



## Assessing the Effect of the Lack of Pharmaceutical Manufacturing on Healthcare Provision in Botswana

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ARTICLE INFO	ABSTRACT
<p><i>Received: 01 July 2022</i></p> <p><i>Reviewed: 12 July 2022</i></p> <p><i>Revised: 16 August 2022</i></p> <p><i>Accept: 23 August 2022</i></p>	<p><b>Purpose:</b> The lack of pharmaceutical products in Botswana has been a serious concern as citizens experience adverse health outcomes due to poor access to effective treatments. This study investigated the effect of the lack of pharmaceutical manufacturing on healthcare provision in Botswana. Systems Theory underpinned this study. This theory specifies the importance of component parts to work in unison to achieve a specific objective. An interpretivist research paradigm was adopted, which enhanced gaining knowledge on the fundamental reasons for the dearth of drugs/medicine in the Botswana healthcare system.</p>
<p><b>Keywords:</b> <i>Pharmaceutical Manufacturing, Medicine Stock Out, Healthcare Provision, Service Delivery, Botswana</i></p>	<p><b>Methodology:</b> A qualitative research approach and an exploratory research design were selected for this study. These two methods enhanced the interviewing thirty-four participants such as doctors, nurses, pharmacists, inventory employees, and the public on the reasons for the shortage of drugs and how this affects citizens. Data were collected using open-ended interviews and responses were gathered from participants from a historical point of view. After the collection of data, an analysis was conducted using Atlas-ti Software (version 8.2). Themes and categories were generated and were discussed by corroborating them with the literature review findings.</p> <p><b>Findings:</b> Findings from the study indicate that the reasons for medical stockout include poor planning by medical authorities, the emergence of new diseases, the lack of public private partnerships, logistic issues such as organizational red tape during tender decisions, ordering less than national demand by medical procurement officials, delays in import permits, delays by suppliers, and transportation challenges. The effects of medicine stockout include the healthcare system's inability to cure diseases, an increase of deaths, failure to control disease, continued stockouts, worsening of sicknesses, non-compliance of patients, failure to meet treatment outcomes, and an increased cost of medicines. The study recommends among others, that the government should support local pharmaceutical manufacturing, allow private companies to participate, and discourage sole distributorship.</p> <p><b>Originality/Value:</b> This research Assessing the effect of the lack of pharmaceutical manufacturing on healthcare provision in Botswana</p>

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## 1. Introduction

The availability of medicines is one of the most visible and obvious indicators that a health system is working. It is one of the most significant components in the provision of health services and it directly affects both the health providers and their clients [1]. The use of genotypic and phenotypic information in drug discovery and drug therapy, the increasing wealth around the world, growing patient involvement through information and communication technology, and innovations in pharmaceutical manufacturing technology is transforming the provision of healthcare [2]. This assertion by Stegemann emphasizes the fact that pharmaceutical manufacturing plays a vital role in the provision of healthcare. Furthermore, agile manufacturing is at the centre of achieving a sustainable competitive advantage, especially in light of current unprecedented market instability coupled with complex customer requirements [3].

Millions of people around the world experience adverse health outcomes from conditions because of poor access to effective treatments [4]. Furthermore, Zimmermann emphasizes the importance of the availability of quality-assured pharmaceutical products. For this reason, the pharmaceutical industry continues to embark on research to improve disease treatment [5]. It is, therefore, crucial to have manufacturing capacity within the locality to improve the health situation of the citizenry [5]. Access to medicines is a core concept within universal health coverage. It is defined as ‘medicines being continuously available and affordable at public or private health facilities or medicine outlets that are within one hour’s walk of the population [6]. Hence, the need to have local manufacturing capacity to ensure medicine security through reliable and subsequent sustainable supply. Although using ARVs and other pharmaceuticals produced in-country could reduce supply problems, the domestically manufactured product currently does not meet World Health Organization (WHO) standards.

Over the past years, drug shortages caused by manufacturing compliance problems were responsible for several public health crises. Manufacturing/quality requirements also contribute to drug shortages, since non-compliance leads to recalls [7]. Though India has become a global hub of generic drug manufacturing, the expected benefits of cheaper drugs are not translating into savings for ordinary people. This is in part due to the rise of branded generics, which are marketed at a price point close to the innovator brands [8]. Meanwhile, As Africa, including Botswana, imports the vast majority of the pharmaceutical products consumed (United Nations Conference on Trade and Development [9], many take the view that fostering local production could be an effective way to improve access to medicines by shortening the supply chain and cutting down import costs, and, at the same time, helping the development of the continent’s industrial complex [10].

This study aims to investigate the reasons for medicine stockouts at various health facilities in Botswana and the causes thereof. Primarily, this study endeavours to find out if there is a shortage of manufacturing activity, and whether the lack thereof contributes to compromised health care. This present chapter presents the background of the study, motivation of the study, problem statement, research objectives, pragmatic perspectives, delimitation of the study, research methodology, trustworthiness of the study, ethical considerations, exposition of the study, and the summary of the chapter.

## 1.1. Background to the Study

Medicine shortages have generated significant healthcare barriers. The consequences of these shortages include therapeutic differences, safety issues (compromised outcomes, medication errors, death and so on) and financial ramifications (higher hospital expenses, increased labour costs, increased cost for patients and so on [11]). The shortages affect countries worldwide, especially developing countries such as Botswana. The evidence of shortages to date is limited but suggests that stockouts are associated with treatment alteration and discontinuation and with worse health outcomes. However, none of the previous studies carried out provide any estimates of the impact of stockouts on health outcomes. They also do not examine whether stockouts affect rich and poor communities differentially [12].

This was the case even back in 2009, as reported by Bird [13], who observed that approximately 30 per cent of the world's population (over 1.7 billion people) had inadequate access or no access at all to essential medicines. More studies have further revealed that there is a significant shortage of essential medicines [9, 11, 14]. For example, "Hypertension patients reported receiving monthly prescribed medication. However, there were occasional drug stockouts in some health facilities and participants expressed frustration with irregular supplies of anti-hypertension medicines" [14]. Furthermore, medicine shortages pose risks for patients' health as a result of non-treatment, under-treatment, and possible medication errors from attempts to substitute missing medicines [15].

The types of medications affected include many commonly used medicines such as antibiotics, cancer medicines, cardiovascular medicines, and anaesthetics. Many of them are off patent products and are difficult to formulate or have a tightly defined shelf life [16]. This combines with characteristics at the levels of manufacturers, buyers, and supply chains [15]. In Botswana, at least 40% of essential drugs were out of stock for a median duration of 30 days in 2015 [16]. Stockouts affected chemotherapy drugs needed in first-line regimens for treating potentially curable diseases such as cervical, breast, and colorectal cancer and were not associated with buyer price of therapy [16]. Furthermore, data on stockouts and shortages of cancer medicines in Botswana have been reported as one of the reasons that hinder treatment and potentially increase mortality [17].

Caregivers identified five main challenges faced in providing care to children with tuberculosis (TB) in Botswana as follows: long delays in their child's diagnosis, difficulty attending a clinic for daily treatment, difficulty administering TB medications, stockouts of TB medications leading to treatment interruptions, and inadequate TB education [18]. Likewise in Ghana, Stockouts of ARVs resulted in inconsistent administration of therapy, increased indirect medical costs for women living with HIV, and negative labelling of patients [19]. Poku further suggests that inefficiencies in drug supply, poor coordination with port authorities, inadequate government funding, and dependence on international aid contribute to the stockouts experienced in Ghana. A favourable economic outlook and support from the international community created the necessary conditions for the development of the nascent pharmaceutical industry in Mozambique, while in Zimbabwe, the presence of an established local industry was instrumental in bringing in favourable, if not always coherent, government regulation [10].

A host of factors challenge the successful procurement of medicines from global markets. Commonly reported problems include a fragmented demand, rigid rules on tenders, rigid shelf-life requirements, and overly customized specifications and payment issues. All these challenges can lead to manufacturers refusing to participate in tenders, or holding orders until they combine to full batch quantities, to be able to supply from fresh production [15]. Hedman further stated that "Medicine

shortages have been increasingly related to quality and raw material problems at the manufacturing level”.

Evidence from studies by both the United Nations Industrial Development Organization (UNIDO) and the United Nations Conference on Trade and Development (UNCTAD) shows that Africa has had the lowest Manufacturing Value Added performance in relation to the rest of the world. It was reflected that the continent relies on imports for most of its manufactured goods [20]. This was still relevant in 2016 as Moyo [21] states that resource-dependent and primary-commodity exporters such as Namibia, Botswana, South Africa, Zambia, Democratic Republic of Congo, and Kenya, to name a few, are among economies that were adversely affected by the 2009 financial crisis. Hence, this study seeks to investigate unpublished reports that have in the past suggested that poor supply of medications and severe shortages at health facilities are attributable to the fact that the country does not make medications locally.

Manufacturing is the bridge between research and patient: without product, there is no clinical outcome. The shortage has a variety of causes [22]. In close cooperation with national regulatory agencies and partner organizations, the World Health Organisation’s (WHO) assesses priority medicines, vaccines and in-vitro diagnostics, and contributes to strengthened national capacity for sustainable manufacturing and monitoring of quality through hands-on training [23].

This study will be conducted in Botswana, an independent sovereign republic situated in southern Africa. It will investigate the reasons for pharmaceutical manufacturing stockout in Botswana. Since the country is landlocked, Botswana is heavily dependent on neighbouring countries such as South Africa and Namibia for access to the world of trade through sea transport [24]. The Southern African Development Community (SADC) region has an inefficient and ineffective freight transport system that faces numerous challenges relating to providing adequate regional infrastructure and related transport services, a setting that urgently requires strategies to improve and expand the freight transport system to meet emerging demand. In addition, Botswana has a relatively small population of just over two million dispersed throughout the vast land, with most habitation along the Eastern corridor [25].

## **1.2. Motivation to the Study**

Approximately 1.6 million Africans died of malaria, tuberculosis, and HIV-related illnesses in 2015 [26]. These diseases can be prevented or treated with timely access to appropriate and affordable medicines, vaccines, and other health services. But less than 2% of drugs consumed in Africa are produced on the continent. This means that many sick patients do not have access to locally produced drugs and may not afford to buy the imported ones [26, 27]. In Botswana, a country challenged by a shortage of both medications and professionals qualified to process and administer medications, as well as low levels of health literacy, the risk of medication errors is even higher [28, 29]. A recommendation was made by Tshiamo et al. [28] that a platform for regular dialogue between Central Medical Stores (CMS) and the National TB Program be established for forecasting, to reduce drug stockouts [30].

In quantifying the association between the duration of chemotherapy stockout and the risk of having a suboptimal therapy delivery event, compared with standard delivery of therapy among cancer patients in Botswana, Martei [16] concluded that chemotherapy stockout is independently associated with an 80% increased risk of a patient experiencing dose reduction, change in therapy, or delay in therapy. The finding that the availability of prescribed medication was overall generally poor could be because in

Botswana, all drugs are sourced from the CMS. Therefore, if items are unavailable at the CMS, they would be unavailable at all facilities in the country. It appears that the availability of prescribed medications is not adequately available in health posts, followed by clinics, and worst in hospitals [31, 32].

### **1.3. Problem Statement**

The European Union [33] asserts that providing the right treatment to the right patient, at the right dose, at the right time, is paramount to uphold the healthcare system of any country. More so, identifying the patient population who will benefit from these expensive drugs will be crucial for patient care, as well as for the economic sustainability of a healthcare system [34, 35]. Also, insufficient awareness of the centrality of Pathology and Laboratory Medicine (PALM) to a functioning healthcare system at policy and governmental level, with the resultant inadequate investment, has meant that efforts to enhance PALM in low-income and middle-income countries have been local, fragmented, and mostly unsustainable. Botswana is no exception as it bears the middle-income status [36, 37]. There seems to be a problem that exists in Botswana of repeated low supplies of medications, resulting in shortages at public health facilities, as well as in private hospitals, clinics, and community pharmacies [34]. In most cases, these shortages are attributed to “stockouts” at the distributor/supplier level, who have often blamed this on deliveries by the manufacturers or their agents. While this problem exists, no evidence links the shortage to manufacturers or the fact that there are no local manufacturers. The problem of this study, therefore, is that medicine stockout continues to ravage the healthcare system of Botswana while the government has shown little interest in resolving it. Unless this problem is solved, the citizenry would not receive adequate medical care. The objectives that guided this study include to investigate if the medical inventory system is well-managed within the Botswana healthcare system, establish the effects of medicine stockouts in Botswana, and investigate how to improve the supply of medicines by the Government of Botswana to improve the healthcare of the citizenry.

## **2. Literature review**

The literature review of this study will investigate the meaning of medicine stockout and the reasons for medicine stockout.

### **2.1. The meaning of medicine stockout**

Medicine stockout simply means a shortage or complete absence of required drugs at a storage point. In other words, when there is an absence or shortage of required medicine or drugs in a health facility, a stockout is said to have occurred. Several definitions have been given in the literature. The WHO define a medicine stockout as “the complete absence of a required drug at a storage point or delivery point for at least one day” [38, 39]. “Stockouts are also known as shortages or complete absence of a particular inventory, in public health facilities” [40]. It is also defined as the “absence of medicines at health facility level”. Drug stockout can also be referred to as “the absence or lack of drug(s) at the health facility/pharmacy store at the time of filling the prescription” [38]. Stockout is also known as an inadequate availability or complete absence of a particular inventory of supplies in health facilities [40]. It means “the (temporally) inadequate supply of a requested pharmaceutical” [38].

From these definitions, it can be deduced that stockouts occur when there are insufficient drugs and/or supplies, which usually result in the interruption to treatment programmes in a medical facility. This

implies that once there is a drop in supplies or a complete absence of drugs within a medical facility, a medical stockout is essentially said to have occurred. Invariably, drug shortages can be characterized as a shortcoming in the supply of a pharmaceutical product, which makes it challenging for suppliers to realize patient-level demand for the product.

## **2.2. Reasons for medicine stockouts in the Botswana healthcare system**

Across the globe, stockout can be caused by a mirage of reasons. These reasons range broadly from manufacturing challenges down to supply and demand reasons. However, these reasons and challenges equally vary from country to country, as well as from one medical facility to another. In Botswana, some of the known reasons for medicine stockout include manufacturing issues. According to a report published by the Botswana Country Commercial Guide [41], there is no pharmaceutical production facility in Botswana. In other words, the country lacks the capacity to produce the drugs it consumes locally. It also unfortunately implies that the country depends completely on importation to sustain its domestic drug demand. However, companies are engaged in the bulk importation and packaging of drugs. The Government of Botswana has made noted efforts to address this ugly situation. The Botswana Country Commercial Guide [41] revealed that the Government has developed a Health Financing Strategy in 2019 to secure adequate funding to improve and develop infrastructure, as well as upgrade medical and surgical equipment production in the country. This policy will definitely increase efficiency by including the private sector in the delivery of health services at full cost-recovery rates to guarantee financial sustainability.

Research conducted by Lufesi et al. [42] in sub-Saharan Africa (SSA), especially in Botswana, has identified “weak infrastructure along the supply chain, including procurement and distribution, inadequate drug supply and lack of trained personnel, and inaccurate demand forecasting” as mechanisms for supplies delays and stockouts. According Lufesi et al. [42], the inadequacy or unavailability of some or all these facilities showcase low government capacity to develop the healthcare facilities across Botswana. The study also indicated that these factors also cause delays in the procurement of medicine and eventual stockouts in the country. Also, Taylor [43] affirms that Botswana lacks the capacity to produce drugs locally. Therefore, the country relies on importation from western countries for its domestic medical supplies. Confirming Taylor’s assertion, Krämer et al. [38] affirms that this situation has not only contributed to the consistent discontinuation of drug production in Botswana, but it has also created a malfunctioning and disjointed drug manufacturing sector in the country. Taylor linked the incessant discontinuation of drug production to this challenge and stressed that the country will continue to be faced with this odious challenge unless urgent drastic measures are taken by the Government to address it [43]. To this end, Krämer et al. [38] suggested a policy reform and sustained implementation as a strategy that could minimize the challenge of drug stockout, improve supply chain, and enhance distribution across the country.

The Botswana health system has witnessed an increasing demand for medicine because of a surging prevalence of communicable and non-communicable diseases. According to Farahani et al. [44], the prevalence of HIV/AIDS in Botswana was at 27% in 2001. The study indicated that this number rose tremendously by 2015, implying an excessive increase in the demand for RVD as an increasing number of patients require treatment. Further indications reveal that by November of 2012, the number of HIV/AIDS prevalence had reached 201 822 patients who were treated across more than 200 clinics and 35 hospitals in the country. The consequence, as pointed out by Krämer et al. [38], is an overwhelmed healthcare system due to an excessive demand for medicine. An excessive demand of medicine also

resulted in the shortage and stockout of medicine across the country [43]. Botswana imports its raw materials for domestic public and private medical consumption. Because of a lack of local raw materials for the local production of medicine, the country imports both mixed and unmixed medical material, not only from some African Countries but also other countries of the world. Some of these countries include its immediate neighbor South Africa, and Zimbabwe. Other countries are India, Malaysia, the United States of America, Canada, and Italy, among others [38]. The reason behind the importation of medicine in Botswana is chiefly the lack of raw materials. Therefore, medicine, especially vaccines both for human and animals, are hugely imported.

The findings of a study conducted by Farahani et al. [45] illustrated that Botswana had a successful scale-up effort that enabled the health system of the country to cope with the tremendous burden of the HIV epidemic, irrespective of its low worker population ratio and insufficient infrastructure. The results further revealed that the country had the highest population of HIV prevalence in the world after Switzerland. Consequently, its health sector recorded 247 856 patients in 2014. It was a 70-fold increase from 3,500 in 2002. This situation suggests a massive influx of patients in need of a variety of services [45]. Hence, the health system was consequently subjected to considerable pressure because health professionals were overwhelmed by providing care for HIV-related conditions, as well as other non-communicable diseases. Further findings by Martei et al. [46] also illustrated the high prevalence of HIV in Botswana. The study revealed that the country has a high population of HIV patients. As a result, it is experiencing a low physician-to-patient ratio. The recorded physician-to-patient ratio according to Global Health Observatory of the World Health Organization [30], was about 3.4 doctors to about 10,000 Botswana people between 2005 and 2012. This result is far below the international average of about 13.9 per 10,000 population [45]. Pheage emphasised that the prevalence of HIV in many low- and middle-income countries such as Botswana remains one of the serious factors causing a shortage of medicines in the health facilities, as well as the death of many patients [29]. He opined that the medicine supply chain is overwhelmed because of HIV prevalence. The outcome is often the shortage of routine Anti Retro-Viral drugs, which in-turn hinder patients from accessing the medication.

Pheage posited that several factors impede access to medicines. However, the foremost ones, according to the WHO, are the shortage of resources and the lack of skilled personnel [29]. The lack of skilled personnel is the most challenging factor exacerbating the limited access to medicines in Botswana. Martei et al. [46] indicated that investing in the training of health and supply chain personnel in Botswana is an opportunity to develop the healthcare sector of the country. The authors took special interest in stressing the need to train these categories of personnel in significant areas such as commodity planning and forecasting, as well as logistics and supply chain. In addition, Pheage buttressed this point, stating that training health and supply chain personnel in these areas is vital for reducing the out stock of medicines in Botswana [29].

### **3. Research methodology synopsis**

This study adopted an interpretivist paradigm. Creswell [47] affirms that interpretivist philosophers believe in finding the consequence of human actions in daily life, rather than in the regulated environment. However, Ivankova opines that the interpretivists select their options that do not depend on laws of science or nature [48]. This enables detailed research finding by looking at culture and how people live their lives, unlike positivists. This research paradigm enhanced gaining knowledge on the fundamental reasons for the dearth of drugs/medicine in the Botswana Healthcare system. A qualitative

research approach was adopted for this study. This approach enhanced the interviewing of the doctors, nurses, pharmacists, inventory employees, and the public on the reasons for the shortage of drugs and associated effects on citizens. Data were collected using open-ended interviews from thirty-four (34) participants. These participants include 5 medical doctors, 4 nurses, 5 pharmacists, 10 inventory employees, and 10 individuals who access medical care in the study area. These interviews encouraged gathering responses from a historical point of view. After the collection of data, an analysis was conducted using Atlas-ti Software (version 9). Themes and categories were generated and were discussed by corroborating the findings with the literature review of the study. Themes represented the research questions, and the categories represented the findings from each research question. Trustworthiness was maintained such as credibility, dependability, transferability, and conformability, all giving great rigour to the study. Observable ethical considerations such as informed consent, the anonymity of responses, voluntary participation and exit, and the report of actual findings were maintained.

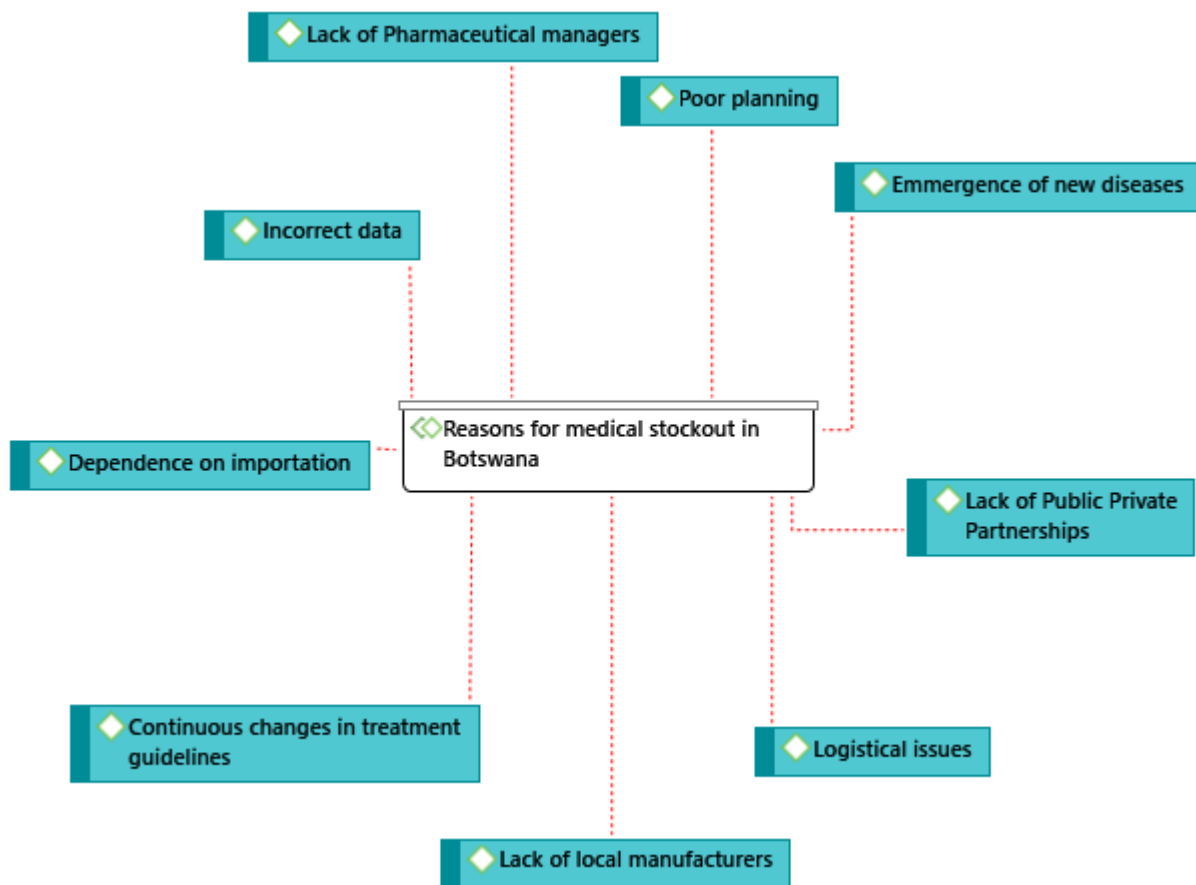
## **4. Presentation of findings from research objectives**

This section reports the findings obtained from the main research objectives of the study. The study presents the network diagrams from the Atlas-ti platform which were the findings from the objectives. Afterwards, the results were interpreted and excerpts from the participants were quoted to obtain credibility of the study.

### **4.1. The reasons for medicine stockouts in the Botswana healthcare system**

In this section, participants were asked the reasons for medicine stockout in Botswana and their responses are summarized in Figure (1). The reason for including this research question is to ascertain if there is the occurrence of medicine stockout and also to determine the causes of stockouts. According to the findings from this section, participants indicated that there are several reasons for medical stockout in Botswana. Amongst these reasons are poor planning by the medical authorities, emergence of new diseases, lack of public private partnerships, logistic issues, and lack of local manufacturers, continuous change in treatment guideline, dependence on importation, incorrect data, and lack of pharmaceutical managers. Regarding logistical issues, participants indicated the existence of issues such as organizational red tape in tender decisions, ordering less than national demand by medical procurement officials, delays in import permits, delays by suppliers, and transportation challenges. The interpretation of the findings and direct excerpts are expounded upon subsequently.





**Fig. 1. Reasons for medical stockout in Botswana**

**The emergence of new diseases:** The emergence of new diseases was described by the participants as the one of the factors that contribute to medicine stockout in Botswana. Considering the definition of stockout by Krämer et al. [38], emergence of new disease can enhance the total absence of medicine to handle a particular ailment. Direct excerpts from the participants are as follows:

*P3 asserted “When there is emergence of new disease like COVID-19, there is complete absence of medicine to handle the ailment which leads to several deaths”.*

**Lack of public private partnerships:** Participants described the government as not being cooperative with the private sector to improve stockouts. They also testified that there are no user-friendly policies and legislation to enable the private sector to venture into medical inventory logistics in Botswana. This has led to incessant medicine stockouts. Excerpts from the participants are as follows:

*P1said “There is no cordial cooperation between the government and the private sector to alleviate medicine stockouts, the government has failed to enact and implement soluble policies”.*

**Logistic issues:** This refers to the processes involved in the manufacturing and delivery of medicines to the final user [41]. Participants testified that the logistics are not well-handled as there exists organisational red tape in tender decisions: the inventory managers order less than national demand, delays in import permits, delays by suppliers, and transportation challenges. Excerpts from the participants are as follows:

*P7 said “Our logistics are very poor we need to improve the method of deliveries. It should be prompt and exact and capable of meeting the demands of the people.”*

**Lack of local manufacturers:** Local manufacturing is needed in every country to enhance economic development and growth [41]. Participants indicated that there is no drug manufacturing firm in Botswana. This triggers stockouts due to delays in importation procedures.

*P8 said “There is no local manufacturing firm in this country, we need it here, we need to stand on our own. The importation of drugs will not do us any good”.*

**Continuous change in treatment guideline:** Due to policy reforms and the emergence of new waves of diseases, the medical association adjusts to new guidelines in treatment. This, however, triggers stockouts as a new breed of medicines are recommended for treatment [46]. Participants of this study highlighted that there are continuous changes in treatment guidelines which have contributed to stockouts. Excerpts from the participants are as follows:

*P16 said “The truth is that the government through the medical association of Botswana changes the guidelines in treatment. This could be witnessed in the waves of Covid-19 where it was required to adjust the method of treatment. This also caused stockouts.*

**Dependence on importation:** One of the determinants of an economically growing country is a reduction on importations [49]. The participants of the study concurred that Botswana depends on importation for its medicines. This dependence has continued to create stockouts due to unnecessary delays or red tapes in importation procedures. Excerpts from the participants are as follows:

*P27 asserted “There is much dependence on importation of drugs in our country. This creates unwanted scarcity of drugs needed to treat patients. The government needs to do something about it. They should build drug manufacturing firms”.*

**Incorrect data:** The effective and efficient storage is proper labelling and arrangement of inventories. According to Shafaat et al. [50] and Raja and Mohammad [51], a well labelled and arranged inventory will enhance easy access, counting, and data management of the storage facility. Participants of the study affirmed that inventory management is not competent in handling their data. This results in incorrect data from central management system. Excerpts from the participants are as follows:

*P33 and P34 indicated “We need efficient data specialists in the Botswana medical health system. The staff handling the data management are not competent. Sometimes they don’t even know about the availability of drugs.”*

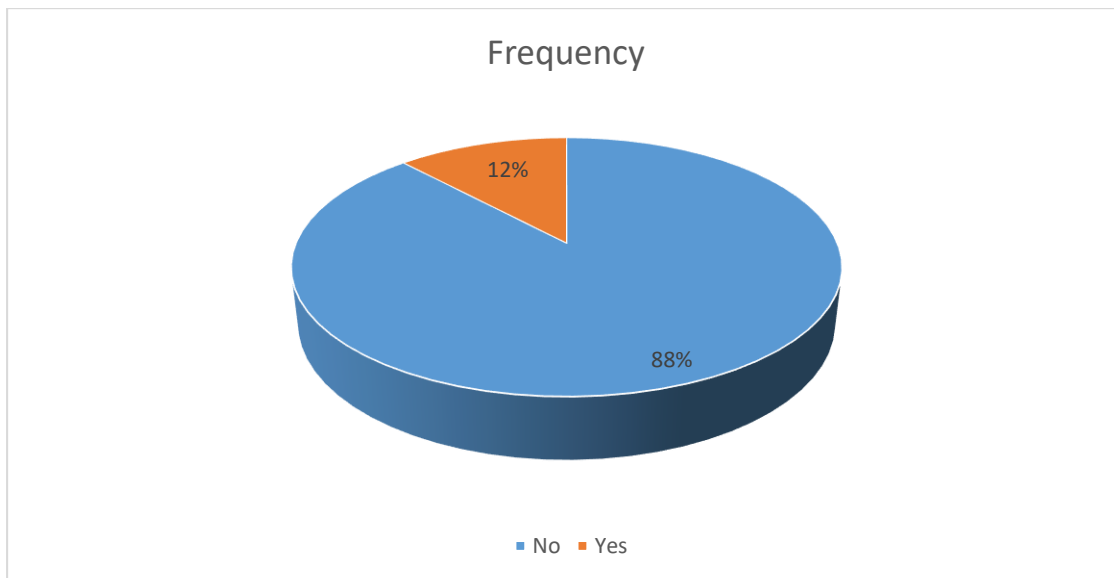
**The lack of pharmaceutical managers:** Consequent upon incorrect data, Kagashe and Massawe opine that the lack of good pharmaceutical managers contributes to medicine stockouts [52]. This was also affirmed by the participants who attested that the lack of trained pharmaceutical managers has contributed to medicine stockout in the Botswana medical health system. Excerpts from the participants are as follows:

*P24 and P31 asserted “We are lacking knowledgeable pharmaceutical managers in our health system more capable hands are needed”.*

The next section expounds on the second objective of the study.

## 4.2. The effectiveness of the medical inventory system within the Botswana healthcare system

This is the second objective which investigates whether the medical inventory system is well-managed in the Botswana healthcare system. The participants were asked to indicate if the inventory system in Botswana is effective and their responses are summarised in Figure (2).



**Fig. 2. The management of the medical inventory system in Botswana**

Most participants concurred that the medical inventory system is not well-managed in Botswana healthcare system. According to Figure (2), more participants (88%) indicated that the medical inventory system is not effectively managed, while fewer participants (12%) indicated that it is well-managed. This agrees with the studies of [9, 11, 14] who indicated that inventories are not well-managed in the Botswana medical health system. However, the Botswana Medical Association has flayed on the recklessness of the inventory employees due to huge expiries of drugs and shortages of essential medicines. Participants further indicated that there are many cases of expiries due to delays in importation and other challenges in stock management. Some excerpts from the respondents are as follows:

***P10 said** “In the public sector, inventory management is computerized at CMS, which eases tracking of products by their batches and expiries. Beyond CMS, there is no end-to-end data visibility. Reporting of supply chain data is very poor, especially for essential medicines.*

***P13 said** “While CMS is a modern warehouse that follows good warehousing practices and is well resourced to deliver health commodities to all health facilities in its scope, storage conditions at the district level are often below standard and delivery to smaller facilities (the last mile) is constrained by inadequate and inappropriate transport resources.*

*I do not think so because I have read on newspapers, not really far ago, that expired medicines were to be destroyed from government facilities. This makes me believe that inventory is not well managed”.*

### 4.3. The effects of medicine stockouts in Botswana

This section was designed to investigate the effects of medicine stockout in the Botswana healthcare system. The participants pointed out that the effect of medicine stockout include a compromised healthcare system, inability to cure diseases, increase of deaths, failure to control disease, continued stockouts, worsening of sicknesses, non-compliance of patients, failure to meet treatment outcomes, and increased cost of medicines. The responses of the respondents are summarized in the Atlas-ti network diagram in Figure (3).

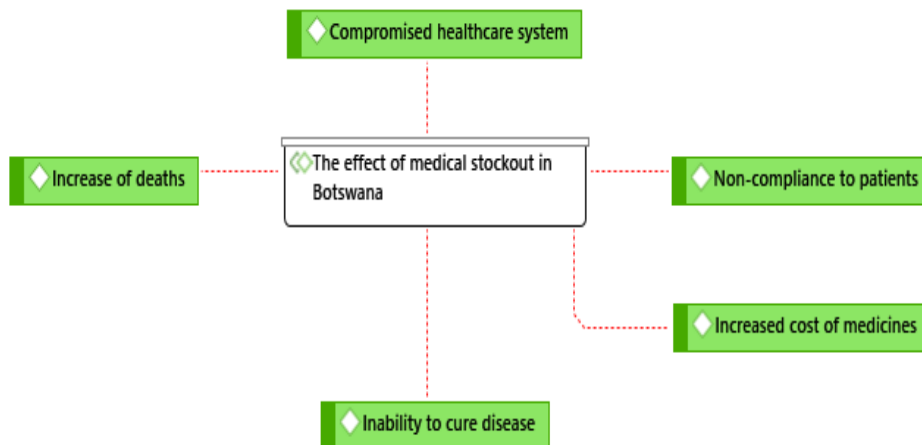


Fig. 3. The effects of medicine stockout in Botswana

**A compromised healthcare system:** Study participants concurred that one of the effects of medicine stockout is a compromised healthcare system. This is confirmed by the United Nations as it was noted that drugs should be available in all clinics and hospitals for the provision of primary healthcare [53]. In the case of stockouts, there would be compromised healthcare which is disastrous to the health system of any country. The excerpts from the participants are as follows:

*P24 said “We need to ensure that we have adequate stock of drugs to service our health system. When we do not have the needed stock, it leads to compromised health care.”*

**Inability to cure diseases:** The availability of medicine in the stock helps to cure illnesses in the healthcare system. The medicine stockouts results in the inability to cure diseases. Participants emphasised that the dearth of required medical stock has resulted in the resistance of diseases which makes it difficult to cure them. Also, this has resulted in a failure to control diseases, failure to meet treatment outcomes, and the worsening of sicknesses. Direct excerpts from the participants are as follows:

*P29 said “We need adequate stock in this hospital. When we do not have the needed stock, it makes it impossible to cure diseases.”*

**An increase of deaths:** Due to medicine stockout, many deaths have been recorded in Botswana. This is in concurrence with the studies of United Nations where it was emphasised that the dearth of desired drugs in Sub-Saharan Africa has led to unwanted deaths, especially relating to HIV and Tuberculosis. Participants further indicated that the lack of required medicine leads to deaths [53]. Some excerpts recorded are as follows:

*P28 said “The dearth of medicine has caused a lot of deaths in Botswana. We need to have a streamlined source of medicine stock to provide services to our patients.”*

**Non-compliance to patients:** The lack of drugs in our pharmacies results in the non-compliance of patients and this leads to a loss of lives. The participants confirmed that the dearth of medicines has led to failures to comply with medical rules. Excerpts from participants are as follows:

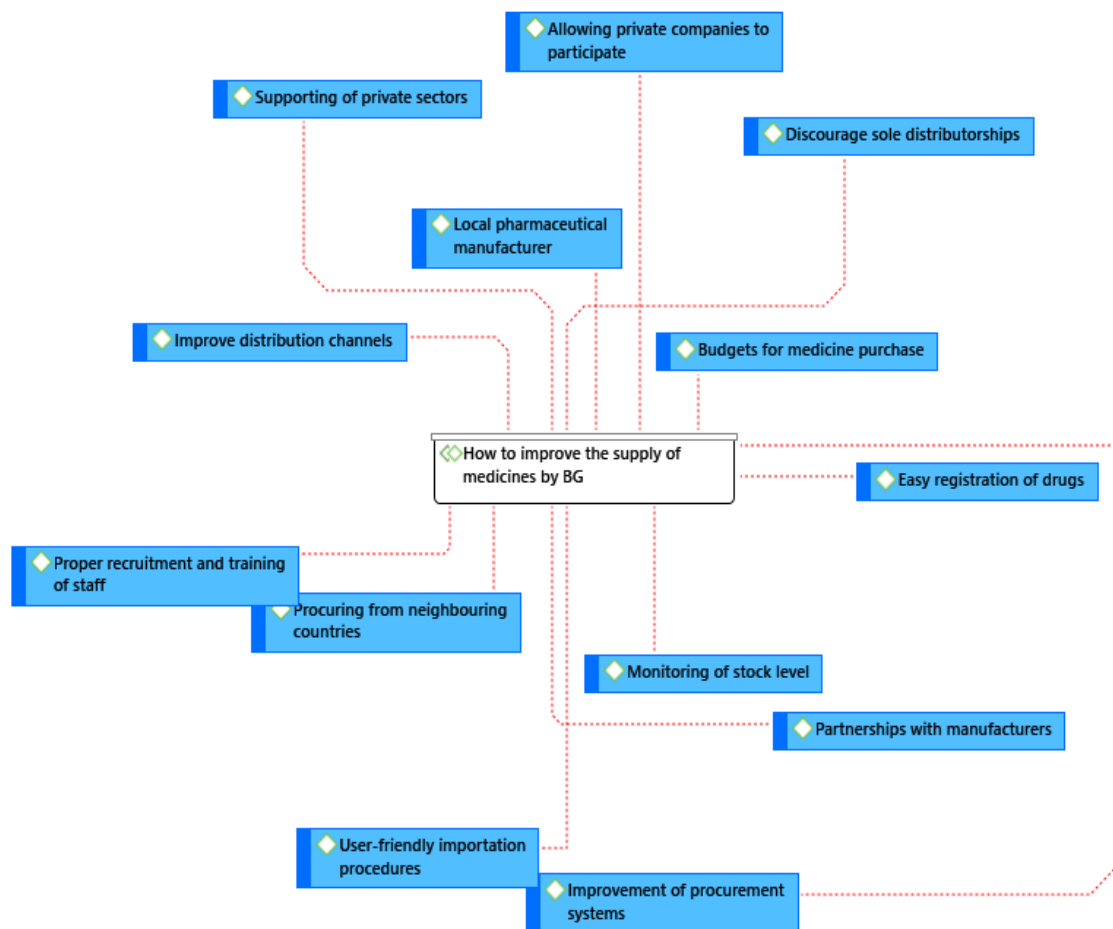
*P22 said “Sometimes we do not keep the medical rules prior to the treatment of our patients due to medicine stockout, this should be dealt with to avoid loss of lives.”*

**An increased cost of medicines:** It is noted that the higher the demand, the lesser the supply, and the higher the price. This is also applicable to medicine stock. The participants of the study concurred that the lack of medicine stock results in the increase in price of medicines, which leads to deaths as some low-income earners cannot afford to buy those medicines for their various treatments. Excerpts from participants are as follows:

*P15 said “Medicine stockout leads to an increase in price of some certain drugs. This should be dealt with. We need a steady supply of medicines”.*

#### **4.4. Improving the supply of medicines by the Government of Botswana to improve the healthcare of the citizenry**

At the end of the interview, the interviewer asked the participants of the study the various ways by which the Botswana health care system can improve medicine stockout to ensure that adequate services are provided to the people and to the grassroots level. This section serves as the general recommendations of the study. Their responses are summarised in Figure (4).



**Fig. 4. Improving the supply of medicine in Botswana**

According to Figure (4), participants indicated a multitude of ways that the Government of Botswana can implement to improve the supply of medicines. These measures include supporting local pharmaceutical manufacturing, allowing private companies to participate, discouraging sole-distributorship, allocating adequate budgets for medicine purchase, easy registration of drugs, monitoring of stock level, partnerships with manufacturers, improvement of procurement systems, user-friendly importation procedure, procuring from neighbouring countries, proper recruitment and training of staff, improving distribution channels, and supporting of private sectors. These findings serve as the general recommendations of the study.

#### **4.5. Recommendations to medical officials**

The following recommendations are made to the medical officials of Botswana healthcare system:

- *Due to the incompetence in handling medicine data, the study recommends that medical healthcare should embark on on-the-job training for inventory managers.*
- *Employment should be based on competency and should not be dulled by nepotism.*
- *The Government of Botswana should support local pharmaceutical manufacturing and should gradually withdraw from importations.*
- *The Government should also allow private companies to participate in supply processes to allow speedy deliveries.*

- *The sole distributorship of medicines should be grossly discouraged.*
- *During budget allocations, more financial resources should be allocated for medicine purchase to eliminate shortages.*
- *There should be an easy and quick process in the registration of drugs.*
- *Inventory management should be very effective in the monitoring of stock levels.*
- *There should be established partnerships with manufacturers.*
- *Procurement systems should be improved.*
- *The Government should ensure that importation procedures are user-friendly.*
- *There should be alternatives in importing medicines, especially from other neighboring countries.*
- *All the distribution channels, transportation, and delivery systems should be improved.*
- *The Government should be very supportive to the private sector, especially in the provision of funding.*

## **5. Conclusion of the study**

This study investigated the effects of pharmaceutical manufacturing on healthcare provision in Botswana. The study was underpinned by four major objectives which are to investigate the reasons for medicine stockouts in the Botswana healthcare system, to examine if the medical inventory system is well-managed in the Botswana healthcare system, to consider the effects of medicine stockouts in the Botswana healthcare system, and to investigate how to improve the supply of medicines by the Government of Botswana to improve the healthcare of the citizenry. A qualitative research approach and exploratory research design was adopted to find solutions to the problem of the study. Data were collected from thirty-four participants that handle medicine stocks in the Botswana healthcare system. Furthermore, findings were analysed using Atlas-ti software (version 9). Themes and categories emerged and were discussed in an endeavour to find solutions to the identified problems. Findings depict that medicine stockout is a well-known phenomenon in the Botswana health system. The reasons for medicine stockout were attributed to both the activities of the inventory officials and the Government of Botswana. As Systems theory is embraced in the study, its precepts depicts that all the component parts of the system (government and workers) should always work in unison to achieve their objectives. In this regard, the government should assist in making soluble legislation that will improve importations, local manufacturing, training of staff, reduce organisational red tapes, and tender processes to ensure that medicines are always available at the needed places. Conversely, the inventory employees should as a matter of urgency, employ expertise experienced in inventory management to ensure that medicine stockout are eliminated or at least minimized. This study concludes that medicine stockout as witnessed by healthcare providers could be curbed if both the Government and inventory employees work together. Improvements must be employed both in public and private facilities, hence the recommendations of this study.

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