievement of UHC. Ensuring that service coverage increases while also being financially accessible to all is pivotal to the global goal of UHC by 2030.

3.2 Definitions

3.2.1 Universal Healthcare Coverage and Access

In this research, "universal healthcare coverage" will refer to the extent to which populations under study are able to access healthcare services, mostly in terms of scope (the types of services they have access to). For conceptual clarity, we will distinguish between four dimensions of "access":

1) Affordability, defined as the financial or economic ability to pay for healthcare services – here, we consider a patient has the ability to pay for healthcare services when it does not represent an out-of-pocket expenditure; however, we will not limit our understanding of "affordability" to access to public health insurance schemes, since they do not always necessarily increase patients' ability to pay

2) Availability, defined as the physical presence of healthcare services or products at one's location

3) Obtainability, defined as patients' physical ability to gain access to (a) certain type(s) of health service(s) – for instance, some drugs are affordable and in stock at a local pharmacy, but they can only be obtained through prescription by an authorised health professional

4) Quality, defined as one's ability to access healthcare services or products that are suitable for the treatment of the health condition it is intended to treat and are of sufficient quality.

3.2.2 The Health Supply Chain

Core Functions of the Health Supply Chain

The Logistics & Supply Chain Management Manual defines a supply chain as 'a network of organisations that are involved, through upstream and downstream linkages, in the different processes and activities that produce value in the form of products and services in the hands of the ultimate consumer" (Christopher, 2016). The health supply chain therefore specifically refers to the network used to supply healthcare products and services, including essential medicines and access to facilities. In particular, health supply chain literature commonly refers to the procurement, storage, and distribution as core functions of the supply chain in its provision of essential health commodities. Each of these core functions involves several other sub-functions and requires a co-ordinated approach to facilitate a health supply chain that works effectively.

A Broader View to Align With the Goals of Universal Health Coverage

Whilst health supply chains have commonly been associated with their core functions - including procurement, storage, and distribution - developments in healthcare strategy and goals highlight that this understanding is often too narrow and does not recognise how the health supply chain is integrated within a wider healthcare system (Steele et al., 2019; Betcheva et al., 2020). With particular reference to healthcare, the term health supply chain management (HSCM) is more frequently referred to in literature.

HSCM prioritises the management of upstream and downstream supply chain activities. Effective HSCM considers the complete coordination of all supply chain segments in order to maintain the quality of health commodities whilst keeping costs low (Dobrzykowski, 2019). The process is versatile and takes a total system approach in increasing the efficiency of the entire business process from raw materials to a finished product. In the health supply chain, a range of stakeholders from the manufacturer to the health care facilities deliver materials and information to ensure quality patient care. This approach aims to ensure that the right health commodities are present in sufficient quantities.

When more broadly considering the whole health system beyond HSCM, one of the most widely used and internationally recognised frameworks is the WHO Building Blocks, designed in 2007, and adapted by many subsequent scholars and organisations for different goals. Steele et al. (2019) outline how these key health system building blocks overlap with the functions and management of a health supply chain. Drawing from this original resource, Table 1 demonstrates how the health supply chain is essential for every aspect of a successful health system, often integrated across all requirements.

To ensure that essential medicines are discussed, we refer to the first building block as health service and medicine delivery, rather than simply health service delivery. The WHO Building Block framework additionally includes a separate block for 'Access to Essential Medicines,' which is not included in the original table by Steele et al., presumably as it is a cross-cutting supply chain area which all other areas contribute to.

WHO Building Block	Health Supply Chain Management Functions
Health Service and Medicine Delivery	• Procurement • Storage • Distribution • Quality Assurance
Health Workforce	• Staffing • Skills and training • Working conditions

	• Motivation and incentives
Health Information Systems	• Inventory management • Quantification • Forecasting
Health Systems Financing	• Funding (Donor and Government) • Purchasing practices • Investments • Health insurance schemes
Leadership and Governance	• Legal structure and policies • Transparency and accountability • Stakeholder management and co-ordination

Table 1: WHO Building Blocks and associated HSCM functions (Adapted from Steele et al. 2019).

The Role of the Health Supply Chain in Universal Health Coverage

Universal health coverage therefore relies largely on sustained HSCM efforts. A plethora of issues arise as a direct consequence of inefficient HSCM which is felt most harshly in LMICs. These issues indicate the dire need for strategic frameworks streamlined across the supply chain to improve patient-oriented care, integration, and oversight.

The role of the health supply chain in facilitating UHC is undeniable. Timely and financially viable procurement, successful storage and then delivery of adequate health commodities to every location is essential in propagating this developmental agenda. The health supply chain therefore plays a foundational and continual supportive role in facilitating UHC.

3.2.3 Framework of This Paper

Our definition of "<u>health(care) supply chains</u>" will combine Steele's definition of 7 supply chain functions (selection of medicine, quantification, procurement, quality assurance, inventory management, warehousing, distribution and support functions[1]) with the World Health Organisation's (WHO) 6 core health systems building blocks and indicators (health service delivery, health workforce, health information, essential medicines, health financing and leadership and financing) as outlined in the below table (Steele et al., 2019;WHO, 2010). The building blocks and associated HSCM functions as outlined in Table 2 are used as the framework throughout this paper to identify how the health supply chain is facilitating UHC.

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[1] Termed enabling functions in this paper

Table 2: Adapted health(care) supply chains functions	
Supply Chain Functions (Health Service and medicine delivery)	Procurement
	Inventory management (including selection and quantification)
	Warehousing
	Quality assurance
	Distribution
Enabling Functions	Health Workforce
	Health Information Systems
	Financing
	Leadership and governance

A compromise in any of the above mentioned processes has a direct effect on both the end-user and the health system. The functions will be used as a guide and not necessarily an exhaustive definition of health(care) supply chains, particularly as they often interact and overlap.

The need for this broader approach that considers the whole health system is particularly important when considering the role of the health supply chain in facilitating UHC; to recognise not only the processes that the health supply chain is responsible for, but how they impact the end user's ability to access and afford essential medicines and care. The importance of this approach was reinforced by results not only from literature, but also from interviews with key informants, who referred to the WHO building blocks as a pivotal framework for their national approach to achieving UHC.

This paper therefore takes into account the need for a broader definition of HSCM, emphasising how health supply chains are an integral part of a health system which effectively facilitates UHC. In particular, various stakeholder involvement and coordination across the health supply chain is crucial to sustain functionality across a health system, as well as accessibility and affordability of healthcare. We therefore refer to different stakeholders' involvement in the health supply chain, such as government agencies, non-government organisations, health facilities, and citizens and patients, to take a broader approach to recognise how the supply chain works to ensure the undisrupted flow of essential medicines and care services at affordable prices for UHC.

4. Methodology

The broad definition of HSCM and its role in the wider health system discussed in the Literature Review has guided the methods employed in this research paper, including conducting literature analysis and interviews with key informants.

This research aims at identifying best practices in expanding healthcare coverage at the national level. In particular, it uses a HSCM framework to identify barriers and enablers to the achievement of UHC. The research is based on a cross-comparative study of health supply chain-related challenges experienced by three countries of East Africa (Kenya, Tanzania and Rwanda) in their efforts to expand healthcare coverage. This method was selected as research relating to supply chain aspects of UHC is currently relatively limited; as such, a cross-comparative analysis would allow for a more detailed baseline study of different aspects of this relationship. Further, this research is also policy-oriented; as such, comparing "best practices" implemented in different countries will allow for more pragmatic insights into policy responses implemented in various contexts.

4.1 Case Study Settings

Case study selection was conducted through a preliminary comparative review of grey and scientific literature outlining challenges and policies implemented in member countries of the East African Community. The choice of Kenya, Tanzania and Rwanda as case studies stemmed from their geographical proximity, but also from their reputation for having achieved impressive gains in healthcare systems strengthening and coverage. However, those gains have not necessarily been made through similar means.

These countries act as a small representation to showcase the current state and progress towards the SDG of achieving UHC by 2030, and highlight how the health supply chain is facilitating this aim. As previously discussed, UHC indicators are lagging in most LMICs. Further, many LMICs are also currently experiencing an epidemiological transition from communicable conditions to non-communicable conditions. Recognising the specific bottlenecks and current initiatives of these countries offers critical knowledge to understand how the health supply chain and its management can be engaged to propel the realisation of UHC.

4.2 Data Collection

For all case studies, a review of literature was conducted from a range of online sources. Two semi-structured interviews were also conducted, one focusing on UHC and HSCM in Kenya and one focusing on UHC and

HSCM in Tanzania. The interviews took place on online platforms with national health supply chain professionals with expertise in their country's approach to UHC. The semi-structured interview was designed to approach all aspects of HSCM and UHC and catered for each informant's expertise.

The Rwanda case study used a more in-depth literature review (a coded qualitative study using NVivo) instead of a key informant interview. For this, a total of 51 files were initially collected for a systematic desk and literature review, including 30 peer-reviewed papers, 11 policy reports and 10 interview transcriptions or direct policymaker communications (e.g. blog posts). The main method used for the collection of the 30 scientific papers was a systematic literature review, which included the use of general (e.g. Google Scholar) and specialised search engines (e.g. PubMed). The policy reports and interview transcriptions were collected through search engine (Google) and snow-ball sampling. The papers were then coded into the qualitative data analysis software NVivo 12 (v.12.6.1.). The files were classified by author and date of publication; to ensure a close understanding of the text, their content was coded manually into a pre-designed coding matrix following the preliminary framework established in section 3.2.3 The matrix was then developed inductively throughout the analysis to reflect the particularities of the case study.

4.3 Data Analysis

Taken together, the literature and interviews were analysed with a broad definition of HSCM and the health system in order to better understand their role for UHC. To improve cross-comparability, a preliminary data analysis framework guided by the WHO Building Blocks and the subsequent HSCM functions was developed in the early stages of research (see Table 2). Both primary and secondary data collected through desk review and interviews were examined through content analysis; the analysis thus focused on the identification of main themes or topics that were directly related to the research questions.

5. Findings

5.1 Rwanda

5.1.1 Overview: Results and Data Collection

Due to constraints of time and space, the following analysis focuses on the 30 peer-reviewed papers. As outlined in the methodology, they were coded into the qualitative data analysis software NVivo 12 (v.12.6.1.), following the preliminary framework established in section 3.2.3. Overall, 7241 references across 30 files were coded throughout the analysis.

5.1.2 Background

Organisation
Governmental Agencies

The main governmental agency coordinating health services at the national level is the Ministry of Health (MoH), whose aim is 'to provide and continually improve affordable promotive, preventive, curative and rehabilitative health care services of the highest quality, thereby contributing to the reduction of poverty and enhancing the general well-being of the population,' through the fulfilment of four main objectives (Republic of Rwanda MoH, n.d.)

1) *Full implementation of the main health programmes (improve demand, access and quality)*

2) *Strengthen the health systems building blocks (strengthen policies, resources and management)*

3) *Strengthen all levels of service delivery (organize the services effectively at all levels, referrals)*

4) *Ensure effective governance of the sector (strengthen decentralization, partnership, private sector coordination, aid effectiveness, and financial management)*

The literature highlights at least four types of HSCM-relevant MoH subdivisions:

1) <u>Programmes and departments</u>: disease-specific programmes (eg. malaria, maternal and child health) and departments (eg. Department of Mental Health and Substance Abuse) (Chandani et al., 2014; Ng and Harerimana, 2016; Smith et al., 2017).

2) <u>Regulatory agencies:</u> the *Bureau des Formations Médicales Agréées* (BUFMAR - Medical Education Office) and the Performance-Based Financing System (Huttinger et al., 2017; Bizimana et al., 2020).

3) <u>Supply chain management</u>: the community health desk, which coordinates the procurement of products at community level, and the Rwanda Biomedical Centre, including the Medical Procurement and Production Division (MPPD) (Central Medical Store) and the Rwanda Food and Drug Authority (Bizimana et al., 2020; Chandani et al., 2014; Karim et al., 2021; Uwizeyimana et al., 2021)

4) <u>Surveillance and preparedness:</u> Rwanda's Electronic Infectious Disease Surveillance and Response, the National Reference Laboratory, National Epidemic Prevention Control Coordination Committee and the Risk Communication and Community Engagement team, all of which were involved in COVID-19 preparedness and response in 2020 (Karim et al., 2021).

In addition to the MoH, the literature also identifies the Ministry of Infrastructure, the Ministry of Finance and Economic Planning (including the Rwanda Social Security Board), the Ministry of Local Administration and members of departments of the executive office (President of the Republic, Prime Minister, Treasury) as entities involved in HSCM at the level of the national government (Huttinger et al., 2017; Nyandekwe et al., 2014; Karim et al., 2021; Krakauer et al., 2018; Sekabaraga et al., 2011; Uwizeyimana et al., 2021; Bizimana et al., 2020).

Public Health Providers and Health Insurance

Rwanda's health system is characterised by political decentralisation, particularly regarding health service provision and fiscal decentralisation (Sekabaraga et al., 2011). We can differentiate between three types of healthcare facilities (HCFs): <u>National-level public hospitals</u> which offer both general and specialised services, <u>district-level health centres</u> which mostly offer access to basic primary and preventative care and <u>community health centres</u> which offer basic essential care. However, since the great majority of Rwanda's population lives in rural areas, the location of specialised health centres and referral hospitals constitutes a great barrier to patient access to those services (Small et al., 2019). This is further compounded by travel obstructions such as poor road conditions in some areas or ambulance delays due to miscoordination at health centre or hospital level. In addition, if patients manage to make their way to their destination facility on time, they might still experience treatment delays due to resource shortages, potentially with life-threatening consequences (Small et al., 2019).

Patients have access to private and public health insurance. The *mutuelles* are a type of community-based health insurance (CBHI) scheme and the main public health insurance providers in Rwanda. Other public health insurance schemes also cater for the military and civil servants. *Muteuelles* subsidise premiums and co-

payments for most (but not all) healthcare services provided at contracted HCFs (hospitals, DHCs, CHCs and public pharmacies). In 2008, Rwanda introduced 'district and national guarantee funds to subsidize the extension of the benefit packages of health mutuelles' and 'implement[ed] demand-based, targeted subsidies through which the government, donors and non-government organisations provide health insurance coverage to indigents, vulnerable groups and people living with HIV/AIDS' (Sekabaraga et al., 2011).

However, *mutuelles* are operated and organised by community representatives and are operated on a model of voluntary adhesion. Whilst a law was passed at national government level to make adhesion compulsory in 2008, Sekabaraga et al. report state that it was still not enforced in 2010. Nevertheless, by 2008, 85% of the population was enrolled with a *mutuelle*, compared with 44% in 2005 (Sekabaraga et al., 2011; National Institute of Statistics of Rwanda, 2006). For further information on *mutuelles,* refer to the financing section below.

Private Sector: Businesses and Non-Governmental Organisations (NGOs)

Private businesses are also important actors in Rwanda's health sector and include private hospitals or clinics, insurance companies, pharmacies and drug wholesalers, and operate in regular interaction with public HCFs and institutions, for instance when the latter experience shortages. Indeed, public district and community pharmacies can be authorised to purchase medicines from private wholesalers when no stocks are available from the Central Medical Store.

However, Rwanda's national drug manufacturing capability is low. As a result of the country's high reliance on international importation, foreign pharmaceuticals manufacturers can be considered as private business actors participating in the functioning of Rwanda's health system. Other private foreign businesses contributing to Rwanda's health system are foreign (mostly U.S.-based) research institutions such as the Harvard Medical School, who collaborated with Rwandan universities to develop Rwanda's postgraduate medical curriculum, or the Clinton Health Access Initiative (CHAI), a philanthropic foundation which funds a number of health-related programmes in Rwanda in collaboration with the U.S. Agency for International Development (USAID), the U.S. development cooperation agency.

In addition, whilst other NGOs operate in Rwanda with variable degrees of participation in its health system, many recent health-related projects at community-level have been supported by Partners in Health (PiH), a global U.S.-based health NGO operating in 11 countries, including, since 2005, Rwanda. Over the last decade, PiH provided human resources and infrastructure to projects aiming at expanding access to healthcare in rural areas, for instance through the Mentorship and Enhanced Supervision for Healthcare (MESH) programme

or by supporting the Butaro Cancer Centre of Excellence (BCCOE) and transfers of patients to national referral hospitals (Manzi et al. 2017; Umutesi et al., 2021).

5.1.3 Health Supply Chain Functions

Procurement

In Rwanda, the procurement of health supplies is coordinated at the national level by the Medical Production and Procurement Division (MPPD) of the MoH, which acts as Central Medical Store (Bizimana et al., 2020; Uwizeyimana et al., 2021). However, at the local level, other public sector institutions (pharmacies, health facilities), private pharmacies, community health workers (CHWs) and individual patients all perform procurement activities. For instance, community pharmacies and private health clinics or hospitals obtain medical commodities from private wholesalers (Uwizeyimana et al., 2021). District pharmacies also serve distribution points to district hospitals and health centres (Bizimana et al., 2020). In some instances, public sector organisations may also request an authorisation from the MPPD to purchase drugs from private wholesalers if they are out-of-stock at the Central Medical Store (Uwizeyimana et al., 2021). Lastly, individual patients perform procurement tasks by buying items from their local pharmacies or when travelling to other countries to receive care otherwise not available in Rwanda; for example, oncology patients travelling to Nairobi Hospital to gain access to brachytherapy, which is the preferred treatment modality for patients with potentially curable cancers (Bizimana et al. 2020; Umutesi et al. 2021).

Inventory Management

Most of the literature referring to inventory management discusses activities related to resupply procedures at community-level, and to some extent, the selection of medicines at all levels. In particular, Chandani et al. (2014, 2017) report that whilst quantification and reporting take place at the local level, CHWs do not always follow a structured, standardised approach to resupply; where reporting instruments are available, data is not always entered accurately, which explains recurring shortages of medical supplies at community level.

To address 'bottlenecks that prevent CHWs from accessing essential medicines,' the Supply Chain for Community Case Management (SC4CCM) project was established in Rwanda and Malawi in 2009 (Chandani et al., 2017). During its early phases (2010), the SC4CCM project focused on establishing Standard Resupply Procedures (RSPs) with the aim to provide CHWs with a simple system to ensure continuous stocks of essential medicines. This was based on three main elements: identifying a lead CHW as a 'Cell Coordinator,' condensing requirements into three simple tools and then adding resupply procedures into integrated training for all Cell Coordinators.

This intervention was also complemented by the establishment of Quality Insurance Teams in 2012-2013, to support the correct use of the resupply procedures, link Cell Coordinators with health centre and district staff, and address any Community Case Management (CCM) product shortages and stockouts for the 5 key CCM products (Chandani et al., 2017). The Quality Improvement teams compiled and analysed data, identified problems and developed or refined solutions to resupply procedures problems during monthly meetings at health centre level.

In addition, Umutesi et al. (2021) outline that low community awareness, a lack of trained providers in the management of chronic diseases and a limited access to diagnostic services explain gaps in medicine selection for the treatment of non-communicable diseases (NCDs) in Rwanda.

Warehousing

Only one article mentioned the warehousing of health supplies, which is coordinated by the MPPD at the national level; according to Uwizeyimana et al. (2021), district pharmacies then serve as the distribution point of pharmaceutical products to district hospitals and health centres.

Quality Assurance

Quality assurance activities were tested through implementation research, as part of the Kabeho Mwana project (Chandani et al., 2017) and SC4CCM (Chandani et al., 2014). However, no other detail about quality assurance activities were reported by the literature.

Distribution

The literature contained little detail about the health supplies distribution process in Rwanda. According to Uwizeyiamana et al. (2021), the MPPD acts as the main distributor of health commodities to public health institutions, whilst district pharmacies are the main local distributors for district hospitals and health centres. However, Bizimana et al. (2020) reported issues in medicine availability at community level, which would impede the distribution process from CHWs to patients altogether.

5.1.4 Health Supply Chain Enabling Functions

Health Workforce

Some of the main challenges identified as barriers to the development of Rwanda's health workforce included a "brain drain" following the forced migration or death of health professionals after the 1994 genocide, low human resource density at community health centre level and skills gaps in both clinical and non-clinical health specialties. In particular, the literature highlights the lack of training for non-clinical public health workers, mental health professionals, biomedical scientists and specialty consultants (including psychiatry, oncology, gynaecology and obstetrics) (Iyer et al., 2018; Small et al., 2019; Smith et al. 2017; Uwizeyimana et

al., 2021). In addition, it outlines the need for a more integrated training for all health professionals (clinicals and non-clinical) to allow for the effective management of chronic diseases and psychiatric conditions.

One frequently mentioned programme targeting healthcare workforce capacity development is the Human Resources for Health Programme, led by the Government of Rwanda from 2012 to 2019 and involving a consortium of more than 20 academic institutions from the United States (Delisle, 2018). The programme was aligned with Rwanda's national development plan, "Vision 2020", which includes the establishment of a large, diverse and competent health workforce as a core component (ibid.). The Programme aimed to address health workforce shortages as well as strengthen Rwanda's health graduate schools. However, Delisle (2019) noted that the training programmes focused solely on health professionals with a clinical background (doctors, nurses, midwives or dentists). Moreover, the process through which priorities were determined is unclear based on available data, and the author notes that problems have been reported at that stage of the decision-making process (Delisle, 2019).

Health Information Systems

This function includes surveillance activities and the development of national health expertise through research and development. In Rwanda, the national government established a national health information system (including disease-specific systems for HIV, malaria and tuberculosis) to inform policy priority setting and support a culture of 'data-driven policymaking' (Iyer et al., 2018). Government agencies regularly monitor data quality and have incorporated routine data quality assessments into national data capture systems (Ibid.). In addition, a focus on data collection has attracted foreign researchers and facilitated the establishment of long-term research partnerships, with opportunities for Rwanda's healthcare workforce skills development (Iyer et al., 2018; Uwizeyimana et al., 2021). Moreover, the development of local research and development capabilities has enabled the development of key infrastructure and technology to expand healthcare coverage, such as mobile penetration and the development of mobile health (mHealth) programmes, the use of drones to deliver health supplies to remote areas, and robots for contact-free COVID-19 testing during the early stages of the pandemic in 2020 (Lygidakis et al., 2019; Karim et al., 2021).

Challenge: 'Data flow': Stocks and Resupply

The literature identified data flow, particularly the reporting of stock-related information at community level, as a key challenge and attributed stockage issues to the unavailability or inaccuracy of stock cards handled by community health workers (CHWs). Indeed, when reviewing the results of a new integrated community case management programme in three districts, Chandani et al. (2014) found that while 65 to 85% of CHWs in the non-intervention group had access to stock cards for the six pharmaceutical products under review, only 18%

had completed them accurately. In addition, only 38% had all products in stock on the day of visit. By contrast, the groups having benefited from either of their interventions (Quality Collaboratives or Incentives for Community Supply Chain Improvement) did better in both aspects. Moreover, the authors concluded that the end stock improvement was statistically significant in the Quality Collaboratives group.

The enabling factor identified was not the provision of incentives contained in the Incentives for Community Supply Chain Improvement – which was criticized by participants for having introduced competition – but 'the establishment and training of Quality Improvement Teams at health centres to find solutions for operationalizing the new resupply procedures at the CHW level' (Chandani et al., 2014). As the authors conclude, this intervention focused more strongly on improving CHW skills and motivation; however, they found high levels of competency across individual CHWs in completing stock cards, which suggests trainings had a greater effect on motivation than on sole skill development.

Health Systems Financing

According to Smith et al. (2017), 'improvements in premature mortality, including large reductions in maternal mortality, under five mortality and deaths from secondary infectious diseases such as HIV/AIDS, tuberculosis and malaria' are attributable to significant governmental investments in the health sector since 1994. Rwanda has benefited from high foreign investments through earmarked funding, in particular for HIV/AIDS, and through general budget support; the government has been particularly successful in strengthening Rwanda's health system as a whole by redirecting earmarked funding towards cross-cutting policy areas. For instance, the government leveraged earmarked HIV funding to develop electronic inventory management systems for medical supplies, strengthen national logistics and train healthcare workers in supply chain management (Frisch, Scott and Binagwaho, 2021).

The national government has also progressively decentralised health financing through three major reforms: fiscal decentralisation, the introduction of community-based health insurance schemes (micro-finance) and performance-based financing to regulate public funding towards public health providers (Sekabaraga et al., 2011; Dhillon and Phillips, 2015; Huttinger et al., 2017). As such, the performance-based financing has also enabled regular monitoring and evaluation of key infrastructure at health centre level, including water and sanitation infrastructure (Huttinger et al., 2017).

Liu, Subramanian and Lu (2019), state that the introduction of *mutuelles* has 'provided a pro-poor benefit package and contributed to the reduction of the inequality of household catastrophic health spending by poverty after 2011' through public subsidy of premium and co-payments for the very poor. According to Sekabaraga, Diop and Soucat (2011), *mutuelles* played an important role in increasing rates of health services

utilisation (the main indicator used by the Rwandan government to evaluate progress in healthcare coverage expansion) over the past two decades. Since the analysis of health insurance schemes is beyond the scope of this paper, we will not examine it in great detail; however, it is important to note that whilst the introduction of CBHI is consistently associated with '[a] significant reduction of direct illness-related spending [...] across all [...] quintiles of household income,' research has shown it does not automatically translate to improved healthcare access in practice (Sekabaraga et al., 2011:).

Outside of *les mutuelles de santé*, CBHI companies dominating Rwanda's health insurance ecosystem, the literature mentions very few UHC-oriented financing projects or policies implemented in Rwanda. One notable exception is PiH-led Ubudehe, a programme providing socio-economic support to the most vulnerable patients enrolled in chronic diseases care programmes. Support was extended, for instance, to all oncology patients going through chemotherapy. Like *mutuelles*, Ubudehe is community-based, and defined as a 'home-grown [household based] socio-economic categorisation mechanism for determining eligibility for Rwanda's key social protection interventions,' (Republic of Rwanda MoLG, n.d.). The interventions were implemented in three rural districts (Kirehe, Kayonza and Burera) and included the delivery of nutritional, hygienic and infection control household items to their residents, as well as direct cash transfers to patients living outside those three districts (of equivalent cost than that of the packages delivered within the target districts) (Umutesi et al., 2021).

Leadership and Governance

The first function we can identify from the literature is **agenda setting through command and control.** The presence of a politically secure leadership has allowed the pursuit of long-term goals and opened the possibility for the use of aggressive strategies in times of crisis, for instance during the early stages of the COVID-19 pandemic (Iyer et al., 2018; Karim et al., 2021). From that perspective, Rwanda's decentralised health system model does not intend a complete devolution of power to the local communities, as the national government retains most decision-making power at the regulatory level and at higher levels of executive decision-making. However, research has demonstrated that increased autonomy in executive decision-making at the local level would be beneficial to Rwanda's health system, as higher levels of autonomy could constitute an incentive for health workers to complete further training, coordinate with others or perform accurate and regular reporting (Chandani et al., 2014).

Rwanda's hierarchical structure has also enabled the national government to play a central role in **emergency preparedness**, a function involving the pre-coordination of supply chains activities to facilitate rapid and effective decision-making when essential resources become unavailable. In Rwanda, the national government has, for instance, played an important role in early COVID-19 planning by establishing the National COVID-

19 Preparedness and Response Plan (Karim et al., 2021). In particular, the latter detailed protocols for community health workers (CHWs) outreach, contact tracing, early testing, hotspots identification, travellers screening at port of entry and emergency public information (Ibid.)

Thirdly, **evaluation, monitoring and standards-setting** are performed by the national government to support procurement (annual quantification and regular supply plans monitoring, and joint collaboration with the MPPD), infrastructure maintenance, health workforce development and service delivery (Chandani et al., 2014; Binagwaho et al., 2018; Iyer et al., 2018; Small et al., 2019). This has been accomplished, for instance, by the establishment of a strategic plan for the development of measurable activities, efficient procurement procedures, a national mental health policy and the issuance of directives to guide palliative care or the adoption of recommendations for improved HIV treatment (Smith et al., 2017; Bizimana et al., 2020; Krakauer et al., 2018), In addition, this function is also carried out by community health centres, for instance via the development and implementation of water provision plans, or by district health centres, who monitor and evaluate infrastructure status based on their own norms and indicators (Huttinger et al., 2017).

Delays at implementation stage: legislative barriers to health policy implementation

According to Binagwaho et al. (2018), one challenge affecting health supply chains in Rwanda is the delays decision-makers face at the policy implementation stage. In particular, the authors refer to delays incurred by the MoH in 2010 when moving to the implementation phase of a new action plan on micronutrients, as legal provisions dating back to the colonial era indicate that only the Head of State is able to issue instructions in this policy area (Binagwaho et al., 2018). For this reason, the authors argue for the invalidation of legal arrangements that no longer serve Rwanda's governance system after its independence, or for the adoption of an alternative interpretation framework that would allow them to be bypassed (Binagwaho et al., 2018).

5.1.5 'Product Flow:' Equity

However, beyond the ability of health supply chains to carry out certain functions, an emerging body of literature examines the manner in which health supplies are circulated, as well as their nature and the populations who receive them. For example, Frisch, Scott and Binagwaho (2021) argue that promoting equitable supply chains will play a key part in facilitating efforts towards Universal Health Coverage. Within this area, growing attention has been dedicated to differences in health outcomes among patient groups. Indeed, according to Umutesi et al. (2021), Rwanda has shown gains in key health indicators such as increased life expectancy, declines in maternal mortality and gains in the control of infectious diseases (e.g. HIV, tuberculosis and malaria). However, they also note that fewer gains have been recorded for the management

of NCDs. Similarly, Bizimana et al. (2020) found that NCD-related and generic medicine availability rates are low in Rwanda, consistent with rates found in other LMICs, though the study's instigators note the country generally fares slightly better than its counterparts. The low availability of NCD-related medicines in public or faith-based sectors often forces patients to buy from the private sector at a significantly higher cost and with no CBHI scheme coverage (Bizimana et al., 2020).While these differences might first be approached as limitations regarding the nature and quantity of supply chain circulated health products (health supply chain "scope"), they also bear equity implications; indeed, by prioritising certain types of supplies, health supply chain stakeholders prioritise certain groups of patients, differentiate between "urgent" needs and those that "can wait", and ultimately discriminate between health conditions.

5.1.6 Conclusion

Rwanda has shown considerable progress towards achieving UHC and has witnessed gains in key health indicators such as increased life expectancy and declines in maternal mortality. However, important challenges remain, including low availability rates of NCD-related and generic medicines. Other challenges across the health supply chain include low drug manufacturing capability, gaps in medicine selection for the treatment of NCDs, skills gaps amongst staff and lack of decision-making autonomy at the local level.

Mutuelles have provided a pro-poor benefit package and have played an important role in increasing rates of health services utilisation. However, the low availability of medicines at health facilities can force patients to buy from the private sector at a higher cost and with no CBHI scheme coverage. Moreover, it is critical to look beyond only health financing and insurance for achieving UHC. Many positive supply chain initiatives and improvements are in place or have been undertaken. These include high levels of foreign investment, strong government leadership in terms of preparedness, M&E and agenda -setting and the establishment of a national health information system by the government.

5.2 Kenya

The information provided in this case study was gathered from literature-based research and supplemented by an interview with a key informant, a trained pharmacist with further qualifications and extensive experience in health systems management, health economics and financing strategy in Kenya.

5.2.1 Background

Kenya made a commitment to achieve UHC by 2022 (Elizabeth & Charles, 2019). This commitment was made by President Uhuru Kenyatta in 2018 as part of the countries 'Big Four Agenda' for national sustainable

development, which includes healthcare for all as one of the of the four key development priorities (Barasa et al., 2019).

The commitment to UHC saw the subsequent creation of a Department of Universal Health Coverage in 2018, with the UHC initiative commencing in two stages. In the first phase, 4 pilot counties, including Kisumu, Machakos, Nyeri and Isiolo, were selected to implement the UHC package, after which the government reviewed the success for the second phase to roll out the programme in the remaining 43 counties.

Kenya's healthcare system is pluralistic in nature, with both public and private healthcare facilities in almost equal measure (Barasa et al., 2018a). There are two key players when considering the role of supply chains in achieving UHC: KEMSA and the National Health Insurance Fund (NHIF).

KEMSA was created in 2000, replacing the previous Medical Supplies Coordinating Unit, and was originally an agency of the Ministry of Health (MoH). Through an act of the Kenyan Parliament, KEMSA became an 'authority' in 2013, although it remains tied to the missions and aims of the MoH (Unicef, 2017). KEMSA's mandate is to procure, warehouse, and distribute drugs and medical supplies for public health programmes and to fulfil other tasks related to the public health supply chain (KEMSA, 2013). KEMSA now operates a not-for-profit, self-sustaining, commercial business model, which is aligned with Kenya's devolved governance system. These changes to the structure and role of KEMSA are highly praised and have been described as facilitating the organisation's transition from an 'ungainly bureaucracy to a competitive and customer focused medical logistics organization' (Yadav, 2014).

One pivotal method through which Kenya has prioritised the attainment of UHC is through the expansion of health insurance coverage to reduce OOPP via the NHIF. The NHIF is a state corporation that was established after independence in 1966 with a state mandate to provide health insurance to all its members (Barasa et al. 2018b, Mbau et al. 2020). Membership is mandatory for formal sector workers and voluntary for informal sector workers. Despite efforts to increase membership since the Big Four Agenda by offering new services and restructuring payment plans, membership has remained relatively stagnant at 19% of the population.

Taking into account the two key features of UHC, service coverage and financial risk protection, Barasa et al. (2018a) developed a summary measure for UHC in Kenya for 2003 – 2014, during which the overall combined measure of UHC increased from 44% to 53% (Barasa et al. 2019). While the coverage of preventative and curative healthcare services increased over the study years and the incidence of catastrophic expenditure decreased, the level of coverage remains generally low and is not accessible to all: the poor continue to bear a

disproportionate burden of catastrophic healthcare costs. This increases inequality in healthcare expenditure and leads to the poor becoming poorer.

5.2.2 Health Supply Chain Functions

Procurement

A pivotal reform that was highlighted by our interviewee was that of KEMSA enabling multiple contracting when procuring drugs. While literature searches could not confirm the results of this reform, the interviewee reinforced its influence, stating that contracts can be awarded to two or more suppliers, so that if one of their suppliers fails, immediate action can be taken to award it to the second choice. KEMSA is therefore not tied to a supplier that may not be able to honour its contract. This is critical to ensure access to essential medicines and reduce the prevalence of stock outs.

KEMSA has also implemented an e-procurement system circa 2014/2015, moving from paper based to electronic bidding. This shift enhances transparency and credibility in the management of public finances and tendering processes, aids the reduction of bid rigging, increases the traceability of procurement practices and should increase the turnaround time for bidding processes (Humphreys, 2015).

It was also confirmed that KEMSA's list of essential medicines that can be procured and supplied has expanded to cater for more conditions.

Quality Assurance

Cohn et al. (2013) highlight that complex supply chains are vulnerable to the entry of substandard or falsified (SF) medicines and provide an account of the presence of SF medicines in Kenya in 2011 in the supplies of a Médecins Sans Frontières initiative. SF medicines are not only a huge public health concern, endangering individuals' health and recovery, but can also corrupt the supply chain, create a huge economic burden to the country and compromise the achievement of UHC (WHO, 2017). Kenya has a number of legal frameworks and policies in place to address incidents of this nature. However, the greatest challenge was knowing who should execute these laws and how to successfully execute them, with no formal charges having been made two years after the incident. Cohn et al. highlight the importance of an integrated quality-assurance system that can lead to the identification of any concerns early in the supply chain before they reach patients. If concerns are identified, the authors also emphasise that transparency in the enquiry process is vital to demonstrate the independence of the regulatory boards. In turn, this will increase trust in health facilities, clinicians and patients.

A 2017 WHO report estimated that there was a 10.5% prevalence of SF medicines in the supply chain in LMICs, with trends such as global manufacturing and a rise in internet purchasing of medicines likely to increase their presence if regulatory forces do not respond successfully. Orubu et al. (2020) refer to SF medicines as 'tackling the blind spot' in UHC as medicine quality is not referred to as one of the indicators of progress towards UHC.

Despite these challenges, Kenya has several current actions and reforms that prioritise the issue of SF medicines, which was highlighted by the expertise of the interviewee. Of note, Kenya is a centre of excellence in pharmacoviligence, with the Pharmacy and Poisons Board providing guidelines about what, why, when, where and how to report any issues in the health system. There are also current reviews taking place regarding the Kenya Food and Drug Act and the Pharmacy and Poisons Board, looking specifically at their different roles and whether they require re-structuring or combining efforts. There is currently a document being processed by cabinet requesting that the head of state sign the African Medicines Agency treaty. This treaty was adopted by the African Medicines Agency in 2019 and aims to enhance regulatory oversight across the continent and meet the challenges of access to quality, safe, and efficacious medicines in the continent. It has currently been signed by 15 countries across the continent, with Kenya currently considering its position. These practices highlight a number of policies in place to address quality assurance in the supply chain; however, ensuring that they are streamlined and effective on the ground at every stage is the largest challenge.

5.2.3 Enabling Functions

Health Workforce

The Purdue Kenya Partnership is an initiative implemented in connection with the Academic Model Providing Access to Healthcare (AMPATH) partnership between Kenya and North America. The Purdue Kenya Partnership offers the Purdue Global Health Residency programme, providing training in HSCM and the training of future pharmaceutical professionals within the country (Miller et al., 2016). As well as contributing to the greater access and provisions of medicines and healthcare for more rural areas - especially in Western Kenya – the partnership also greatly contributes to the future development of the country's healthcare sector. This initiative is influential as there is a critical shortage of qualified and well-trained clinical professionals in LMICs, acting as a key bottleneck in effective health care service delivery (Roush et al., 2013).

Health Information Systems
Inventory Management and Forecasting

A central theme highlighted throughout literature and via the interview, is that structural changes to KEMSA - namely the devolution of power to counties – have resulted in the supply chain changing from a push system to a pull system. Previously KEMSA 'pushed' supplies to health facilities based on historical estimates of

needs. In 2006, KEMSA started using a pull system, whereby health facilities and counties ordered supplies based on their own needs. As described by the interviewee, KEMSA became like a supermarket where counties can come and shop as they like, whereas before KEMSA delivered what they had with little regard to current needs. This system was initially only available in urban areas, but after widespread success was scaled up to rural areas (Yadav, 2014; Unicef, 2017).

This pull model required new technologies to facilitate forecasting algorithms and easy ordering. The KEMSA e-mobile service was implemented to place orders over mobile phones, and other new technologies were implemented to create real-time stock data (Yadav 2014).

An initiative that contributed to this pull system successfully being scaled in rural areas, is that of the Community Health Volunteers (CHVs). CHVs, launched in 2006, are part of the Kenyan Community Health Strategy. In line with devolution to counties, the CHVs play a critical role in not only extending care to communities, but also initiate dialogue about new services available, and can gather nuanced and contextual information that reflect on the ground needs of patients. This strategy follows the principles of the pan-African Bamako Initiative (1987) that focused on increasing access to essential drugs for all, especially in rural areas organised by communities (Pangu, 1997). Andersson et al. (2013) highlight the importance of ensuring that digital technologies can be designed with rural and nomadic CHVs in mind. They describe how the use of cStock, a RapidSMS, open-source, web-accessible logistics management information system, could be adapted and re-designed with the specific requirements of CHVs, such as varying literary levels, or differing access to mobile service and data. This was part of the Supply Chain Alternatives for Last Mile Equity (SCALE) project, a multi-partner project that seeks to address inequity in health.

These initiatives are influential for UHC in ensuring that the needs of all individuals are being reflected, and that there is a truly representative system all the way from CHVs working with patients on the ground, to healthcare and county representatives that communicate with KEMSA representatives. These initiatives all reflect the success of a devolved governance of KEMSA.

Health Systems Financing
The Revolving Fund Pharmacy
One pivotal initiative that has spurred the country's ability to supply healthcare is that of the Revolving Fund Pharmacy (RFP) model which also operates via the Academic Model Providing Access to Healthcare (AMPATH). The scheme operates across seven counties in Kenya, serving a population of 8 million people in western Kenya (Tran et al., 2021). The RFP model is an initiative to provide high quality medications consistently to patients, whereby initial stock of essential medicines is obtained through donations or purchase

and sold at a small mark-up price sufficient to generate revenues to sustainably resupply medications, but small enough to ensure that the medicines remain affordable (Manji et al., 2016). In this vein, it therefore operates in a similar manner to KEMSA. This model was originally introduced in Sub-Saharan Africa in 1987 through the Bamako Initiative, as a method to increase the availability of essential medicines in the region. In Kenya, the prevalence of the RFP is commonly referred to as a 'backup supply chain system'. In particular, the RFP, working in collaboration with the MoH and KEMSA, aims to operate in more rural areas, supporting the current emphasis on ensuring the supply of medicines until the last mile. This model has become especially important during the COVID-19 pandemic, in which essential drug stockouts have become increasingly prevalent. The RFP was able to adapt in response to changes, such as social distancing, to switch to a push-based supply system to support more rapid availability while limiting further danger imposed by the pandemic (Tran et al., 2021).

While the presence of this initiative is arguably not an example of best practice due to certain failures of the MoH and KEMSA, and could have unintended negative consequences on impetus for their improvements, RFP is a programme that is endorsed by the government, works collaboratively with KEMSA and contributes to the development of supply chain logistics across the country (Miller et al., 2016).

NHIF Reforms

Reforms that focus on health financing, namely via the NHIF, have been at the centre of Kenya's goals to achieve UHC. Of particular importance has been to ensure that the NHIF are able to offer prepaid mechanisms that ensure members are not paying at the point of accessing care, thereby reducing OOPPs and incidences of catastrophic health expenditure (Barasa et al., 2018b). While the number and details of the reforms are beyond the scope of this paper, they are well documented by other research (Barasa et al, 2018b; Mbau et al, 2020). The implications of this research highlight two key themes of the reforms.

Firstly, NHIF purchasing practices continue to be passive. This means that payments and reimbursements provided by the NHIF rely on historical or predetermined budgets. This has meant that some services are inadequately capitated and at times do not cover the costs required. Unlike KEMSA, that has seen success in the devolution of its power so that procurement practices are more representative of its users, the NHIF has failed to implement strategic purchasing practices that reflect the requirements of its services and health facilities. The NHIF has also been characterised by delayed payments and weak links to financial accountability.

Secondly, premium rates associated with the new services offered were found to be regressive, meaning that those with lower-incomes contributed more of their income towards the premiums than those with higher-

income. This result was found for both the formal and informal sectors (Mbau et al., 2020). It is also suggested that the distribution of contracted facilities were pro-urban and pro-private. This confirms other research that suggests health inequity has actually increased (Barasa et al. 2019). The unaffordability of the new premiums is a barrier to enrolment and hence UHC. The NHIF reforms, while well-intentioned, show weaknesses in design and implementation. Efforts need to be made to align the reforms with strategic purchasing.

These findings were reinforced by information provided by the interviewee, acknowledging that the NHIF reforms were currently a bottleneck and were yet to contribute to any realisation of UHC, with coverage having remained at 19% since 2018. However, they referred to current legislation that is going through Parliament to mandate insurance. Furthermore, policy changes are also being considered to work more collaboratively with health facilities.

Chronic Underfunding, Donor Funds and OOPPs:

A common theme found throughout literature is the systematic underfunding of health services in Kenya, with public expenditure on health as a percentage of GDP at only 2.3%. It has been shown that improvements in health services and facilities become evident when this figure reaches beyond 5%. This has meant that Kenya is heavily reliant on donor funds, at 25.6%, and OOPPs, at 27%. While donor funds are needed, they are often subjected to certain programmes that focus on particular diseases and do not necessarily align to Kenya's aims for UHC (Barasa et al., 2018a).

High Administrative Costs

Confirmed throughout research was the high administrative costs associated with the NHIF, namely regarding the manual claim process that the organisation required (Mbau et al., 2020). As a share of total revenue, administrative costs were reduced from 42% to 22% from 2010 to 2017, but nevertheless still present a high inefficacy (Barasa et al. 2018b).

Leadership and Governance
Legal Reforms and Political Will

The WHO states that countries that have achieved UHC have built it on legal foundations, referring specifically to 1) acceptance of reforms 2) authority to proceed and 3) capacity to complete the goals (Mbindyo et al., 2020). The political will and subsequent reforms that Kenya has committed to improving health are unquestionable; the commitment to health as a human right is enshrined in Kenya's Constitution 2010, its development agenda outlined in Vision 2030, and most pertinently via the Big Four Agenda and the subsequent creation of a Department of Universal Health Coverage in 2018. As a previous employee of the Department of Universal Health Coverage, the interviewee demonstrated how this department worked horizontally across all government and ministries. This included, for example, the Ministry of ICT, who re-

aligned their budgeting and planning to support the Big Four agenda, including expertise on new digital technologies and e-procurement services required, and the Ministry of Transport, who identified possible bottlenecks that could be impacting the distribution of medicines. Thus, similar to the approach taken by this paper, Kenya's approach to UHC has not simply involved KEMSA and NHIF, but has engaged all stakeholders as their (support) functions in HSCM are pivotal. After the first initial phase of the UHC initiative rolled out to four counties, the need to mainstream UHC ideals across all ministry departments led to its abolition, remaining as a secretariat that should be integrated within all goals.

Prior to legal reforms and the restructuring of KEMSA, the health supply chain was known for its inefficiencies and ineffectiveness, and for its complex 'spaghetti' like structure (Unicef, 2017). As discussed throughout this case study, changes to KEMSA, namely its devolution, has been influential for it to become more user-friendly and representative of current needs, changing from a push to a pull system.

Fragmentation

However, as noted by the WHO, these reforms need to have the authority and capacity to succeed. While KEMSA has slowly and steadily shown improvements in its operation, reforms of the NHIF have yet to be realised, with the interviewee referring to the importance of current ministry and legal proceedings to unlock its potential. The difference in progress has meant that the efforts of KEMSA are also capped because many citizens cannot afford NHIF membership and may not be able to afford OOPPs for healthcare. This therefore highlights the importance for all ministries and organisations to be working in unison for success. Ensuring that the NHIF schemes were aligned with the current UHC goals and aims of the nation were highlighted by a number of studies (Owino et al. 2020). Indeed Mbindyo et al. (2020) argue that fragmentation has become an inherent and entrenched character of the Kenyan legal system, with gaps, duplication, overlaps and conflicts in mandates. This is notably reinforced by a number of bottlenecks mentioned throughout this case study, including possible revisions and changes to the Kenya Food and Drug Act and the Pharmacy and Poisons Board. Further corrective action is needed to rationalise and consolidate the health system to facilitate UHC.

Transparency and Communication

Highlighted throughout literature is the issue of public transparency and communication. In regards to KEMSA, a recent and ongoing corruption scandal about the use of funds specifically directed for COVID-19 supplies is being investigated, with suggestions that the funds have been misused and laws on procurement have been breached (Igunza, 2020). This has eclipsed much of KEMSA's progress, highlighting the need for greater monitoring and anti-fraudulent measures in place. The impact of this occurrence could see KEMSA

loose financing from global donors, which would have severe repercussions on their ability to provide service coverage.

Research has also referred to the lack of communication about changes to NHIF services, meaning that members are not aware of new premium rates, nor whether the location and types of services and medicines they can access have changed. This can result in wasted expenditure and have drastic health consequences when expectations are different to reality (Barasa et al., 2018b; Mbau et al., 2020).

Global Partnerships and Collaboration

In this case study, the AMPATH, Purdue Kenya Partnership and SCALE initiatives have been mentioned. All rely on global partnerships and collaboration from other nations and non-governmental agencies. While the need for these initiatives should reduce as the capabilities of a nation's health supply chain grow, they are essential for current goals of UHC, by sharing best practices and proven success tools that can be implemented and adapted for specific needs. The reliance on these global initiatives, however, are the result of slow UHC progress as well as, arguably, the chronic underfunding of the health sector by the Kenyan government.

5.2.4 Conclusion

Kenya has a long journey ahead to realise UHC. Nevertheless, it is a country that has stated its vision for a long time and whose changes to the structure and running of KEMSA and the NHIF show strong political will for UHC. However, it is a vision that requires some changes in execution to achieve its ambition. A number of challenges are mentioned throughout this case study, including quality assurance, human resources, transparency and communication. Particularly evident are the current challenges faced by the NHIF, with reforms having actually increased inequity in healthcare, whereby the poor have to spend a higher proportion of their income on premiums compared to those of higher incomes. These regressive service plans are hampering the country's UHC progress. Despite health financing being a major focus of the Department of Universal Health Coverage, it remains the pivotal challenge to unlock any further possible progress in Kenya.

5.3 Tanzania

The information provided in this case study was gathered from literature-based research and supplemented by an interview with a key informant. The key informant is a private consultant who previously worked in the logistics management unit in Tanzania's Medical Stores Department for over 20 years.

5.3.1 Background

The United Republic of Tanzania is the largest East African country and has ambitious plans towards achieving middle-income status. Central to that agenda is the development of the health sector in pursuit of universal health access. The Ministry of Health and Social Welfare developed and implemented the Health Sector Strategic Plan (HSSP IV) to spearhead these efforts (United Republic of Tanzania, 2015) and launched its fifth HSSP in 2021, to cover the years 2021 to 2026. This plan focuses on health sector policy, service delivery, and healthcare support systems. The supply chain is an integral support system and, in this plan, critical in sustaining the equitable distribution of health commodities at all levels and times (Arora et al., 2018). The Ministry of Health and the Pharmaceutical Sector have defined guidelines to describe the roles and responsibilities of various actors at different levels of supply chain management. These guidelines set the scope for operational efficiency and, ultimately, improved healthcare delivery.

The Medical Stores Department (MSD) functions autonomously under the governance of a Board of Trustees and its mandate (under Act of Parliament No. 13 of 1993) is to procure, store, and distribute medical supplies (MSD, n.d.b). The governing body assigns tasks through directors that are responsible for execution at their respective zonal regions (MSD, n.d.b; United Republic of Tanzania, 2015) and the board operates through the Audit and Risk Management committee, Technical Services Committee and the Finance and Administration Committee. MSD headquarters, located in Dar es Salaam, operate through nine zones that function as strategic business units in order to ensure the last mile delivery of essential medical supplies to end users. As the national supply agency, the MSD acquires medical supplies and disseminates them to the national, regional, and district hospitals. Medical dispensaries and healthcare facilities are also direct beneficiaries and are therefore equipped to cater for individuals in remote areas.

The medical supplies agency recognises that a well-functioning supply system is at the center of UHC and thus vital in assuring the uninterrupted flow of high-quality essential medicines. MSD has been a recipient of various capacity-building projects that have resulted in increased service delivery and health workforce training. Core supply chain enhancements include modernised warehouse construction, fleet acquisition, and the installation and integration of an open logistics management information system to the central Enterprise Resource Planning (ERP) software. The key developmental partners in this context include a number of donors such as The Global Fund, USAID, World Bank, Bill & Melinda Gates Foundation, UNFPA, UNICEF, WHO, and DANIDA. However, several issues remain, such as order fill rates not showing a significant improvement and continued reliance on the donor community (Githendu, 2020). This case study presents and briefly discusses the high-level findings of challenges and initiatives related to the health supply chain for UHC, with reference to the framework presented in Table 2.

5.3.2 Health Supply Chain Functions

As highlighted in the literature review, core supply chain functions play a key role in supporting the realisation of UHC through ensuring that qualify, affordable medicines are available at the right place and at the right time. Some key initiatives and challenges that MSD has faced in Tanzania in this area are listed below.

Warehousing
Warehouse in a Box

The warehouse in a box initiative, part of the Supply Chain Management System (SCMS) and USAID Deliver Project, was introduced to address the urgent need for modern medical warehousing infrastructure (Supply Chain Management System, 2016). Scale-up in the country's vertical programmes had directly resulted in strain and a severe lack of storage capacity, further intensified by theft and illicit practices at the different warehouses. The modernised warehouses were built in five MSD zones. The storage infrastructure approximately covers 19000 m2 with constant CCTV monitoring. The state-of-the-art storage facilities are additionally equipped with adjustable pallet and gravity flow racking. These enhancements were vital for increased storage capacity and security. The project has led to cost savings that approximate to $608.000 at fifty percent utilization and $1.2 million at 100% utilisation annually (Supply Chain Management System, 2016). Adherence to good storage guidelines in this context is important and has improved dramatically over time. Further integration of warehousing functions with the present ERP system has also improved barcoding and to a larger extent warehouse operations management.

Quality Assurance
Tanzania Food and Drugs Authority (TFDA)-based pharmacovigilance

Pharmacovigilance systems have been in place since 1993 with activities focused on the detection, assessment, understanding, and prevention of adverse drug effects (Supply Chain Management System, 2016). The guidelines set by the authority allows for the detection of risk factors related to medicine use post-authorisation. The process can directly track and trace the use of falsified and substandard medicines. Spontaneous and passive reporting processes exist, with each targeted towards locating and providing surveillance of adverse events.

In conjunction with the MSD, pharmacy council, and the Bureau of standards, TFDA aim to conduct and strengthen:

- Post-marketing studies

- Product labelling and labelling-related contradiction and changes

- Product withdrawal

- The dissemination of information to health care providers and patients on recalled products, or medicines that pose a significant threat to desired therapeutic outcomes

Distribution

Fleet acquisition & Project Last Mile

Recapitalisation provided by the Global Fund was instrumental in the acquisition of 181 modern cold-chain trucks to facilitate direct commodity delivery from the zonal stores to the respective health facilities. The project was initiated in January 2017 in addition to comprehensive logistics system redesign.

Project last mile was created in 2010 to leverage private sector practices to improve the delivery of health commodities. The idea behind the rollout of this project was based on the wide availability of Coca-Cola products in hard-to-reach areas, and leverages best practices used by Coca-Cola to ensure the availability of essential medicines in remote areas (Linnander et al., 2017). The models shared by the partnership provided knowledge on best practices on route optimisation, workforce capacity development, and supply chain management from a private sector perspective. Since 2010, MSD has expanded delivery of essential medicines from 130 regional hubs to over 5700 health facilities, with a large number located in hard-to-reach areas. Through the project, the national supply agency has also developed a performance management system to increase staff accountability and foster a positive shift towards client-oriented work.

5.3.3 Enabling Functions

Health Workforce

In 2015, collaboration between the Tanzanian government and the Global Fund led to the creation of a Strategic Management Office (for further details, refer to *MSD Governance Reforms* below). The reforms entailed the regular training and technical capacity building of staff as well as the integration of supply chain modules into the broader national curriculum of the health workforce in Tanzania (Githendu, 2020). This is particularly important given that literature has highlighted how supply chains can be strengthened through increased supply chain and logistics training for health care providers at all levels (Forum on Neuroscience and Nervous System Disorders, 2014). The Medium-Term Strategic Plan (MTSP, 2014 – 2020) also included a 5-year HR plan.

Health Information Systems

Installation of Electronic Logistics Management Information System (eLMIS)

As part of the USAID Deliver project, an eLMIS was designed to support the real-time management of health commodities, draw data, integrate functions with existing ERP and medical information systems and facilitate data collection in low-infrastructure environments to actively enhance data aggregation, analysis and forecasting (Supply Chain Management System, 2016). The data collected and stored in eLMIS provides valuable information on commodity availability in more than 6000 delivery points and further interfaces with national vertical programmes, providing information on pressing health needs at any given time. For ease of access, the software is web-based and thus easily available to essential stakeholders for procurement and distribution processes.

The wider benefits of this project include essential data for timely decision-making, business process automation, health commodity management, and ultimately a reduction in medical wastage due to expiration and overstocking.

<u>Digital Health Strategy</u>

The real-time traceability and visibility of data is seen as elemental in increasing access to essential medicines and played an important role in the development and rollout of the country's digital health strategy (Supply Chain Management System, 2016). The digital health strategy follows the health ministry's mandate to invest in the development of information and communication technology infrastructure and systems (United Republic of Tanzania, 2019). The Ministry of Health strives to utilise ICT applications for administrative, financial, and clinical operations. More broadly, strategic priority 7 of the digital health strategy solely focuses on the health supply chain, aiming to mainstream the use of digital solutions for HSCM. The solutions are targeted at addressing stock availability at health facilities, inter-intra facilities stock exchange, uneven medicine distribution, potential medicine side-effects, irrational prescription and dispensing of medicine and the influx of counterfeit medicines. The strategic initiatives linked to this priority area involve:

1. Strengthening eLMIS

2. Implementation of tracking and tracing of health commodities

3. Integration to the national product registry of medicines, medical supplies and medical devices with supporting systems

4. Strengthening the adverse-drug-reactions reporting systems for medicines, medical devices and cosmetics

Overall, the digital health strategy aims to improve service delivery and health outcomes in order to fast-track UHC realisation and all health-related SDGs.

Health Systems Financing

Financing is an essential supply chain enabler that facilitates UHC. Lu et al. (2011) highlight that an increase in medical expenditure, particularly in LMICs, is important in achieving healthcare-related goals and in this context, UHC. The purchase of essential medicines in Tanzania is funded through a number of models. The national government allocates a portion of its GDP to fund healthcare with a portion of the funds directed towards the MSD (United Republic of Tanzania, 2015). Specific schemes are outlined below.

National Health Insurance and Community Health Fund:

The health ministry, through the Tanzanian National Health Insurance Fund and Community Health Fund, provides additional sources for healthcare financing. The NHIF was established under the National Health Insurance Act with the main objective to increase wider accessibility to healthcare services. By law, the fund is mandatory for all public servants and also provides services to private institutions, farmers and children below the age of 18 (NHIF, n.d.). According to the aforementioned act, public employees are obliged to contribute 6% of their monthly earnings to the NHIF. The benefits of this include access to primary health care, essential medicines and medical products. The NHIF however covers a small minority and caters less for individuals in the informal sector. The Community Health Fund bridges this gap, prioritising coverage for individuals in the rural informal sector through the utilisation of a cost-sharing model (Renggli et al., 2019). Participation in this insurance scheme is voluntary with relatively low contribution rates, with the premium rate paid by community members varying by district but not rising beyond a certain threshold. The funds are collected at a local healthcare facility which, in conjunction with a government matching grant, provides funds for the acquisition of essential health care products procured from the MSD. Kigume & Maluka (2021) conducted a study assessing the effectiveness of this funding and concluded that the prevalence of stock outs in addition to a lack of medical equipment at the community level should promote the revision of the Community Health Fund model for UHC.

Vertical Programmes:

Vertical programmes (VP) focus on a particular disease group. Commonly observed programmes include reproductive health, tuberculosis, HIV & Aids and immunisation. VPs largely increase the finance pool for the acquisition of essential medicines and related health products (MSD, n.d.a). The funds used to acquire commodities in VPs are sourced from donors via alignment with donor services and profiles. The integration

of VPs ensures coordinated procurement, storage, distribution, management and timely stock status reporting of all programme medicines and commodities.

Progressive strengthening of the VPs has lowered operational costs and has resulted in wider stock availability. A key theme identified through the key informant interviews and an extensive literature review was donor dependency. A large proportion of the essential medicines procured by the MSD are directly funded by VPs (MSD, 2013). The lack of sufficient local financing to sustain service coverage has innumerable knock-on effects, impacting sustained primary healthcare and central to this paper, supply chain efficiency and UHC.

Leadership and Governance

Leadership and governance are a critical driving force in UHC achievement (WHO, 2014). At the highest level, political and legislative oversight directly result in the implementation of policies that prioritise and align with the strategic goals defined for UHC achievement. More broadly, strong leadership and governance are also important functions which support the health supply chain.

Demand-driven pricing

In Tanzania, a lack of pricing regulation has resulted in unpredictable price mark-ups, reflecting the demand-driven nature of medicines. This has been shown to correlate with an increasing rate of OOPPs, a surge in sub-standard medicines and distrust in the wider health system (Kruk et al., 2008). In line with this, the key informant suggested that revisions were being made to pricing policies in order to cap erratic price mark-ups. They also suggested that the government is considering the implementation of mandatory Universal Insurance to ensure total population coverage and increased financial risk protection.

MSD Governance reforms: Strategic Management Office

Collaboration between The Global Fund and the MSD led to the establishment of a separate board with functional expertise in 2016, responsible for the oversight and evaluation of the core areas of MSD operations (Githendu, 2020). In tandem, the reforms also resulted in the creation of the Strategic Management Office. The Strategic Management Office was directly involved in the monitoring and evaluation of various aspects of strategic reforms and operations. The immediate benefits of this office include the regular training of staff and technical capacity building, drafting and iterative editing of standard operating procedures and the development of reporting tools. The consultancy provided by the Global Fund was also underpinned by the regular transfer of activities inhouse to ensure sustained operation. The reforms had a wider reach through the integration of supply chain training modules to Tanzania's national health workforce training curriculum, which also functioned as a sustainable financial measure.

Performance Measurement and Strategic Planning

The MSD's medium-term strategic plan (MTSP), spanning the years 2014 – 2020, was developed to build upon the gains of the agency's previous strategic plans. The plan reflected an essential shift from a Results-Based Management Framework towards the Balanced Scorecard Framework (BSC) directly sourced from the Balanced Scorecard Institute's Nine Steps to Success Framework (MSD, 2013). The BSCs framework is an integrated planning and performance management tool that succinctly relays an organisation's vision, mission and strategy to all stakeholders. The BSC framework considers customers, financial performance, business processes and growth initiatives. In line with this case study was the amendment of MSD's mission and vision with a narrower focus on making medicines and medical products of acceptable quality available at all times, in addition to the mandate to become a centre of excellence for the supply of health commodities in Africa. The three pillars of success for effective execution of the MTSP were operational excellence, service excellence and business growth.

The abovementioned strategies were vital for UHC realisation, reflecting MSD's aim to build a trustworthy and reliable health commodities supply chain that serves the health needs of end-users through efficient operations, well-established distribution networks, timely order fulfilment and reduced operational costs.

The ten building blocks of the strategy were to:

- Improve the MSD work environment

- Leverage and strengthen stakeholder management and relationships

- Improve the agency's performance-based culture

- Enhance ICT usage

- Enhance compliance

- Improve service delivery

- Improve knowledge and skills

- Increase market share

- Enhance financial performance

- Increase customer satisfaction

The MTSP supported a number of projects and initiatives, including:

- A failure-cause analysis for out-of-stock situations

- The development of a five-year HR plan

- Establishment of a health security system

- Installation of IV fluids, syrups and linen manufacturing plants through private-public partnership

- Implementation of a gender mainstreaming programme

The strategic plan to date has resulted in an increase in the MSD's capacity with increased operational efficiency and health workforce training (Githendu, 2020).

5.3.4 Tanzania Primary Healthcare Vital Signs Profile and UHC Monitoring Report

The primary health care (PHC) vital signs profile (VSP) provides a comprehensive summary on national primary healthcare, honing in on specific strengths and weaknesses (PHCPI, 2018). Much like UHC, PHC is widely enhanced and facilitated by the supply chain. The VSP can therefore be adapted and utilised as a powerful tool to provide essential information for assessing/monitoring UHC.

The profile provides data on:

- Financing: PHC financing and prioritisation (values presented as %)

- Capacity: an assessment of functional capacity which essentially measures governance, health sector input (supply chain and workforce focused) and the management of population health facilities (scored 1 (low) - 4 (high))

- Performance: service delivery, access to primary health care services and essential medicines, and quality service coverage (index 0 (low) –100 (high))

- Equity: highlights differences in the equitable access to PHC with reference to wealth, geography and education (values presented as %)

Tanzania Vital Signs Profile (2018):

VSP Measure
Financing

PHC Spending	$15 per capita
Prioritisation of PHC	Overall spending: 41% Government Health spending: 25%
Sources of PHC spending	Government: 19% Other: 81%
Capacity	
Governance	2.9
Inputs	2.2
Population Health and Facility Management	2.1
Performance	
Access Index	54
Quality Index	61
Service Coverage Index	50
Equity	
Access: % with perceived barriers due to cost, by wealth quantile	Highest:33% Lowest:63%
Coverage of Reproductive Maternal Newborn and Child Health services, by mother's education	None: 53% Secondary+:70%
Outcomes: Under-five mortality, by residence	Rural: 74% Urban: 86%

*Adapted from PHCPI (2018)

The data displayed in the table provides useful information on UHC realisation with reference to the recent state of primary healthcare in the country. The indicators used to measure PHC are also vital for UHC and in this paper, complement the framework used.

Capacity in this context involves a complex set of sub-indicators, including primary health care policies, quality management and infrastructure, and social accountability in the public health sector. The score displayed for this measure indicates the need for an increase in political will to foster the development of PHC. The 'Inputs' measure directly provides information on central supply chain activity. This category summarises vital data on the availability of essential medicines, health facility infrastructure, information systems and the health workforce. Tanzania's score (2.2) is lowered by a high frequency of stock outs and a severe lack of a skilled workforce (PHCPI, 2018).

Performance and equity measures are likewise robust indicators derived from the 2017 WHO and World Bank UHC Global monitoring report with the aid of multiple resources for the latter (WHO and the World Bank, 2017). In 2017, it was registered that Tanzania had a service coverage index of 50, an access index of 54 and a quality index of 61. It was also observed that individuals in the lower wealth quantile faced numerous barriers in accessing PHC. With direct inference from the data above, Tanzania seems to be on a path towards sustained PHC. The achievement of this however is greatly influenced by the indicators highlighted in the VSP above. With continuous capacity-building across all sectors, sustained access to PHC and the achievement of UHC should be attainable through a gradual transition towards providing comprehensive health care services with little to no financial hardship.

5.3.5 Conclusion

Tanzania has seen improvements which have largely resulted in the widespread increase in service coverage in rural and hard-to-reach areas. The nation recognises that extending health insurance far beyond public servants is important to ensure financial risk protection when accessing essential health care services. Prioritisation of the digital health strategy is also key in the pursuit of efficient HSCM to achieve UHC. Presently, the nation is grappling with the burden of donor dependency, reflecting the need to shift towards building and sustaining the in-country capacity to sufficiently cater for its population. With continuous political oversight and targeted policy implementation, UHC can be achieved in Tanzania.

6. Comparative Analysis

Achieving UHC is still a pertinent and ongoing goal for Kenya, Tanzania and Rwanda. There is a broad consensus within the literature and from key informants about the meaning and requirements of UHC, all highlighting the two key indicators of service coverage and financial risk protection. Importantly, the achievement of UHC relies on a broader understanding of health supply chain management, involving every aspect of the health system. The table below showcases the health supply chain initiatives and bottlenecks of Kenya, Tanzania and Rwanda, organised by the framework outlined in Table 2. This acts as a summary of all information detailed in the case studies.

Kenya	Tanzania	Rwanda
Supply Chain Functions (Health Service and Medicine Delivery)		
Initiatives: • Multiple Contracting, allowing immediate action if one supplier fails • E-procurement • Legal policies + frameworks to address SF medicines • Centre of Excellence in pharmacovigilance • Global collaborations - e.g. the Revolving Fund Pharmacy – backing up KEMSA to reach rural areas	Initiatives: • Warehouse in a box initiative • Project Last Mile – leveraging private sector practices to improve the delivery of health commodities • Fleet acquisition via Global Fund • Pharmacovigilance through the Tanzania Food and Drugs Authority	Initiatives: • SC4CCM project established to address bottlenecks preventing CHWs from accessing essential medicines. Established standard resupply procedures and established Quality Insurance Teams.

• Increased list of essential medicines provided by KEMSA • Kenya considering signing the African Medicines Agency Bottlenecks: • Need for quality assurance system to identify SF medicines	Bottlenecks: • Stock outs • Lack of optimised routes for hard-to-reach areas • Sub-standard/falsified medicines • Low customer satisfaction	Bottlenecks: • Problems with resupply procedures in inventory management at community-level • Lack of trained providers + limited access to diagnostic services led to medicine selection gaps for NCDs.
Enabling Functions		
Health Workforce Initiatives: • Global collaborations – e.g. Purdue Kenya Partnership: HSCM training	Health Workforce Initiatives: • Workforce training and capacity-building • Five-year HR (staffing & retention) plan	Health Workforce Initiatives: • Human Resources for Health Programme (but solely focused on health professionals with clinical backgrounds) • Five-year HR (staffing & retention) plan

Bottlenecks: • Shortage of qualified clinical professionals	Bottlenecks: • Lack of sufficiently skilled personnel	Bottlenecks: • 'Brain drain' • Low Human Resource density at community health centre level • Lack of training for non-clinical public health workers
Health Information Systems Initiatives: • Devolution of KEMSA, resulting in a decentralised pull system • E-mobile system for stock management, forecasting and ordering • Community Health Volunteers provide care to communities and initiate dialogue • Global collaborations, e.g. cStock, an adaptable technology for different skills and needs Bottlenecks:	**Health Information Systems** Initiatives: • Rollout of integrated ERP system (EPICOR) • Installation of eLMIS • Digital heath strategy (strategic priority 7 solely focuses on health supply chain) Bottlenecks:	**Health Information Systems** Initiatives: • Govt. established national health information system • Govt. agencies regularly monitor data quality • Data collection focus facilitates long-term research partnership with opportunities for healthcare workforce skills development • Mobile health (mHealth) programmes • Drone delivery of health supplies to remote areas • Quality Improvement Teams and new resupply procedures aimed at improving community level data flow Bottlenecks:

	• Poor data visibility and traceability on health commodities	• Data flow and stock-related information has been a challenge at community level
Health Systems Financing Initiatives: • NHIF introduced reforms with aim to reduce OOPPs • Future policy changes to mandate insurance • Revolving Fund Pharmacy model works in collaboration with MoH and KEMSA, particularly in rural areas / at the last mile Bottlenecks:	**Health Systems Financing** Initiatives: • NHIF (mandatory for all public servants, includes access to primary health care and medical products) and Community Health Fund (prioritises coverage for individuals in the rural informal sector through a cost-sharing model) • Vertical Programmes (funded by donors) increase finance pool Bottlenecks: • NHIF covers a small minority	**Health Systems Financing** Initiatives: • Significant govt. investment in health since mid-90s • High foreign investments through earmarked funding (which govt. has redirected towards cross-cutting policy areas) • Decentralisation of health financing (fiscal decentralisation, micro-finance and performance-based financing) • *Mutuelles* (community-based health insurance schemes, providing public subsidy of premiums + co-payments for very poor). • NGO-led Ubudehe, providing socio-economic support to most vulnerable patients enrolled in chronic diseases care programmes Bottlenecks: • Research has shown that CBHI does not automatically translate to improved healthcare access in practice.

• NHIF uses passive purchasing, relying on historical / predetermined budgets leading some services to be inadequately capitated • NHIF experienced delayed payments and weak links to financial accountability • Regressive NHIF service plans • High Administrative costs of NHIF • Chronic underfunding, OOPPs and reliance on donor funds	• Low market share (MSD) relative to the private sector • Donor dependency • Demand-driven medicine pricing	
Leadership and Governance Initiatives: • Legal reforms and political will (including creation of Department of Universal Health Coverage, which worked horizontally across govt. + ministries). • Global partnerships and collaboration Bottlenecks:	**Leadership and Governance** Initiatives: • Prioritisation of public-private partnership • Establishment of the Strategic Management Office, directly involved in the M&E of various aspects of strategic reforms and operations • Creation of MSD's Medium-term strategic plan (2014-2020), which aimed to build a trustworthy and reliable health commodities supply chain. Bottlenecks: • Lack of political priority setting	**Leadership and Governance** Initiatives: • Govt. plays key role in agenda setting through command and control • Hierarchical structure facilitates emergency preparedness • National govt. conducts M&E to support procurement, infrastructure maintenance, health workforce development + service delivery Bottlenecks:

• Transparency and communication (including lack of communication about changes to NHIF services) • Fragmentation	• Lack of medicine pricing regulation	• Decision-makers face delays at policy implementation level • Higher levels of autonomy at local level may be beneficial

7. Conclusion

Improving UHC is a key global objective and has been highlighted by the UN as part of Sustainable Development Goal 3. This research has taken a broad view of health supply chains and shown how health supply chain management plays a critical role in achieving UHC. This research adopted a framework based on the six WHO building blocks and the 7 functions of health supply chain management, as outlined by Steele et. al. (2019) to compare how health supply chains in Rwanda, Kenya and Tanzania are facilitating UHC. These are summarised below.

Health Service and Medicine Delivery / Core Supply Chain Functions. Initiatives identified by the research include pharmacovigilance (Kenya and Tanzania), an expanded list of essential medicines provided by the government agency (Kenya), initiatives to improve warehousing (Tanzania) and the use of multiple contracting during procurement (Kenya). Bottlenecks include the need for greater quality assurance systems and the prevalence of sub-standard / falsified medicines (Tanzania) and medicine selection gaps for NCDs (Rwanda).

Health workforce. The research highlighted issues with a lack of sufficiently skilled supply chain personnel across all three countries. Kenya has conducted HSCM training through global collaboration and Tanzania has implemented a 5-year HR plan.

Health Information Systems. Steps to improve UHC include the use of mHealth programmes (Rwanda and Kenya), creation of a digital health strategy including a focus on the health supply chain (Tanzania), drone delivery (Rwanda), and use of eLMIS. Tanzania and Rwanda also reported issues with data visibility.

Health Systems Financing. The research explored the strengths and weaknesses of the different types of health insurance schemes adopted by Rwanda, Kenya and Tanzania. Rwanda uses *Mutuelles*, a type of community-based health insurance which subsidises premiums and co-payments at contracted health centres. In Kenya, the National Health Insurance Fund has played a central role in the country's goal to achieve UHC and Tanzania has implemented a National Health Insurance and a Community Health Fund. However, there have been issues with the implementation of these schemes. For example, Kenya has witnessed regressive premium rates, pro-urban and pro-private bias and high administrative costs. The NHIF in Tanzania also covers a small minority and caters less for individuals in the rural informal sector.

Leadership and governance. Global collaboration as well as political will was demonstrated by all three countries, including the creation of the Department of Universal Health Coverage in Kenya. Tanzania has

also created a Medium-term Strategic Plan (2014 – 2020) and a Strategic Management Office. Challenges include transparency (mentioned in relation to Kenya), delays at policy implementation (Rwanda) and lack of medicine pricing regulation (Tanzania).

The health supply chain has played a critical role in all three countries' progress towards UHC. However, research into the specific role health supply chain plays towards the achievement of UHC is currently lacking. Whilst this paper has made a start towards filling this gap, further research is still required. One area of research that may be particularly useful is the creation of criteria relating to the supply chain functions required to achieve UHC, against which countries could be measured.

Despite the observed bottlenecks, with key challenges pertaining to gaps in health insurance schemes, a lack of trained supply chain personnel, and medicine availability at the last mile, the three countries are making progress towards achieving UHC. In particular, the research highlighted how Rwanda has witnessed gains in key health indicators such as increased life expectancy, Kenya has created a Department of Universal Health Coverage and Tanzania has witnessed improvements resulting in increased service overage in rural and hard-to-reach areas. Further, the contextual differences observed in the regional health systems indicates the absence of a set pathway towards achieving UHC.

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