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Impact of COVID-19 pandemic on pharmaceutical systems and supply chain – a phenomenological study

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ABSTRACT

Background: Resilient pharmaceutical systems and supply chains are critical in the control of COVID-19, a pandemic that has mostly devastated public health systems and livelihoods in resource-limited countries in sub-Saharan Africa. **Objective:** To evaluate the impact of COVID-19 on pharmaceutical systems and supply chain in a resource-limited setting.

Methods: A descriptive qualitative survey using a phenomenological approach was conducted among key informants in the public and private pharmaceutical sectors of Namibia. Data were collected on the perceived impact of COVID-19 pandemic on the supply chain, as well as access and availability of essential medicines among the distributors and points of care in the private and public sectors. Qualitative themes of the impact were analyzed using Tesch's approach. **Results:** Of the 21 key-informants, 57.1% were female and 85% were from the private versus the public pharmaceutical sector. Overall, key informants reported a negative impact on access and availability of essential medicines, particularly sanitation and hygiene products, and antimicrobials. Most medicine outlets, experienced longer lead times, attributed to reduced inter-country transportation of goods and services and limited in-country capacity and capabilities to manufacture. The main thematic challenges included bureaucratic bottlenecks and lack of emergency readiness of the medicine's logistics supply chain in Namibia.

Conclusion: COVID-19 pandemic aggravated the inequitable access to essential medicines in the public and private sectors of Namibia. Governments in resource-limited countries need to strengthen in-country Private-Public Partnerships as well as regional treaties for Universal Health Coverage in context of the COVID-19 pandemic.

1. Introduction

Pandemics are an increasing global public health concern. The World Health Organization (WHO) declared COVID-19 infection, i.e. Severe Acute Respiratory Coronavirus infection (SARS-CoV-2), a pandemic on March 11 2020,¹ after the outbreak of a rare flu-like infection was first reported in Wuhan, China in early December 2019.² More than 140 million infections and over 3 million deaths have since been reported globally.³ The first case of COVID-19 infection in Namibia was reported in March 2020 and since that time, more than 46,000 infections and almost 600 deaths have been recorded.

With increased globalization and migration of people, the likelihood of pandemics is projected to increase.⁴ Pandemics such as COVID-19 are associated with high rates of morbidity and mortality, and negatively impact the socioeconomic status and livelihoods of communities, particularly in

resource-limited countries. In these settings, the pharmaceutical sector has not been an exception, limiting access to quality and cost-effective medicines to control diseases in a region with already a high burden of infectious diseases and weak health systems.^{5,6} The pharmaceutical industry plays a pivotal role in the provision of quality healthcare services,⁷ especially during pandemics, when medicines supply chain can be overwhelmed or shut down due to varying reasons. These include, over-reliance on traditional manufacturing and distribution routes such as China and India,^{8,9} and South Africa in the case of Namibia. Also, the hoarding and non-release of pharmaceutical supplies to buying countries, thus, causing shortages or disruption of pharmaceuticals supply chain within the countries.^{10,11} Furthermore, lockdowns, as in during the early days of COVID-19 pandemic, led to restriction of in-country and cross border movements; this had a huge impact on how pharmaceutical supplies are transported and delivered during the period.

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Pharmaceutical systems in Namibia were grossly affected by the pandemic, limiting access to essential medicines at public and private health facilities.¹² Moreover, the pandemic reduced revenue of minor and major players in the pharmaceutical sector in Namibia. Several studies outside Namibia has shown the impact of the pandemic on the lives of individuals, either ordinary citizens or healthcare professionals. However, no study has sought to quantify the impact of the COVID-19 pandemic in Namibia within the pharmaceutical business setting and thus, relate this to the lived experiences of those directly affected by the pandemic within the system.

Consequently, this study aimed to evaluate the impact of COVID-19 pandemic on pharmaceutical systems and supply chain in Namibia in order to inform policies and strategies for emergency preparedness in this sector.

2. Methods

2.1. Research design and setting

Between November and December 2020, a descriptive qualitative survey design employing a phenomenological approach was used to identify lived experiences of key informants on the impact of the COVID-19 pandemic on the pharmaceutical systems and supply chain in a resource-limited country, Namibia. The study was conducted using an online semi-structured interview guide among key informants in the pharmaceutical public and private sectors in Namibia. Only respondents that gave an online written consent completed the survey.

2.2. Population and sample

Key pharmaceutical professionals working within the pharmaceutical supply chain system i.e. government, educational institutions, retail and wholesale pharmacy outlets in Namibia were invited to participate in the study. Only pharmaceutical personnel working within and conversant with the pharmaceutical supply chain system in Namibia were included in the study.

2.3. Data collection tool

Four questions were included in the online survey platform at the initial stage of the questionnaire development. Relevance and validity of the survey questions were tested using two members of the research team; responses obtained from the pilot phase were not included in the final analyses. Inconsistencies were identified and the need to include two questions to gauge participants' experiences with regard to stock outs and lead time to receiving ordered items from wholesalers were proposed. These were subsequently added to the platform, prior to rollout.

2.4. Data collection and procedure

An online survey was developed using Google® Forms as survey platform, in line with current social distancing requirements, where participants can complete an online questionnaire. This was in the form of semi-structured questions. A snowballing referral system was used to identify eligible individuals within the pharmaceutical sector, these were selected for their lived experiences. The number of respondents included in the study was dependent on when saturation was reached.

The interview guide consisted of six open-ended questions. (1) Briefly explain how COVID-19 pandemic has affected your personal life, time with family and friends, including how you normally carry out your daily activities. (2) With particular emphasis on period of lockdowns, was there any difference between your sales volume prior to the lockdown and during the lockdown? (3) Can you explain how you interact with your patients/clients during this pandemic? Any positive or negative experience gained from this period? (4) How do you feel the pharmaceutical sector in Namibia can handle a pandemic better in the future, with specific emphasis on the staff and supply chain? (5) Did you experience more stock outs for

products after COVID-19 pandemic started compared to period before? (6) How were delivery lead times for your orders affected? What was the average lead time before the pandemic and how did it change after the pandemic, etc.

2.5. Data analysis

Qualitative data from online responses were double-coded by two researchers (TT and BAA) in the research team using thematic content analysis according to Tesch's approach.¹³ A third researcher (DK) reviewed the coding to identify inconsistencies that were clarified between the three researchers. Confidentiality of the participants was ensured.

2.5.1. Ethics and data protection, storage and disposal

The study was approved by the Ministry of Health and Social Services (MoHSS) ethics review Board (17/3/3 JG). All data files were stored securely in a safe or locked file cabinet by the principal investigator, and will be kept for a minimum of 3-years after study completion.

3. Results

Twenty-one eligible and consented participants took part in the online questionnaire. Most of the participants were community pharmacists (51.7%), while 57.1% were females (Table 1).

3.1. Thematic analysis of the impact of COVID-19 on pharmaceutical system (n = 21)

Through thematic analyses, four themes related to personal lives of pharmaceutical personnel (Table 2) and 10 themes related to their professional lives were derived (Tables 3-5). A number of challenges limiting the provision of quality and cost-effective healthcare services during the lockdown were highlighted by the respondents.

3.2. Pharmaceutical personnel personal lives

With respect to the personal lives of the respondents, 4 emergent themes were identified: (1) Social interactions; (2) Financial strain; (3) Sales of multivitamins and immune boosters and PPE increased during lockdown; and (4) Sales of most commodities decreased during lockdown.

Most of the respondents' living conditions were negatively affected by the pandemic and eventual lockdowns. More than 90% had their family routine changed due to the government's institution of compulsory lockdowns and need for social distancing. One of the respondents lost his/her

Table 1
Demographic characteristics of the respondents (N = 21).

Demographic variables	Categories	n (%)
Age, (n, %)	20–29 years	4 (19.0)
	30–39 years	6 (28.6)
	40–49 years	6 (28.6)
	50–59 years	5 (23.8)
Years of experience (mean, S. D.)		15.0(10.3)
Years of experience (n, %)	0–9 years	6 (28.6)
	10–19 years	9 (42.9)
	20–29 years	3 (14.3)
	30–39 years	3 (14.3)
Gender (n, %)	Female	12 (57.1)
	Male	9 (42.9)
Type of facility (n, %)	Academic Institution	1 (4.8)
	Manufacturing Industry	1 (4.8)
	State Hospital Pharmacy	2 (9.6)
	Private Hospital Pharmacy	3 (14.3)
	Wholesale/Distribution	4 (19.1)
	Community Pharmacy	10 (51.7)
Highest qualification (n, %)	Masters	4 (19.0)
	BPharm degree	16 (76.2)
	Others	1 (4.8)

Table 2
Pharmaceutical personnel personal lives.

1. Briefly explain how COVID-19 pandemic has affected the personal life of professionals in the pharmaceutical system and supply chain in Namibia.		
Themes	Subthemes	Quotes
Social interaction	Family time	"Everything was changed, more time with family."
	Negatively affected social-life style	"I became anti-social to prevent infection, because I am the only pharmacist and cannot afford to get sick. The pharmacy needs to be operational."
Financial strain	Employment and financial related stress	"Movements and luxury travel have been eliminated whilst social interaction and association has vanished."
		"Interrupted routine, lost my job."
		"As a working mom in this industry it was tough. All day care and schools were closed and home schooling after a long, tiring day at hospital was too much to handle".
		"It limited my physical interactions with clients."
		"Has affected my personal life dramatically especially with the financial implications."
2. With particular emphasis on the period of lockdowns, was there any difference between your sales volume prior to the lockdown and during the lockdown?		
Themes	Quotes	
Sales of multivitamins and immune boosters and PPE increased during lockdown	"Definitely sales was higher on the vitamin lines." "Sales volumes went up more in terms of supplements during the lockdown." "We had an increase of sales especially on COVID related sales like gloves, sanitizers and vitamins, but then the sales came down. I think hygienic practices limited flu and cold transmissions."	
Sales of most commodities decreased during lockdown	"Sales volume went down due to ITAC permits and products unable to get into Namibia. There were no stock for 14 weeks." "Prior lockdown sales where high, during lockdown sales were much less as people were quarantining and staying home."	

Table 3
Can you explain how you interact with your patients/clients during this pandemic? Any positive or negative experience gained from this period?

Themes	Sub-themes	Quotes
Barriers to effective patient-pharmacist interactions	Financial stress	"It was difficult to interact with patients as everyone was more stressed financially and mentally drained."
	Psychological stress	"First few days patients panicked, but we tried to comfort them and to be positive. The communication from our Ministry wasn't that clear. We knew more about what was going on in SA then in our country."
Advanced pharmacists' role as counselors	Bureaucratic bottle-necks affected supply chain	"More appreciation of the supportive and accessibility of the pharmacist and roles in community health. A lot of consultancy work obviously not financially beneficial directly but long-term improved visibility."
		"Same level of interaction but with more counseling specifically pertaining to financial and social stress of patients."
Supply chain	Patients' frustrations	"Patients frustrated due to lack of medicine."
	Systemic/bureaucratic bottleneck	"It became very hard to explain why products are not coming. It seemed like Namibian Authorities were not actively doing something about the matter."

job, which can be attributed to the economic impact of the pandemic on businesses and invariably, on the workers. Sales of most pharmaceutical items were reported to have reduced due to low patronage during the lockdowns. However, sales of immune boosters such as multivitamins and personal protective equipment (PPE) such as face masks increased due to both the need to keep safe, and panic-buying. This was brought about by the continued spread of COVID-19 infection within the population.

3.3. Pharmaceutical personnel professional lives

In relation to the professional lives of pharmaceutical personnel, 6 emergent themes were identified: (1) Barriers to effective patient-pharmacist interactions; (2) Advanced pharmacists' role as counselors;

(3) Supply chain; (4) Low stock availability levels prior to the pandemic; (5) Border restrictions; (6) External influence on supply chain.

Nearly all participants reported they had stock outs during the lockdown. This was attributed to issues such as financial and psychological stress which impacted interactions between the pharmacists and their clients, considering everyone was affected by the pandemic. However, in the midst of all the gloom posed by the current pandemic, pharmacists' roles as counselors were enhanced because of the psychosocial and economic status of the clients.

3.4. Strengthening the pharmaceutical system and supply chain

Four (4) emergent themes were identified for strengthening the pharmaceutical and supply chain: (1) Strengthen preparedness and planning;

Table 4
Did you experience more stock outs for products after COVID-19 pandemic started compared to period before?

Themes	Sub-themes	Quotes
Low stock availability levels prior to the pandemic		"Yes. Overall, there has been a consistent decrease in stock availability in Namibia over the last 4 years. The problem has been drastically compounded during COVID with significant shortages at record levels." "Yes, I did, but lifted my stock levels to make sure we did not run out. I think the wholesalers did an excellent job to ensure that we got our meds."
Border restrictions	Bureaucratic bottleneck	"Yes. due to South Africa slacking." "Yes, there was a backlog at suppliers, customs regulations changed, delays due to regional lockdown and curfews. The SA trucks strike was a killer to products arriving on time in Namibia."
External influence on supply chain	Product withdrawal	"Sometimes. Lots of pharmaceutical companies withdrew their products due to economic reasons."
	Erratic product supply	"Yes, it was terrible in the retail sector as supplies of immune boosters became too erratic." "With some suppliers, yes."

Table 5

How do you feel the pharmaceutical sector in Namibia can handle a pandemic better in the future, with specific emphasis on the staff and supply chain?

Themes	Subthemes	Quotes
Strengthen preparedness and planning	Better pharmaceutical and medical supply chain management	<i>"One cannot predict how other countries will change their laws but buying in and early govt intervention would help."</i> <i>_Need to clearly coordinate buffer. Stocks, lead times and cater for delays along supply._</i>
	Liaise with exporting countries	<i>"The medicine shortage was due to South Africa closing their borders and making medicine exports almost impossible. Suggest earlier intervention by our country leaders discussing problem with counterparts in SA."</i> <i>"RSA was the problem, as they were holding up our stock and not wanting to share. Implementation by South African government to obtain special permits wasted much time."</i>
Strengthen local manufacturing	Improve capacity of local industry	<i>"The key would be local manufacturing of the bulk of our products or at least guaranteed access to the resources outsourced. Improved use of social media platforms from suppliers on updates of products available and substitutes on offer."</i>
		<i>"Supporting local manufacturers is key, it is no longer a luxury but a strategic requirement of national importance."</i> <i>Restricted exports from countries like South Africa & Asia, as they scrambled to defend their own domestic supplies was a clear testimony of how vulnerable our country's supply chains are."</i>
Coordinated public-private initiative efforts	Broadened supply chain	<i>"Staff needs training, particularly, the support staff. The supply chain needs to be broadened and to be more responsive to demand."</i>
	Improved supply chain logistics	<i>"If the pharmaceutical sector can work together and put in a standard treatment protocols and make sure these products are available at all facilities on time."</i> <i>"I cannot think of any good idea. To import enough stock beforehand might be difficult as you never know WHICH items might be affected most."</i>
Training		<i>"Staff need training particularly the support staff. The supply chain needs to be broadened and to be more responsive to demand."</i>

(2) Strengthen local manufacturing; (3) Coordinated public-private initiative efforts; and (4) Training.

Owing to the negative impact of the pandemic on the lives of respondents, it was believed that some steps have to be taken to mitigate the effect of any future pandemic or incidents which can limit the normal existence of individuals. Some of the ways highlighted by respondents include strengthening the country's and pharmaceutical system's preparedness through better management of the pharmaceuticals and commodities. Training of pharmaceutical personnel was another way of improving the systems, thus, making the system ready for eventualities.

Currently, only one pharmaceutical manufacturing company is effective in Namibia, respondents suggested manufacturing of essential medicines within the country might enhance independence, thus, reducing over-reliance on foreign entities for medicines.

3.5. How were delivery lead times for your orders affected? What was the average lead time before the pandemic and how did it change after the pandemic, etc

Prior to the pandemic, community pharmacies within Windhoek, Namibia had less than 24 h lead time to receive commodities from wholesalers compared to about 2 days for those pharmacies that are outside the city. The lead times increased to about 72 h for pharmacies within Windhoek and between 2 weeks to 3 months for pharmacies outside the city. Border delays were alluded to as a cause for increase in lead time. However, some pharmacies overstocked due to erratic medicine supply during the lockdown.

4. Discussion

This study explored the impact of COVID-19 on the pharmaceutical systems and supply chain in Namibia through lived experiences of pharmacists working in the public and private pharmaceutical sector during the lockdown period due to the current pandemic. Disruptions in supply chains, not limited to the pharmaceutical setting, has been seen in variety of situations prior to and during the COVID-19 pandemic^{14,15}; such disruptions have led to unlimited damage to daily lives of individuals, both the professionals and patients were affected one way or the other. The abrupt start of the pandemic and ensuing call for lockdowns showed the urgency in the need to curb the spread of SARS-COV-2 infection, however, with no specific logistics on ground to mitigate possible impact of the lockdown on the daily lives of the population, it led to sufferings and uncertainties for majority of the world population.¹⁶

In this study, sales of essential commodities such as multivitamins, immune boosters and personal protective equipment (PPE) were seen to increase at the beginning of the pandemic in Namibia while antibiotics sales went down, this is similar to what was reported by Aljadeed et al. in Saudi Arabia.¹⁷ This might be attributed to closure of businesses, limited business activities and inter-country trades and travels, and lockdown necessitating reduction in social gathering and interactions.

It can be deduced from this study that it is important for governments to take a pivotal role in ensuring functional supply chain system especially during crises as is evident in the current COVID-19 pandemic. Formulation of policies that will encourage both local and foreign investments in manufacturing sector for essential medicines and medical products such as PPE will require political will and insightful leadership. Ensuring favourable working conditions for private-public partnership (PPP) initiatives in different areas of pharmaceutical systems and supply chains can help to improve apparent systemic frailties. Multisectoral engagements become imperative for the government and other governmental and non-governmental entities to proffer lasting solutions in a sector where little disruption can lead to loss of livelihoods and lives through allowance and provision of substandard medicines or medical services.

Pertinent issues such as over-reliance on importation of medicines and medical supplies from China and India as well as the major port/point of entry being South Africa are areas needing government intervention. It might be needed for African Union or other regional organisations to develop workable interventions as alluded to by the respondents in this study, so as to alleviate or plan, prior to any future pandemic that is capable of undermining the existence of a whole population.

Apart from the role of policy makers, psychosocial state of pharmacists and patients was highlighted as an area that was impacted by the lockdown. Loss of employment or inability to make an income during the lockdown led to psychological breakdown for some individuals, coupled with the social distancing policy; all these contributed to longstanding effect of the prevailing economic recession and the current pandemic felt by the pharmaceutical personnel and patients/clients. However, in the midst of all these, a new role for pharmacists emerged, counseling of patients on issues outside their duties. This is the holistic management of patients as envisaged in Bloom Program¹⁸ and Ming et al.¹⁹

Role of marketing authorization holders (MAH) emphasized multisectoral engagements in determining products that an entity wants to deregister and the medical needs of a population. With active PPP arrangements, it might possible to mitigate the effects of cancellation of a longstanding innovator product through registration of comparative or

similar molecule. More than 50 products were deregistered by different MAH during the lockdown, limiting options of physicians and pharmacists. Pharmaceutical wholesale practices have little influence on decisions made by MAH, as argued earlier, PPP arrangements might be an avenue to mitigate effects of medicine deregistration.

5. Conclusion

This study has attempted to document salient points that can assist pharmaceutical and governmental institutions deal with pharmaceutical supply chain disruptions during pandemics in the future. Political will is imperative if LMICs such as Namibia will be able to overcome the impact of generalized pandemics. Impetus to ameliorate the situation should not be the prerogative of the government alone, players or stakeholders in the industry, within and outside the country need to come together to fashion out workable solutions, starting from facility, staffing, remunerating during unprecedented difficult periods, manufacturing capabilities, drug supply, etc.

Some interventions can be immediate or instituted through professional organisations, however, lasting agreements can only be reached at governmental levels through bilateral treaties. Such treaties can be entrenched by local and international organisations through instituting practicable logistics in conjunction with professional and labour organisations.

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Declaration of Competing Interest

None of the authors has any competing interests that are directly related to this project.

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