Original Article

Changes in Availability, Utilization, and Prices of Medicines and Protection Equipment for COVID-19 in an Urban Population of Northern Nigeria

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ABSTRACT

Objective: Measures are ongoing to prevent the spread of COVID-19 and treat it with medicines and personal protective equipment (PPE). However, there has been considerable controversy surrounding treatments such as hydroxychloroquine with misinformation fuelling prices hikes and suicides. Shortages have also appreciably increased costs of PPE, potentially catastrophic among lower- and middle-income countries such as Nigeria with high copayment levels. Consequently, a need to investigate changes in availability, utilization, and prices of relevant medicines and PPE during the pandemic in Nigeria. **Methods:** Exploratory study among community pharmacists with a survey tool comprising four sections including questions on changes in consumption, prices, and shortages of medicines and PPE from the beginning of March 2020 to the end of June 2020. In addition, suggestions from community pharmacists and co-authors on ways to reduce misinformation. **Findings:** 30 out of 34 pharmacists participated giving a response rate of 88.2%. Significant increases were seen (3-fold or more increase) in the consumption of hydroxychloroquine (100%), vitamins/immune boosters (96.7%) and antibiotics (46.7%) as well as PPE (100%). Considerable price increases (50% increase or greater) also seen for antimalarials (96.7%), antibiotics (93.3%), vitamins/immune boosters (66.7%), and PPE (100%). Shortages are also seen for hydroxychloroquine and vitamins/immune boosters but most severe for PPE (80% of pharmacies). **Conclusion:** Encouraging to see increases in the utilization of vitamins/immune boosters and PPE. However, a considerable increase in the utilization and prices of antimicrobials is a concern that needs addressing including misinformation. Community pharmacists have a key role in providing evidence-based advice and helping moderate prices.

KEYWORDS: *Community pharmacists, COVID-19, medicines, Nigeria, price rises*

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INTRODUCTION

Since COVID-19 was first identified in China, by 27 September 2020 there have been over 32 million cases worldwide with 990,000 deaths giving a case fatality ratio (CFR) of 3.03%.[1] Within this, Nigeria currently has the second highest prevalence rate among the World Health Organization (WHO) African countries at 58,198 cases and 1106 deaths, giving a CFR of 1.90%. Mortality currently appears appreciably lower than rates seen in a number of Western countries especially given a population size of over 206 million.[1,2] In addition, certainly in the UK, where higher mortality rates have been seen among the Black Afro-Caribbean versus white population.[3] This probably reflects lessons learnt from previous pandemics in Nigeria, including early lockdown measures and border closures. However, there are concerns with poor compliance with recommended control measures including social distancing and face masks coupled with sanitation challenges among households and the lack of adequate testing facilities at the beginning of the outbreak, although now improving.[2,4]

However, there are still concerns that COVID-19 could overwhelm Nigeria given rising prevalence rates against the background of high prevalence rates of both infectious and non-infectious diseases as well as a lack of intensive care beds, especially in the public healthcare system.[2,5] In addition, funding of healthcare is typically through co-payments, with potentially catastrophic results for families when members become ill, similar to a number of other low- and middle-income countries (LMICs).[6-9] This is a concern if funds for priority disease areas including noncommunicable diseases (NCDs) are diverted to fund prevention and management of new infectious diseases such as COVID-19 where potentially unproven treatments are being purchased at increasing prices,[7] as well as for personal protective equipment (PPE) if appreciable price rises following shortages as seen across countries.[10]

We are aware that several treatments have been proposed for treating COVID-19 building on proven measures to prevent the spread of the virus.[7,11,12] The most successful to date has been low dose dexamethasone in hospitalized patients,[13] although concerns now with remdesivir.[14] There have been increasing concerns with hydroxychloroquine following the initial hype resulting in endorsement by Governments and others.[7,15,16] Later, trials including robust clinical trials failed to show any benefit for either treatment or prevention, alongside potential harm, leading the WHO and others dropping hydroxychloroquine from their studies.[7,17] However, not before the hype and misinformation surrounding hydroxychloroquine had resulted in shortages, price rises, and deaths across countries including Nigeria.[7,18,19] The Nigerian Government though on 22 May warned against the use of hydroxychloroquine due to ongoing concerns.[20] The same controversy also surrounds the use of lopinavir/ritonavir.[17] Community pharmacists especially in countries with high co-payment levels can play a key role during pandemics addressing misinformation and its potentially catastrophic consequences, encourage appropriate prevention, help keep price hikes to a minimum and instigate measures to address the unintended consequences of pandemics with lockdown measures including enhancing medicine adherence levels in patients with NCDs.[7,21,22] Community pharmacies can also play a role in reducing the stigma associated with COVID-19.[2]

There are reports suggesting appreciable price rises and shortages of medicines in current use for COVID-19 in Nigeria.[19] However, we were unaware of any study formally assessing this. Consequently, we sought to address this information gap to provide direction to all key stakeholder groups in the future.

METHODS

This was an exploratory study conducted among community pharmacies in the city of Kano, North-Western Nigeria. Kano metropolis is the commercial hub of Northern Nigeria and the second largest city in the country with an estimated population of just under 4 million people; consequently, chosen for this study.

We adopted the same methodology as studies simultaneously undertaken across Asia.[7] Initially, a brief literature review of current activities in Nigeria as well as suggested approaches to prevent and treat COVID-19 was performed. Subsequently, convenient sampling of community pharmacists within the Kano metropolis region was undertaken to assess changes in utilization, prices, and shortages of medicines used to prevent or treat COVID-19. This included antimalarials (principally hydroxychloroquine), antibiotics including azithromycin, analgesics (principally paracetamol), and vitamins and other immune boosters as well as PPE (principally masks and hand sanitizers) from early March 2020 to the end of June 2020. Approaches to pharmacists included direct contact and emails, with the data verbally collected. Replies to the questionnaire were entered onto Microsoft Excel, with the proportional changes documented for comparison purposes.

The survey tool comprised four sections: Section A: Changes in consumption of medicines and PPE, Section

B: Changes in prices during the study period; Section C: Any shortages of medicines and PPE and Section D: Suggestions on how to reduce misinformation fuelling panic buying. The pharmacists were briefed on the objectives of the study and given the opportunity to decline participation.[7] As before, no ethical approval was sought for this study as this was not required according to national legislation and institutional guidelines, similar to other studies not involving patients directly.[5,7,10,23-25] However, as mentioned, pharmacists could decline to participate.

RESULTS

34 pharmacists were approached for this initial study in the North West of Nigeria (Kano). 30 subsequently took part giving a response rate of 88.2%.

Table 1 describes changes in utilization patterns during the study period. Substantial changes (3 or more-fold increase during the study period) were seen in the utilization of hydroxychloroquine (100%), vitamins/immune boosters (96.7%), and antibiotics (46.7%) as well as PPE (100%).

Table 2 documents price changes during the same period. Appreciable price increases (50% or more) were seen for the antimalarials (96.7%), antibiotics (93.3%), and PPE (66.7%), with a third of pharmacies reporting a substantial price increase of antimalarials of 6-fold or more during the study period. Substantial price increases (6-fold or greater) were also seen in all the pharmacies (100%) for PPE.

Table 3 documents the extent of any shortages during the same period. As expected, shortages were seen for hydroxychloroquine and vitamins/immune boosters, which were severe for PPE (80% of pharmacies).

Suggested activities to reduce the extent of misinformation fuelling increases in the utilization, prices, and shortages of hydroxychloroquine alongside azithromycin include rapid evidence-based communications via the government, regulatory agencies, physicians, and pharmacist societies. This can be through social media with the help of patient organizations. Pharmacists can also play a key role in Nigeria encouraging appropriate preventative activities including hand sanitization as well as reducing the stigma associated with COVID-19 through discussions and displays in their pharmacies.

DISCUSSION

We believe this is the first study undertaken in Nigeria to assess the impact of information and advice regarding COVID-19, including misinformation, on changes in utilization and prices of pertinent medicines and PPE to prevent and treat the virus in recent months alongside potential shortages.

There were appreciable increases in the utilization and prices of antimalarials, antibiotics, and vitamins/immune boosters in Nigeria, greater than seen among Asian countries with similar high patient co-payment levels.[7] Approximately half of the pharmacies surveyed in Bangladesh and India saw no change in the utilization of antimalarials during this period, although greater in Pakistan, with only 6.5% of pharmacies in Bangladesh documenting price increases >50% versus 96.7% in Nigeria with limited changes also seen in India and Pakistan.[7] In Ghana

Table 1: Utilization changes for medicines and personal protective equipment between the beginning of March and end of June 2020

	Antimalarials	Antibiotics	Analgesics	Vitamins/Immune boosters	Face masks/PPE
No change (*n*)		4	28		
Increase in utilization (not specified) (*n*)			1		
Up to 2-fold increase (*n*)		3			
2-fold to 3-fold increase (*n*)		9		1	
3-fold to 4-fold increase (*n*)	7	8		5	1
4-fold to 5-fold increase (*n*)	2	5	1	3	3
5-fold to 6-fold increase (*n*)	15	1		17	4
6 or fold increase (*n*)	6			4	22
Total (*n*)	30	30	30	30	30
No change/decrease (*n*)	0	4	28	0	0
% of total	0%	13.3%	93.3%	0%	0
Increase (%)	100%	86.7%	6.7%	100%	100%
% increase 3-fold or greater	100%	46.7%	3.3%	96.7%	100%

n=number, PPE: personal protective equipment

Table 2: Price changes for medicines and personal protective equipment between the beginning of March and end of June 2020

	Antimalarials	Antibiotics	Analgesics	Vitamins/Immune boosters	Face masks/PPE
No change (*n*)	1	2	26	10	
Increase (not specified) (*n*)			4		
Up to 50% increase (*n*)		22		20	
Between 50% increase and 2-fold increase (*n*)		6			
2- to 3-fold increase (*n*)	15				
4- to 5-fold increase (*n*)	4				
6-fold or more increase (*n*)	10				30
Total (*n*)	30	30	30	30	30
No change/decrease (*n*)	1	2	26	10	0
% of total	3.3	6.7	86.7	33.3	0
% experiencing 50% or more increase (%)	96.7	93.3	0	66.7	100

n=number, PPE: personal protective equipment

Table 3: Shortages for medicines and personal protective equipment between the beginning of March and end of June 2020

	Antimalarials	Antibiotics	Analgesics	Vitamins/Immune boosters	Face masks/PPE
No change/available (*n*)	8	27	29	2	6
Part shortages (*n*)	22			26	
Shortages unspecified (*n*)		3	1	2	
Severe shortages (*n*)					24
Total (*n*)	30	30	30	30	30
No shortages (% of total)	26.7	90.0	96.7	6.7	20.0
Shortages (% of total)	73.3	10.0	3.3	93.3	80.0

n=number, PPE: personal protective equipment

there were appreciable increases in the utilization of antimalarials during the study period (83.3% of pharmacies); however, no change in prices in 50% of pharmacies surveyed, although 16.7% saw appreciable price increases (personal communication IS).

Whilst there was increased utilization of antibiotics in Bangladesh (70.6%) and Pakistan (100%), this was twofold or greater in only 4.1% of pharmacies in Bangladesh, and there were typically only limited price rises across Asia.[7] There was also increased utilization of antibiotics in Ghana but only appreciable in 16.7% of pharmacies. Appreciable increases in antimicrobial utilization are a concern as this increases antimicrobial resistance rates.[24] Multiple strategies including educational strategies will be needed among all key stakeholders in Nigeria to reduce inappropriate prescribing and dispensing of antimicrobials, building on successful activities in other LMICs.[24,25]

Encouragingly, there were also increases in the utilization of vitamins/immune modulators across Asia, (e.g., 58.3%–90.6% of pharmacies[7] and Ghana (100% of pharmacies). However, typically price rises varied in Asia compared with Nigeria with only a maximum of 16.7% of pharmacies recording rises greater than 2-fold.[7] In Ghana, appreciable price increases were

also seen in only 16.7% of pharmacies. Encouragingly, there was also increased utilization of PPE across Asia, Nigeria, and Ghana; however, again price rises were greater in Nigeria with 100% of pharmacies seeing increases greater than three to four-fold versus only 2.4%–2.7% of pharmacies in Bangladesh and India and up to 50% in Malaysia.[7]

The greater price rises in Nigeria versus Asia for medicines and PPE may reflect greater purchasing power coupled with currently lower manufacturing capacity; however, further research is needed before any definitive statement can be made with price controls evident in some Asian countries.[7] There are though ongoing measures in Nigeria to boost local production.[2] However, care is needed with the local manufacturing of medicines given current concerns with the quality of generics in Nigeria.[26] In the meantime, there could be a role for the Government in Nigeria to introduce price controls given potentially devastating consequences when family members become ill similar to some Asian countries.[7] In addition, appreciable resources spent on preventing and treating COVID-19 means less resources for other diseases.

Potential ways forward to address the consequences of misinformation include a greater role for pharmacies

in providing evidence-based advice. This can include verbal communication as well as posters and other media. Similarly, for physicians and their organizations through social media and other platforms, and we will be following this up in the future. The Government in Nigeria can also play a key role building on existing activities including potential fines for personnel and organizations promoting misinformation, similar to other African countries.[2]

Unintended consequences are also a key area to address in the future especially if lockdown and other activities continue to adversely affect immunization programs, prevention programs for infectious diseases such as malaria, and increased morbidity associated with NCDs such as coronary vascular disease and diabetes if medicines are not being taken correctly.[27-29] We will be following this up in the future.

We are aware we only approached 30 pharmacies in only one region of Nigeria for this exploratory study affecting external validity. However, we believe our findings are robust providing direction for future activities including future research projects in Nigeria and wider.

We have seen a considerable increase in utilization and prices for antimalarials and antibiotics in Nigeria arising from the COVID-19 pandemic which needs addressing. Community pharmacies, clinical pharmacologists, and others can play a key role in reducing the impact of any misinformation given the consequences. They can also help address the unintended consequences from lockdown activities including the impact on NCDs. Encouragingly, there was increased use of vitamins/immune boosters and PPE; however, the considerable price rises are a concern that needs to be addressed given already high co-payment levels in Nigeria. Community pharmacists can again play a role here as well alongside the Government.

Authors' Contribution

Mainul Haque, Israel Sefah and Brian Godman devised the concept for the study and developed the questionnaire. Abdullahi Rabiu Abubakar and Ibrahim Haruna Sani undertook the study with Brian Godman undertaking the initial analysis. Brian Godman together with Olayinka O. Ogunleye wrote the first draft, with all authors involved in subsequent revisions. All authors approved the final version.

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Conflicts of interest
There are no conflicts of interest.

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