

**EFFECTS OF COVID-19 LOCKDOWN ON GASTROINTESTINAL COMPLICATIONS  
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**ABSTRACT**

**Background:** The aim of this study was to examine the effects of COVID-19 lockdown on patients with gastrointestinal complications among Nigerian population with the aim of mitigating similar challenges in future. **Methods:** The study was an online based cross-sectional survey which involved the use of online based questionnaire survey to harness the relevant information from participants. Participants were Nigerian citizens across the country between 20 and 80 years old. A total number of 542 participants took part in the study. Data collection included both independent and dependent variables. All the responses were extracted from Google Forms and exported to a Microsoft Excel Sheet for proper cleaning and analysis. **Results:** The result showed that out of a total number of 542 participants 45.6% were males and 54.4% were females. 27.7% of participants experienced gastrointestinal tract complications during the COVID-19 lockdown with 39.9% depending on self-medication for the immediate relief of their gastrointestinal tract ailment(s). About 67.9% of participants had their jobs affected during COVID-19 lockdown while the financial strength of 70.8% of the participants were grossly affected. 54.6% of participants' medication purchasing power were affected during the lockdown and about 39.5% could not have regular appointment with their physician. After the easing of the lockdown, only 33% of the participants were able to keep appointment with their physician. About 56.8% of participants experienced weight gain during the lockdown. **Conclusions:** This study concluded that a reasonable number of Nigerian population suffered gastrointestinal tract complication(s) during the COVID-19 lockdown with some unable to access health facilities probably due to the restriction of clinic appointments to emergency cases alone. The easing of lockdown did not abate the suffering of these patients either due to financial incapacitation or fear of contracting the disease. It will therefore be good if government can make life more bearable for other non-COVID-19 related ailments especially patients with gastrointestinal tract complication(s) by dedicating some health facilities to them, subsidising drugs related commodities as well as providing financial support that could assist patients with gastrointestinal tract complication(s) have access to healthcare facilities during future pandemic to mitigate morbidity and mortality rates.

**KEYWORDS:** COVID-19, Gastrointestinal complications, Lockdown, Nigeria, Patients.**INTRODUCTION**

The global world was ravaged with a novel coronavirus disease also known as COVID-19 in December 2019. The disease was first reported in Wuhan, Hubei province of China.<sup>[1,2]</sup> The virus responsible for coronavirus disease is known as the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).<sup>[3]</sup> Some of the signs and symptoms of COVID-19 include but not limited to tiredness, fever, cough, chills, loss of smell or taste, muscle aches, headaches, sore throat, shortness of breath, running nose and chest pain.<sup>[4]</sup> One or more of these symptoms usually appear between two to fourteen days of exposure. The period between the time of exposure and before the manifestation of the symptoms is called the incubation period. The virus can easily be

transmitted from one person to another most especially when the distance between close contacts is less than 2 meters.<sup>[5]</sup> SARS-CoV-2 is commonly transmitted through respiratory droplets when an infected person talks, sneezes, sings or coughs. These droplets can fall on the mouth or nose of a nearby person; it can also land on surfaces which when touched, can serve as another way of spreading the virus.<sup>[5]</sup> The World Health Organization (WHO) in March 2020, declared the COVID-19 outbreak a pandemic. COVID-19 pandemic had a global devastating effect on the health status of many including Nigerians. The alarming increase in the number of confirmed cases in Nigeria led to the total lockdown in March, 2020.<sup>[6]</sup> During this lockdown, some healthcare providers categorised as "essential workers" whose movements were not restricted because of their essential

services, could not afford to get to the clinic to perform their duties due to transportation problems. Also, due to the economic hardship of COVID-19 pandemic, some community members could not afford to buy food let alone buy drugs or access medical facilities when required.<sup>[7]</sup>

It was indeed more worrisome that there was price hike of many health-related items such as disinfectants, hand sanitizers, gloves, facemasks and drugs during the lockdown.<sup>[7]</sup> Apart from socioeconomic effects of COVID-19 lockdown on the populace, hindered access to health care during this period for non-COVID-19 related ailments was worrisome. Individuals suffering from non-COVID-19 related ailment(s) find it difficult to attend their regular routine clinic and also gain access to healthcare facilities in corroboration with Ahmed *et al.*<sup>[7]</sup> who observed a daily reduction during COVID-19 lockdown in the visitation of patients for general conditions like malaria. Most public and private hospitals started turning patients away due to the fear of over congestion at their premises and particularly to avoid yet-to-be-detected COVID-19 cases.<sup>[8,9]</sup> Most of the hospitals do not have the facilities for COVID-19 testing in low and medium income countries and as such, are not ready to bear the risk of infection. All these led to untold hardship on people with non-COVID-19 related illnesses.<sup>[9]</sup> It is possible that some of these patients may have even exposed their lives to COVID-19 infection in the process of seeking for alternative temporal remedy. Some community health workers in the primary healthcare facilities had to dismiss patients with symptoms similar to that of COVID-19 infection such as gastrointestinal tract (GIT) complications because of fear of infection.<sup>[8]</sup> Studies have shown that COVID-19 infected patients may present with GIT complications such as gastrointestinal bleeding, pancreatitis, bowel ischemia, Ogilvie syndrome, diarrhoea, transaminitis, severe ileus, vomiting, and abdominal pain.<sup>[10,11]</sup> For instance, the first COVID-19 patients in United States presented a 2-day history of nausea and vomiting when admitted in the hospital followed by diarrhea and abdominal discomfort on the second day of hospitalization.<sup>[11]</sup> Clinical studies also showed an incidence rate of diarrhea ranging from 2% to 50% of reported cases of corona virus.<sup>[11]</sup> GIT complications can affect the normal mechanism of the digestive system. The digestive system which consist of the GIT, helps in the digestion of food and elimination of waste materials out of the body.<sup>[12]</sup> The hollow organs that make up the GIT are the stomach and intestines (small and large). Food moves from the mouth, through the oesophagus to the stomach while partly digested food from the stomach moves to the small intestine and later to the large intestine where it is passed out through the anus after proper digestion and absorptive processes. Disruption of the normal functioning of the GIT in human body can lead to serious problems known as GIT complications which can be detrimental to human health. Pregnancy has been reported to elicit GIT diseases such as

inflammatory bowel disease and gastroesophageal reflux which is characterized by dyspepsia nausea and vomiting in about 50–90% of patients.<sup>[13]</sup> Oncology patients also experience GIT complications such as bowel obstruction, radiation enteritis and constipation.<sup>[14]</sup> Due to the strict measures put in place to curtail the spread of COVID-19 in some healthcare centres most especially in primary healthcare facilities, some patients with GIT complications such as appendicitis, abdominal pain, cancer, constipation, diarrhoea, nausea, stomach disorder, ulcer etcetera, may have found life unbearable during COVID-19 lockdown. Hence the need for this study which is aimed at investigating the effects of COVID-19 lockdown on Nigerian population living with gastrointestinal complications with the aim of mitigating similar challenges in future.

## METHODOLOGY

### Study Design

This study is an online based cross-sectional survey conducted for 5 weeks between 21st June 2020 to 26th July 2020. The online platform become the only reasonable and better alternative method for data collection during the COVID-19 pandemic because of the risk of infection. Apart from this, it saved time, cost and distance was not a barrier. This quantitative research methods involved the use of online based questionnaire survey to harness the relevant information from participants.

### Sampling Techniques/Procedures

Participation in this study was voluntary and every participants have the right to opt out at any stage. To ensure anonymity, confidential details such as name, mobile number and address were not included in the survey. All details of the participants were treated with utmost confidentiality. The online based data collection tools used was Google form which was linked to a questionnaire and distributed throughout the country using WhatsApp Messenger (version 2.20.140, Facebook, Inc., California, USA) to the contact lists of the first, second and third researchers and other researched based channels. Responses were automatically stored in “My Drive” database and could be viewed or downloaded in excel format for analysis using statistical software.

### Sample Population

Participants in this study were Nigerian citizens across the country between 20 to 80 years old. A total number of 542 participants irrespective of gender, took part in the study. The inclusion criteria included Nigerian Citizens between the age brackets of 20 to 80 years while the exclusion criteria included non-Nigerian Citizens and those outside the age brackets of 20 to 80 years.

### Study Variables

Socio-demographic: Details such as gender, age, marital status and highest level of qualification were requested from participants.

General life style: Information such as place of work, type of health facility attended, regular check up at the hospital, alcohol consumption and smoking habits were requested from participants.

Medical History: Participants were required to supply information such as whether they are on routine medications, suffering from any GIT ailment(s), have been admitted due to any GIT ailment(s), family history of any GIT ailment(s), any other Medical Condition apart from GIT Ailment(s), any GIT surgery in the Past.

The survey questionnaire also included information of the impact of COVID-19 lockdown on GIT complications. Variables such as the influence of occupation, financial strength, increase in the price of commodities during the COVID-19 lockdown, prescriptive regimen for medical condition, regular attendance of clinic, regular appointment with healthcare provider after easing of lockdown, effect of other medical condition on the treatment of GIT ailment during COVID-19 lockdown, weight change during this COVID-19 lockdown, complaint about this GIT ailment(s) during this COVID-19 lockdown and mode of treatment were recorded. In each case responses were: Yes, no, may be, not needed.

#### **Data Management/Analysis**

All the responses of the participants were extracted from Google Forms and exported to a Microsoft Excel Sheet for proper cleaning. Data from the variables were analysed using descriptive and inferential statistics.

## **RESULTS**

### **Socio-demographic Characteristics**

A total number of 542 participants completed the questionnaire linked to a Google form. Most of the questions asked were compulsory while some were made voluntary depending on the preceding questions and how relevant it is to the participant. The participants were Nigerian citizens drawn from across the country. The age of the participants were between 20 to 80 years of which 45.6% were males and 54.4% were females (Table 1). The highest participants falls within the age bracket of 20-30 in both male (36.44%) and female (46.44%). The least participants are from age bracket of 71-80 in both gender (Table 2). More than 50% were married with less than 10% divorced while 44.1% were single. Married male (53.44%) constitute the highest participant compared to the female (48.14%) counterpart (Table 2). 33.9% of all the participants were first degree graduates while 31.9% had higher postgraduate degrees with less than 35% without first degree certificate as shown in table 1.

### **General Life Style of Participants**

Table 3 shows that 32.7% of all participants were working in the public sector while 23.8% worked in the private sector. Only 22% were unemployed with about 21.6% self-employed. Of the unemployed participants,

the female constitute the higher percentage of 23.39%. About 23.39% of female participants were self-employed as against 19.43% of male counterpart as shown in Table 4. Majority of the participants in both gender worked in the public sector (Figure 1 & 2). More than 60% of participants attended either secondary or tertiary healthcare facility while 27.1% attended primary healthcare facility. Only 43.7% of the participants go for regular check-up. About 24.7% of the participants consume alcohol regularly while 12.5% are regular smokers (Table 3).

### **Medical History and Impact of COVID-19 lockdown on Participants**

Table 5 shows the medical history of the participants in which 30.6% are on routine medication for underlying ailment(s) while 20.3% had GIT ailment(s) with about 13.1% having undergone GIT related surgeries. About 15.9% of the participants have family history of GIT ailment(s).

The impact of COVID-19 lockdown on GIT complications is presented in table 6. 67.9% of participants had their jobs affected during COVID-19 lockdown while the financial strength of 70.8% of the participants were grossly compromised. Table 7 shows that more female had their financial strength and medication purchasing power compromised during the lockdown than males. 54.6% of participants' medication purchasing power were affected during the lockdown and about 39.5% could not have regular appointment with their physicians. After the easing of the lockdown, only 33% of the participants were able to keep appointment with their physicians. Other medical condition(s) did not complicate GIT ailments in 31.2% of participants during COVID-19 lockdown. About 56.8% of participants experienced weight gain during COVID-19 lockdown while 27.7% experience GIT complications with 39.9% depending on self-medication for the immediate relief of their GIT ailment(s). Only 29.7% of participants that got treated of GIT complication during COVID-19 lockdown did so through doctor's prescription while others relied on alternative means such as self-medication, over the counter prescription and herbal therapy (Table 6). More females had complaint of GIT complication(s) during COVID-19 lockdown than males as shown in table 7.

### **Participants with GIT complication(s)**

Out of the 27.7% participants with GIT complication(s), 27.27% were smokers and 29.98% consume alcohol. Only 22% regularly go for medical checkup with 49.33% having a family history of GIT complication(s). About 39.44% of the participants with GIT have undergone previous surgery (ies) as shown in figure 3.

### **Effect of level of education on Medical check-up and prescriptive regimen**

More participants with primary school certificate go for regular check-up compared with other levels of education while higher percentage of participants with

postgraduate degree do not go for regular medical check-up vis-à-vis other levels of education as shown in figure 4. Financial status due to COVID-19 lockdown affected

the prescriptive regimen for GIT ailments of the participants with primary school certificate more than the other levels of education (figure 5).

**Table 1: Socio-demographic Characteristics of participants with GIT.**

Variables	Frequency (n)	%
<b>Sex</b>	<b>542</b>	
Male	247	45.6
female	295	54.4
<b>Age</b>	<b>542</b>	
20-30	227	41.9
31-40	139	25.6
41-50	83	15.3
51-60	47	8.7
61-70	31	5.7
71-80	15	2.8
<b>Marital Status</b>	<b>542</b>	
Single	239	44.1
<b>Married</b>	<b>274</b>	<b>50.6</b>
Divorced	29	5.4
<b>Highest Level of Education</b>	<b>542</b>	
Primary School Certificate	51	9.4
Secondary School Certificate	135	24.9
First Degree Certificate	184	33.9
Postgraduate Degree Certificate	172	31.9

**Table 2: Age and Marital Status by Gender of the participants.**

	Age						Marital Status		
	20-30	31-40	41-50	51-60	61-70	71-80	Divorced	Married	Single
<b>Female</b>	46.44%	23.05%	13.56%	9.49%	5.42%	2.03%	5.08%	48.14%	46.78%
<b>Male</b>	36.44%	28.74%	17.41%	7.69%	6.07%	3.64%	5.67%	53.44%	40.89%

**Table 3: General Life Style of Participants.**

Variables	Frequency (n)	%
<b>Place of Work</b>	<b>542</b>	
Public Sector	177	32.7
Private Sector	129	23.8
Self Employed	117	21.6
Not Employed	119	22.0
<b>Health Facility Attended</b>	<b>542</b>	
Primary	147	27.1
Secondary	207	38.2
Tertiary	188	34.7
<b>Regular Check-up at the Hospital</b>	<b>542</b>	
Yes	237	43.7
No	305	56.3
<b>Alcohol Consumption</b>	<b>542</b>	
Yes	134	24.7
No	408	75.3
<b>Smoking Habit</b>	<b>542</b>	
Yes	68	12.5
No	474	87.5

**Table 4: Employment Status by Gender of the participants.**

	Employment Status			
	Not Employed	Private Sector	Public Sector	Self Employed
<b>Female</b>	23.39%	21.69%	31.53%	23.39%
<b>Male</b>	20.24%	26.32%	34.01%	19.43%

Table 5: Medical History of Participants.

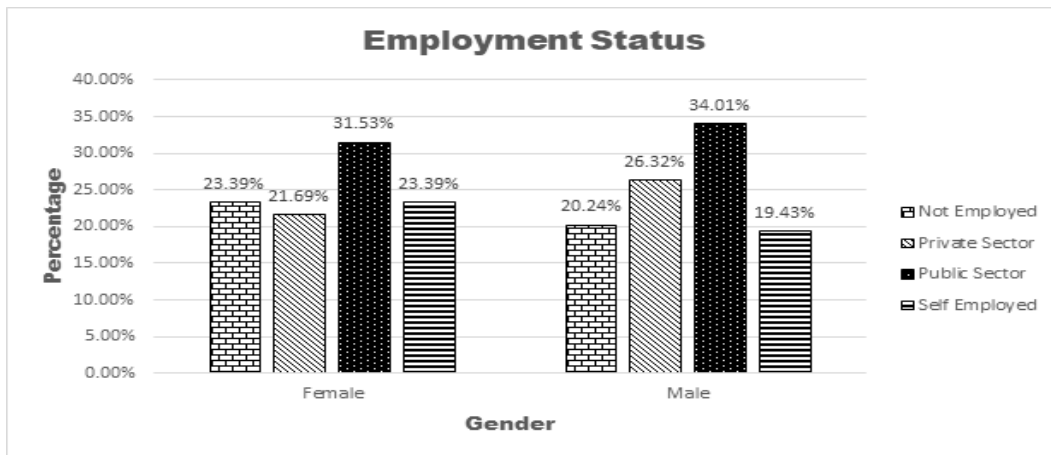
Variables	Frequency (n)	%
<b>On Routine Medication</b>	<b>542</b>	
Yes	166	30.6
No	376	69.4
<b>Any GIT Ailment(s)?</b>	<b>542</b>	
Yes	110	20.3
No	390	72.0
May be	42	7.7
<b>Admission due to GIT Ailment(s) in the Past</b>	<b>463</b>	
Yes	98	21.2
No	365	78.8
<b>Family History of GIT Ailment</b>	<b>473</b>	
Yes	75	15.9
No	348	73.6
May be	50	10.6
<b>Any other Medical Condition apart from GIT Ailment(s)</b>	<b>542</b>	
Yes	81	14.9
No	418	77.1
May be	43	7.9
<b>Any GIT surgery in the Past</b>	<b>542</b>	
Yes	71	13.1
No	471	86.9

Table 6: Impact of COVID-19 lockdown on Participants.

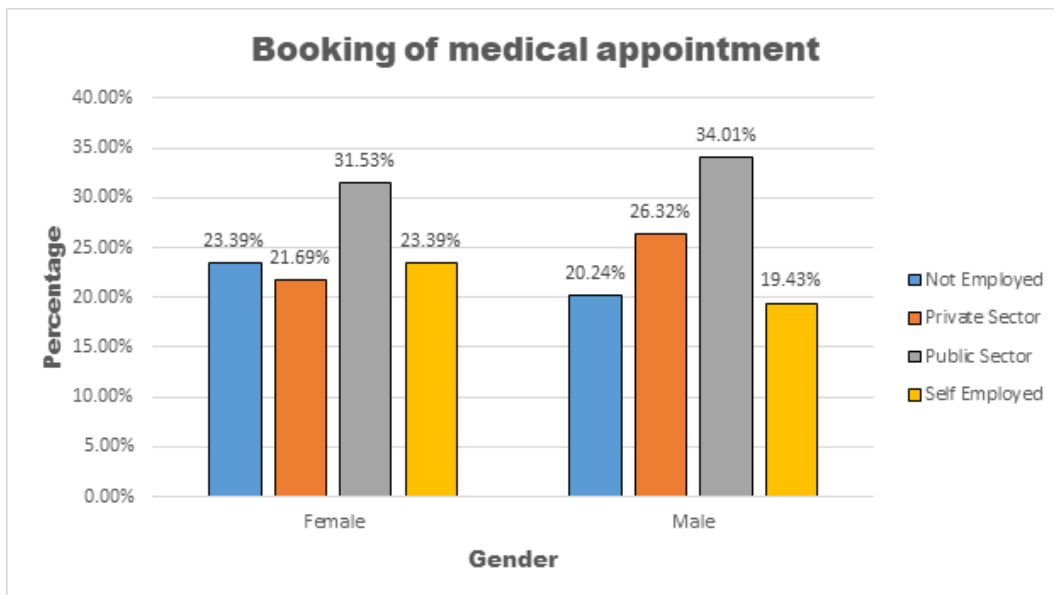
Questions	Responses			
	Yes n (%)	No n (%)	May be/Not Needed n (%)	
Is your occupation affected during this COVID 19 lock down?	368 (67.9)	174 (32.1)	-	
Is your financial strength affected during this COVID 19 lock down?	384 (70.8)	158 (29.2)	-	
Has increase in the price of commodities during the COVID 19 lock down affected your medication purchasing power?	296 (54.6)	246 (45.4)	-	
If yes to question above, does that affect the prescriptive regimen of your medical condition?	121 (30.0)	243 (60.3)	39 (9.7)	
During COVID 19 lock down, were you able to book appointment or regularly attend clinic?	150 (27.7)	214 (39.5)	178 (32.8)	
Has the easing of lockdown during COVID 19 pandemic helped in any way to keep a regular appointment with your health care provider?	179 (33.0)	157 (29.0)	206 (38.0)	
Does the presence of the other medical condition adversely affect/ complicate the treatment of GIT ailment during COVID 19?	139 (31.2)	307 (68.8)	-	
Do you experience weight change during this COVID 19 lock down?	308 (56.8)	149 (27.5)	85 (15.7)	
Have you had any complaint about this GIT ailment during this COVID 19 pandemic?	129 (27.7)	337 (72.3)	-	
If yes to the question above, how was it treated?	<b>Self-Medication n (%)</b>	<b>Prescription from a Physician n (%)</b>	<b>Herbal Regimen n (%)</b>	<b>Over the counter Prescription n (%)</b>
	101 (39.5)	76 (29.7)	40 (15.6)	39 (15.2)

**Table 7: Medical History and Impact of COVID-19 lockdown on Participants by Gender (%).**

	Male			Female		
	Yes	No	May be	Yes	No	Maybe
Do you have any GIT Complication?	19.03	74.90	6.07	21.36	69.49	9.15
Do you go for regular Check-up?	42.91	57.09	-	44.41	55.59	-
Does other ailments affect the treatment of GIT complication during COVID 19 lockdown?	33.33	66.67	-	29.13	70.87	-
Do you Smoke?	16.19	83.81	-	9.49	90.51	-
Do you take Alcohol?	25.51	74.49	-	24.07	75.93	-
Do you have other Medical conditions apart from GIT complications?	14.24	79.66	6.10	15.79	74.09	10.12
Is your occupation affected during this COVID 19 lock down?	70.45	29.55	-	65.76	34.24	-
Is your financial strength affected during this COVID 19 lock down?	68.42	31.58	-	72.88	27.12	-
Has increase in the price of commodities during the COVID 19 lock down affected your medication purchasing power?	42.91	57.09	-	47.46	52.54	-
Do you experience weight change during this COVID 19 lock down?	49.80	26.32	23.89	62.71	28.47	8.81
Do you have any complaint about this GIT ailment during this COVID 19 pandemic?	21.68	78.32	-	33.33	66.67	-



**Figure 1: Showing employment status of participants by gender.**



**Figure 2: Showing the influence of employment status on the booking of medical appointment by participants during COVID-19 lockdown based on gender.**

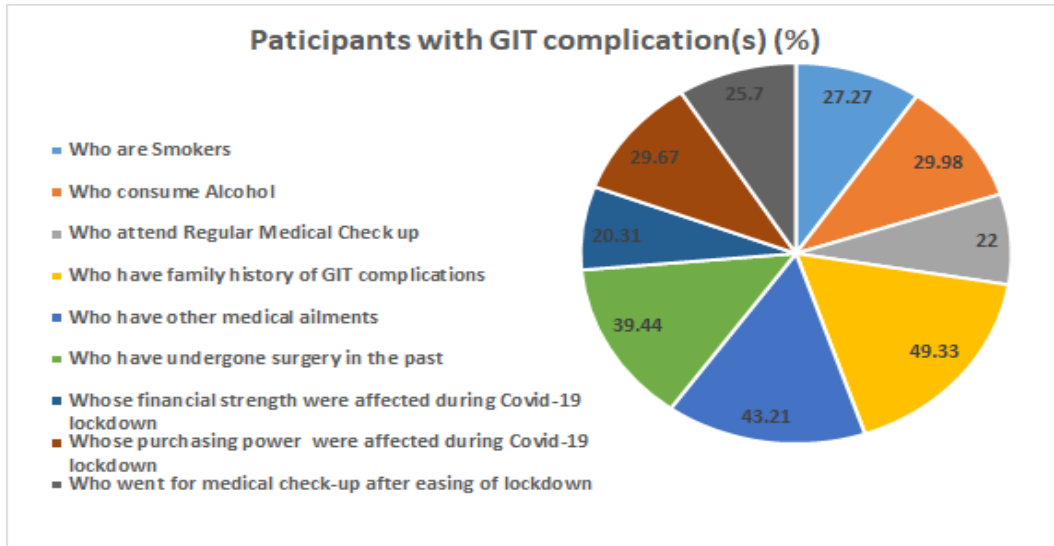


Figure 3: Showing Participants with GIT complication(s).

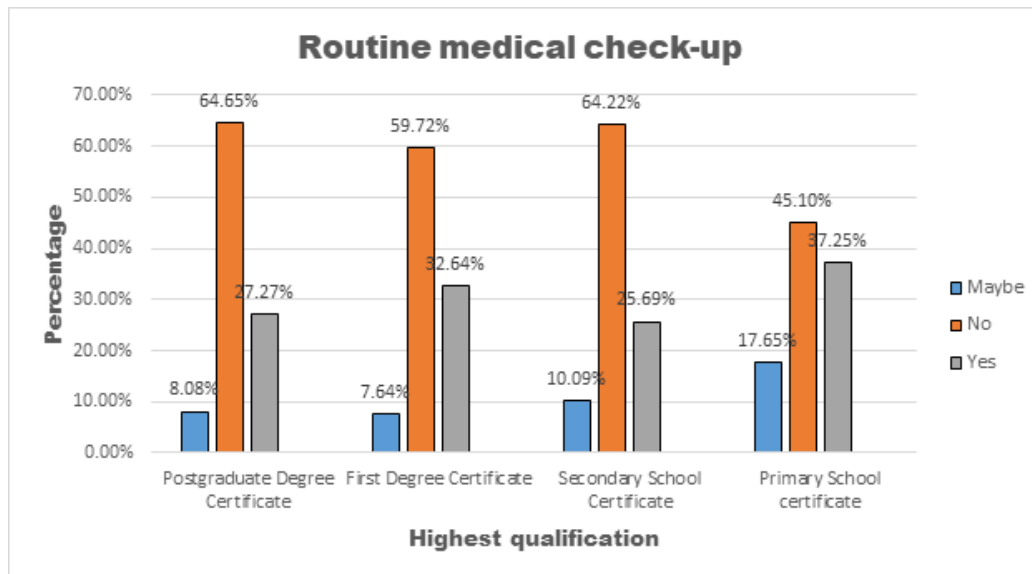


Figure 4: Showing the influence of qualification of participants on routine medical check-up during COVID-19 lockdown.

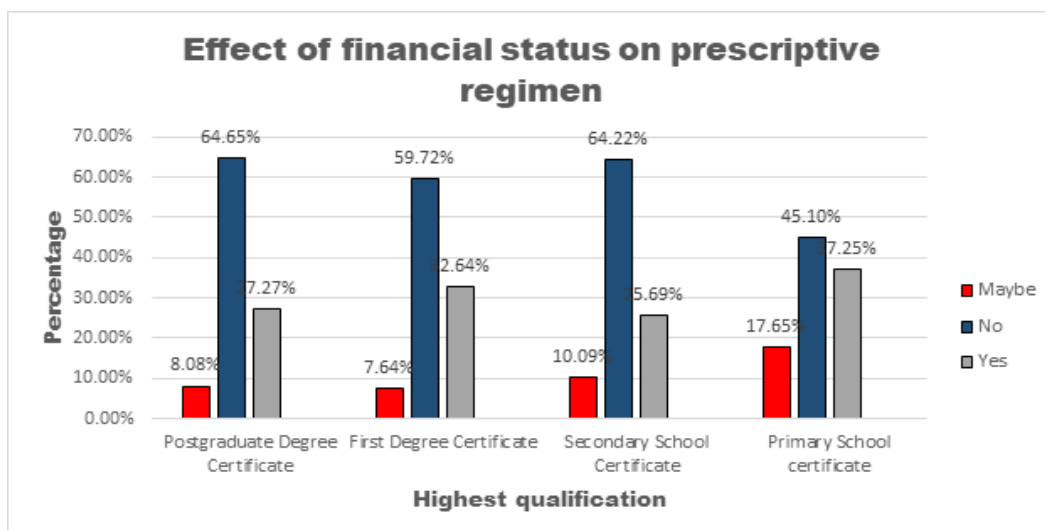


Figure 5: Showing the influence of qualification of participants on prescriptive Regimen based on their financial status during COVID-19 lockdown.

## DISCUSSION

The novel coronavirus is a broad family of Beta coronavirus genus which are pathogenic, the illnesses caused vary from common cold to severe pneumonia such as Middle East Respiratory Syndrome (MERS) and novel Coronavirus Severe Acute Respiratory Syndrome 2.<sup>[15]</sup> Epidemiological and clinical features of COVID-19 patients have been reported however, no data exist on the effects of COVID-19 lockdown on GIT complication(s) therefore, this study investigated the effects of COVID-19 lockdown on patients with gastrointestinal complication(s) among Nigerian population. There were more youths (20-30yrs) that participated in the study than the elderly and married. Also, first degree certificate holders, participated more in this study which may be due to their high standard of living and educational awareness which corroborates the work done by <sup>[16, 17]</sup> who posited that educated individuals are more expressive and thoughtful when answering online open-ended questions. Also, the age bracket (20-30yrs) use internet regularly and are technologically and digitally inclined and so use their smart phones more often than any other age groups. Larekia *et al.*<sup>[18]</sup> reported that about 92% of young people in the United States affirm their daily connectivity to the internet while in Europe, the youngest sector of the population account for the greatest use of mobile devices. The online based data collection tools which makes all the respondents anonymous may have also added to the increase in the number of respondents as it takes away the possibility of being identified by someone who is familiar with their handwriting or medical details <sup>[19]</sup>. There were more female than male participants in this study, this may be due to the fact that females are more health conscious than their male counterpart in corroboration with the reports of <sup>[20]</sup> which confirmed that women have healthier attitudes than men.

Over two thirds of the respondents' occupation and purchasing power were affected during the COVID-19 lockdown as evidenced by the data represented in table 6 & 7. COVID-19 lockdown led to an increase in the prices of various commodities which in turn affected the prescriptive regimen of some of the participants as well as their purchasing power, this is in keeping with the report by, <sup>[21,22]</sup> who reported that the impact of the novel Coronavirus lockdown on inflation is so uncertain resulting in simultaneous supply and demand movements that can tilt the balance towards more inflation or disinflation due to closure of markets at the initial phase of the lockdown; prices of industrial goods in Europe increased significantly due to disruptions in supply chains. Dang *et al.*,<sup>[23]</sup> also reported a 61.6% decrease in the income of people during the COVID-19 lockdown and consequent income deficit of 40% and above. Booking for clinic appointments by participants to see doctor during the lockdown was adversely affected which is believed was to checkmate the spread of the pandemic as many hospitals lack the facilities for COVID-19 testing and so try to minimise the risk of

infection by attending to emergency situations only.<sup>[9]</sup> This observation was also noticeable in developed countries which necessitated the use of telemedicine at the heat and peak of the COVID-19 lockdown. Well established virtual clinic visits and online appointments via usage of mobile phone and personal computer applications was the order of the day as an alternative when doctor's intervention becomes inevitable.<sup>[24]</sup> Regan and Chi,<sup>[25]</sup> posited that the COVID-19 pandemic has greatly obstructed patients' access to health care. Easing of the lockdown only brought a little relief to the restriction of movement and slightly restored access to clinic booking of appointment. The presence of other medical conditions did adversely affect GIT complication(s) in significant manner during COVID-19 lockdown as depicted in table 6, this is in line with the report from <sup>[26]</sup> which confirmed that gastrointestinal complications such as gastric problems vary depending on comorbidities. Furthermore, more than 50% of the participants experienced weight gain during the period of COVID-19 lockdown with preponderance of female over the male counterpart. This may be due to sedentariness and inactivity associated with the lockdown which corroborated the work of <sup>[27]</sup> which stated that staying at home, stockpiling of food, sedentariness and restriction in grocery shopping lead to boredom, consumption of more calories and greater energy intake from overeating and food craving may result in obesity. About a quarter of participants had GIT crisis during the COVID-19 lockdown while more than half of respondents with GIT complications were either regular consumer of alcohol or smokers. Regular consumption of alcohol can destroy the digestive system. Alcohol can alter the production of the acid by the stomach thus reducing the ability of the stomach to destroy bacteria thereby allowing potentially harmful bacteria to gain access to the upper small intestine there by causing gastrointestinal discomfort.<sup>[28]</sup> Bujanda.<sup>[29]</sup> also confirmed that alcohol consumption can elicit the development of colon, gastric and oropharyngeal cancers. Smoking has been documented to have deleterious effects on all parts of the digestive system.<sup>[30]</sup> More females than males had GI crisis during COVID-19 lockdown; the reason for this may be due to the fact that the intestine's nerve cells are more sluggish in women than in men <sup>[31]</sup>. Also, a greater number of female participants than male were unemployed according to our study and this may have been compounded by the pandemic thus compromising their financial strength and medication purchasing power as seen in this study and ultimately having a negative impact on their health care maintenance. About 39.5% of participants couldn't book for clinical appointments during COVID-19 lockdown. This probably was the reason why some of the participants in this study had to result to self-help during the lockdown by seeking for temporal alternative means of relief such as self-medication and over-the-counter prescription which should be strongly discouraged medically because of the attendant risk.



**CONCLUSION**

In Conclusion, lockdown or movement restriction has been found to be the last resort to alleviate impending waves of spread of the COVID-19. However, it is pertinent to put into consideration patients with chronic diseases especially GIT patients and design a strategic plan that will enable their accessibility to healthcare providers. Government can make life more bearable for other non-COVID-19 related ailments especially patients with GIT complication(s) by dedicating some health facilities to them, subsidising drugs related commodities as well as providing financial support that could assist patients with GIT complication(s) or related challenges have access to healthcare facilities during similar future challenges in order to reduce morbidity and mortality rates.

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**Competing interests**

The authors declare no competing interest.

**Authors' contributions**

DAO: conceptualization, literature review, writing of the final manuscript; AEO: literature review, writing of the draft and final manuscript; BEA: literature review and writing of the final manuscript. All the authors have read and approved the final manuscript.

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