

## **The Impact of Covid-19 Pandemic on Eye Care Seekers – A Cross-Sectional Study**

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### **Abstract**

**Background:** Corona virus disease is currently a global health challenge that has disrupted health care delivery.

**Method:** This cross-sectional study was conducted at eye clinic of Lagos State University Teaching Hospital (LASUTH), Nigeria. We assessed the knowledge, attitude of patients attending the eye clinic regarding COVID-19 and the impact on their eye care.

**Result:** The analysis was based on the 136 completed responses. Majority were females (63%), aged 36 to 45 years (31%) and has had tertiary education (77.2%). Most (71%) knows the etiology of COVID-19 to be viral, are aware of the common symptoms – cough (88%), difficulty in breathing (87%), fever (74%), sore throat (76%); universally knows (97%) COVID-19 disease is spread by exposure to droplets from coughing/sneezing; and the general preventive methods – regular hand washing (96%), use of nose masks (92%), avoiding crowded places (85%) and physical distancing (84%). But only 43% of our respondent knows that the disease can affect the eyes and that it can be contracted via the eyes (47%). This is reflective in their poor knowledge of red eyes (17%) as a symptom; that COVID-19 disease can be spread via exposure to tear secretion (34%); and use of protective eye wear (43%). Close to half (47%) of our respondents have missed their clinic appointment due to the pandemic and the pandemic has affected their ability to seek eye care (45%). About 49% of our respondents will be willing to take a COVID-19 vaccine if available. Vaccine safety concern (87%) is the main reason for not taking the vaccine.

**Conclusion:** The COVID-19 pandemic has hindered health care delivery, and the negative impact from missed appointments, missed surgery for eye care-seekers at LASUTH are important consideration that requires innovative approach in addressing them and ensuring continual eye care delivery during and after the pandemic

**Keywords:** COVID-19 disease, Pandemic, Knowledge, Attitude, Impact, Lagos state

### **Background**

Corona virus disease (COVID-19) was first discovered in Wuhan China after a cluster of pneumonia was identified. In this initial cluster of corona virus disease, most patients were found to be male with a median age of 49 years. About 32% of these patients had underlying systemic illness such as diabetes, hypertension, and cardiovascular disease. The most common presenting features in this initial cluster was fever (98%), cough (76%), myalgia and fatigue (44%) [1]. Other features were diarrhea, haemoptysis, headache and sputum production. The disease can complicate by respiratory distress syndrome, acute cardiac injury, secondary infection [1-3]. However, in

this initial disease cluster, no ocular feature or complication was noted.

Asymptomatic corona virus disease carriers have been identified. Health care practitioners like Ophthalmologist, Otorhinolaryngologist are at high risk of contracting the disease from their patients and also spreading the disease due to their close proximity to patients especially during clinical examinations [4]. In a survey conducted at 3 UK eye hospitals amongst eye care workers, 80% felt at risk of contracting COVID-19 at work even with adequate provision of personal protective equipments [5].

An article published by Loon et al [6] in 2004 showed that

the SARS-Corona virus was present in tears following a polymerase chain reaction. This led to the need for urgent precautionary measures to prevent possible spread of the disease via ocular secretions and ocular tissues. Some other studies showed the corona virus affecting the anterior segment of the eyes by causing conjunctivitis and related symptoms such as chemosis, keratoconjunctivitis, photophobia, blurry vision, dry eye and foreign body sensation. [7-10] Contrary data however suggested that the conjunctivitis seen in some COVID-19 affected patients is most likely a coincidental finding rather than a direct causal infection of the conjunctiva [11]. There are scarce data on the posterior segment manifestations of COVID-19. A case report by Egbu E [12] found abducens nerve palsy, bilateral disc edema, another case series by Marinho et al [13] to determine the posterior segment findings demonstrated hyper-reflective lesions in the ganglion cell layer and the inner plexiform layer along with retinal microangiopathy [12,13] Studies have hypothesized that COVID-19 could affect the eye in the form of a viral conjunctivitis and also be a transmission route via the nasolacrimal system. [14,15] These findings are however controversial.

Following the World Health Organization (WHO) classification of the disease as a pandemic, protective measures were aimed towards protecting mucous membrane such as those in the mouth, nose, and eye from environment exposure hence the use of face mask and goggles. This was the first documentation of the eye as being a source of contraction hence the need for protection.

Health organizations and government intervention such as city lock down, travel restrictions, use of protective equipment in clinics, infection control measures and reduction in clinic load have been inferred to be effective in curbing the spread of the disease [4,16].

The Lagos State University Teaching Hospital (LASUTH) Eye clinic at the start of the pandemic suspended outpatient general and subspecialty clinics, and elective procedures, while only attending to emergency cases. Clinic staff strength was reduced to reduce personnel exposure, waiting rooms and consulting rooms were fumigated weekly and monitoring team ensured adequate protective measures were in place after which eased re-opening of the clinic commenced in phases. These new measures as well as the restrictions might have affected either directly or indirectly the patients access to eye care at LASUTH. Thus, the study aimed to measure the impact the COVID-19 pandemic might have had on these patients seeking eye care at LASUTH while assessing their knowledge, attitudes, and beliefs the eye care patients have regarding the COVID-19 disease and the pandemic.

## Methods

### Study design and setting

This was a descriptive cross-sectional study that was conducted at Lagos State University Teaching Hospital (LASUTH) eye clinic which is one of the two institutions providing tertiary medical care to over 15 million inhabitants of the state. The state is one of the most populous states in Africa. This study was conducted for 6 months between August 2020 and January 2021.

### Study participants

The participants included in this study were those individuals 18 years and older who sought eye care at LASUTH within the study period and were willing to voluntarily take part in

the study.

### Sampling Technique

Consecutive patients presenting to the eye clinic was recruited for this study. Eligible participants who meet the inclusion criteria was enrolled until the required sample size was completed.

### Sample size

The sample size of 151 patients was obtained based on the following parameters using the formula for single proportions. Assuming a 10% prevalence rate of COVID-19 infection in Nigeria due to inadequate testing, poor social distancing measures and asymptomatic carriers, a 5% error margin, 5% level of significance and accounting for 10% non-response rate.

### Study procedure

Eye clinic patients who present to the clinic for eye related complaints or follow-up appointments were approached to be part of the study after explaining the details of the study to them. Those willing to be part of the study and after giving written informed consent were given the study questionnaire to complete. On completion of the questionnaire, the research team collects it after thanking the patient for their time and submits for data entry.

### Data collection, entry, and statistical analysis

The data was collected using a semi-structured self-administered questionnaire that was designed in English, to assess the impact the COVID-19 pandemic has had on the patient's eye health and their knowledge, attitude, and beliefs regarding the COVID-19 disease.

All the data were double-entered into an excel file and any discrepancy corrected by looking directly into the questionnaire. Statistical analysis was performed using Stata 13.1, Stata Corp LP, USA. Descriptive statistics was used to report frequencies and percentages, presented as figures and tables.

Knowledge of the participants was assessed using 7 questions namely: if they know about COVID-19 disease, the cause, if the disease can be gotten from the eyes and affect the eyes, the general symptoms, and the mode of spread and preventive measures.

Attitudes of the participants regarding COVID-19 disease was assessed using 5 questions namely: if they routinely use nose masks, willingness to attend eye clinic if there is a suspected and confirmed case, willingness to pay for COVID-19 vaccine if recommended and willing to take the vaccine if available.

Beliefs of the study participants was assessed using 4 questions: if they think they can contract COVID-19 disease, proxy questions on the use of chloroquine and herbal remedies in prevention of COVID-19 disease and if they think seeking eye care in the hospital puts them at risk of contracting COVID-19 disease.

The likely impact of COVID-19 pandemic on the study participants were assessed using 7 questions: recent history of death of family member due to COVID-19 disease, if the participants has been exposed to a suspected case, impact the pandemic has had on their eye health, impact on their ability to seek eye care, if their clinic appointments and procedure or surgery has been postponed due to the pandemic and if they have had difficulty in procuring eye medication during this pandemic.

### Ethical Consideration

The study was approved by the Lagos State University Teaching Hospital (LASUTH) health research and Ethics committee (HREC). Written informed consent was obtained from all participants.

**Results**

A total of 151 patients were given the questionnaire out of which 136 patients responded. Thus, 15 (9.9%) patients did not complete the questionnaire with main reason due to time constraints.

The analysis was based on the 136 completed responses. For the questions with missing data, the actual completed response was used. This was less than 5% in all the cases.

Out of the 136 completed responses, majority were females (86, 63%), aged 36 to 45 years (42, 31%) and has had at least tertiary education (105, 77.2%) as shown in Table 1.

A third (49, 36%) of respondents had been attending the Eye clinic for less than 6 months, 15% between 6 months to 1 year, 16% between 1 to 2 years and 33% for greater than 2 years.

Table 1: Demographics of study participants

Variable	frequency N	Percentage %
<b>Gender</b>		
Male	50	37
Female	86	63
<b>Age groups (yrs)</b>		
18 – 25	29	21
26 – 35	15	11
36 – 45	42	31
46 – 55	19	14
56 – 65	18	13
66 – 75	8	6
76 – 85	3	2
86 – 95	2	2
<b>Educational Status</b>		
Primary	6	4.4
Secondary	25	18.4
Tertiary	105	77.2
<b>Duration of eye clinic attendance</b>		
< 6 months	49	36
6 months to 1 year	20	15
1 year to 2 years	21	16
> 2 years	45	33

**Knowledge**

Almost all the participants (97%) were aware of COVID-19 disease with majority (71%) correctly knowing the etiology of COVID-19 disease to be viral. Some other causes wrongly mentioned by the participants in order of percentage includes 5G network (6%), spiritual causes (3%), bats (2%) and mosquito bites (2%). Most respondents (57%) did not however know that COVID-19 disease can affect the eyes, and that the disease can be contracted via the eyes. There were varying responses on the symptoms of COVID-19 disease with cough and difficulty in breathing having the highest response (88% and 87%) and red eye being the least at 17%. Almost everyone (97%) knew that the disease is spread by exposure to coughing/sneezing persons, while 41% indicated it can be spread through sexual relations with infected persons and 34% chose exposure to tear secretion as a mean of spread of the disease. Over 90% of respondents knew regular hand washing and wearing nose mask was a way of disease prevention, avoiding crowded place and keeping 2 meters from people were known to 85% and 84% respectively. However, only 43% of respondent knew protective eye wear use was a means of protection against contracting COVID-19 disease. About half of the respondents think that taking vitamin supplements and eating fruits and vegetables can help protect them from contracting COVID-19 disease while a minority think that chloroquine and

use of herbal therapies as preventive therapies 14% and 6% respectively as indicated in Table 2.

Table 2. Knowledge of participant about COVID-19 disease

Variable	frequency N	Percent-age %
<b>Do you know about COVID-19?</b>		
Yes	132	97
No	4	3
<b>*What is the cause of COVID-19 disease?</b>		
Mosquito bites	2	2
5G network	8	6
Viral particles	96	71
Spiritual causes	4	3
Bats	3	2
<b>Can COVID-19 disease affect the eyes?</b>		
Yes	58	43
No	78	57
<b>Can one contract COVID-19 disease via the eyes?</b>		
Yes	64	47
No	72	53
<b>*What are the symptoms of COVID-19 disease?</b>		
Cough	119	88
Sore throat	104	76
Catarrh	74	54
Difficulty in breathing	118	87
Fever	100	74
Generalised body weakness	74	54
Red eyes	23	17
Loss of smell	57	42
Headaches	64	47
Vomiting and diarrhoea	46	34
<b>*How does COVID-19 disease spread?</b>		
Exposure to droplets from coughing/sneezing	127	97
Exposure to tear secretion	45	34
Sexual relations with infected persons	53	41
<b>*How can you protect yourself from getting COVID-19?</b>		
Regular hand washing	127	96
Use of nose mask	122	92
Use of chloroquine	18	14
Taking vitamin supplements	67	50
Taking fruits and vegetables	72	54
Avoiding crowded places	113	85
Keeping at least 2 meters from people	112	84
Herbal therapies	8	6
Use of protective eye wear	57	43

\*Only the “Yes” responses tabulated

**Attitudes**

A lot of the participants reported they routinely use nose mask (81%) while about one-fifth do not use it at all or sparingly use it, as shown in table 3. Majority (43%) of respondent said they would not attend the eye clinic if there was a suspected case of COVID-19 while a further 23% were not sure if they would. A lot more (56%) said they would not attend the eye clinic if

there was a confirmed COVID-19 case at the clinic and only about a third will attend.

Regarding vaccination, almost half 49% of total respondents are willing to take the vaccine and with a lower percentage (38%) willing to pay for the vaccine. Some 27% clearly indicated their refusal to take vaccine. Reason for refusing the vaccine was largely based on its possible unknown associated risk/side effect profiles (table 4).

Table 3: Attitude of participant toward COVID-19 disease

	Variable	frequency N	Percentage %
A	Do you routinely use nose mask?		
	Yes	107	81
	No	8	6
	Sparingly	18	13
B	Will you still attend the eye clinic if there was a suspected case of COVID-19 at the eye clinic?		
	Yes	44	34
	No	57	43
	Maybe	30	23
C	Will you still attend the eye clinic if there was a confirmed case of COVID-19 at the eye clinic?		
	Yes	41	31
	No	74	56
	Maybe	18	13
D	Are you willing to pay for COVID-19 vaccine if recommended?		
	Yes	51	38
	No	54	41
	Maybe	28	21
E	Are you willing to take a COVID-19 vaccine if available?		
	Yes	65	49
	No	35	27
	Maybe	32	24

Missing data A = 3, B = 5, C = 3, D = 3, E = 4

Table 4: Reasons why the participants would not want to take COVID-19 vaccine

	Variable	Frequency N	Percentage %
A	Because it is a sign of the beast	3	9
B	It might be associated with risk	27	87
C	Vaccines cannot save us from COVID-19	4	13

Only the "Yes" responses tabulated; Missing data – A = 3, B = 4, C = 4

**Beliefs**

Surprisingly, 61% of respondents believe they cannot contract COVID-19 disease. A quarter of respondents used home remedies for possible prevention of the disease. The most commonly used home remedies were hot ginger, lime, lemon, garlic and dongoyaro leaves (data not shown). Close to half (47%) did not believe that seeking eye care in a hospital puts them at risk of contracting COVID-19 disease, 35% were however unsure while only 18% believed seeking eye care in a hospital could put them at risk of contracting the disease according to table 5.

Table 5: Table showing participants response on the risk of contracting COVID-19 disease in the hospital

	Variable	frequency N	Percentage %
A	Do you think you are susceptible to contracting COVID-19 disease?		
	Yes	53	39
	No	83	61
B	Have you used chloroquine in the last 4 to 6 months for possible prevention from COVID-19 disease?		
	Yes	9	7
	No	123	93
C	Have you used any home remedy in the last 4 to 6 months for possible prevention from COVID-19 disease?		
	Yes	33	25
	No	99	75
D	Do you think seeking eye care in the hospital puts you at risk of contracting COVID-19?		
	Yes	24	18
	No	63	47
	Maybe	46	35

Table 6: Impact of COVID-19 pandemic on the study participants

	Variable	frequency N	Percentage %
A	Any recent death of a family member due to COVID-19 disease within the last 4 months?		
	Yes	6	4
	No	130	96
B	Have you had recent exposure to anyone suspected to have COVID-19 disease?		
	Yes	5	4
	No	115	84
	Maybe	16	12
C	How has the COVID-19 pandemic affected your ability to seek eye care?		
	No, the pandemic has had no effect	75	55
	Yes, the pandemic has had mild effect	27	20
	Yes, the pandemic has had moderate effect	23	17
	Yes, the pandemic has had severe effect	11	8
D	Have you missed any of your clinic appointment or have it extended due to the COVID-19 pandemic?		
	Yes	62	47
	No	69	53
E	Have you had any of your procedures or surgery at the eye clinic postponed due to the COVID-19 pandemic?		
	Yes	25	20
	No	101	80
F	Have you had any difficulty procuring your eye medication during this COVID-19 pandemic?		
	Yes	22	16
	No	114	84

Missing data – D = 5, E = 5

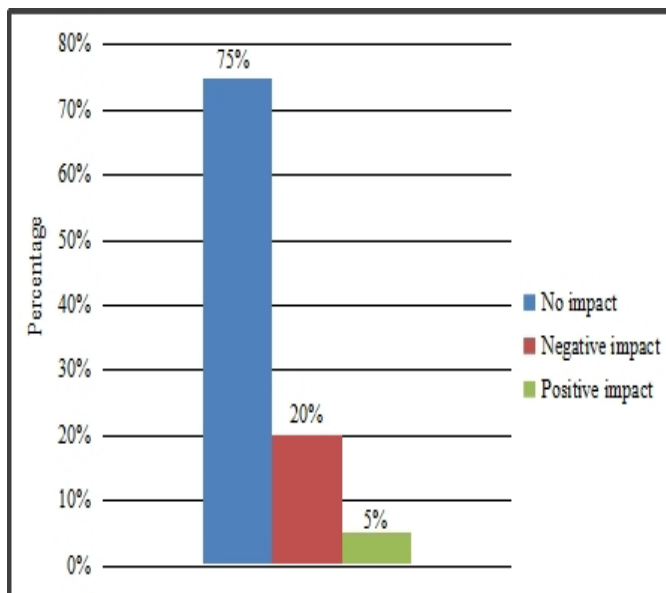


Figure 1: Impact of the COVID-19 pandemic on participant eye health

### Impact

Majority of participant have not lost any family member (96%) from COVID-19 disease and have had no exposure to persons suspected (84%) of having COVID-19 disease. Close to half (45%) of participant however attest that the pandemic had an impact on their ability to seek eye care, almost a half of total respondent 47% have missed their eye clinic appointment or had it extended due to the pandemic, 20% (25) also had their procedures or surgery postponed due to the pandemic. Close to one-fifth of the participants had difficulty in procuring their eye medications during this pandemic as in table 6. A large majority (75%) as shown in figure 1, of the participants said that the pandemic has had no impact on their eye health with one-fifth indicating that it has negatively affected their eye health and only 5% claiming it has had a positive impact.

### Discussion

The corona virus pandemic has had its toll globally. It has stirred negative impact across several field such as Rheumatology [17], TB services [18], neurosurgery [19], renal care [20], dermatology [21], pediatrics [22,23], gastrointestinal endoscopy [24], orthodontic [25], surgical training [26], and in the context of this research, the impact of the pandemic on eye care seekers at the Lagos State University Teaching Hospital has in no doubt flared towards the negative.

Knowledge about the COVID-19 disease from our study revealed that almost all (97%) of our respondents are aware about the disease with 71% correctly knowing that it is caused by a virus, this was similar to a study conducted by Mbachu et al [27] amongst health workers in Nigeria. Also, like Mbachu et al observed; 5G network, personal punishment from God, mosquito bites were amongst the other causes of COVID-19 disease as indicated by some respondents [27].

While it is encouraging that most of the respondents know that regular handwashing, use of nose masks and physical distancing is an effective prevention from getting COVID-19 disease, less than half (43%) are aware that use of protective eye wear was an equally effective prevention method. This was also displayed in their beliefs as 47% of our respondents did not think they could contract the disease by visiting an eye hospital while 35% were unsure. These findings are very much simi-

lar to the study from Lindeke-Myers A et al [28] who in their study had 60% of respondent say it was unlikely or extremely unlikely to contract COVID-19 at the eye clinic. We believe that while the public health measures have been able to convey the message regarding nose masks, hand washing and physical distancing, more work needs to be done to educate the public that protective eye care can equally help prevent COVID-19 disease because the eye contain mucosal surfaces that are potential routes of acquisition of SARS-CoV-2 due to the presence of the ACE2 receptor especially when reliable physical distancing may not be possible [29].

Participants fear of contracting the COVID-19 disease however was displayed when asked if they would still attend the eye clinic if there was a suspected or confirmed case of COVID-19 at the eye clinic, 43% said they would not attend the clinic if there was a suspected case, while 56% claimed they would not attend the clinic if there was a confirmed case. Similar finding have been seen in other studies that explored the volume of patients hospital visits during the pandemic [21,22,30,31]. In the study by Jade Y Moon et al [30] at the Massachusetts eye and ear infirmary, eye specific emergency patients visits reduced by 32% since the declaration of COVID-19 Pandemic. It was concluded from their study that patients were reluctant to seek needed eye care [30]. Similar studies in the Emergency department at a hospital in Lebanon revealed a reduction in emergency visit at the various stages of Lockdown in the country [31].

In our study, we evaluated the impact on eye care seekers and 20% of participant said the pandemic negatively impact their eye health, and an equal percentage of respondents had their procedures or surgery postponed with almost a half of total respondent (47%) missing their eye clinic appointment or had it extended. The European COVID-19 Cataract Group (a group of surgeons from 10 European countries) conducted a study to view the impact of the pandemic on the first month of the lock down, they found that they lost 81% of the patient volume when compared to the previous year, 97% reduction in cataract surgery volume, 57% to 100% of glaucoma treatment were postponed due to the pandemic [32].

The ability to seek eye care was also explored in our study where 45% of respondents claimed the pandemic has had some effect on their ability to seek eye care. With 16% having difficulty procuring their eye medications which was lower than the study by Awucha et al [33] who examined the impact of the COVID-19 pandemic on consumers access to essential medicines in Nigeria and found that 35.2% of their study respondent with chronic disease had difficulty assessing essential medicines [33]. Putting all these together, this creates a cascade of events that further worsens eye care services in the country. This is mainly due to the fact that in low-income countries, eye care services are usually provided at the tertiary and secondary level [34]. Thus, if patients are unable to seek care in institutions like LASUTH, then there will likely be an increase in ocular morbidity and or possible complications that might be irreversible due to delay in seeking appropriate treatment or seeking care from unqualified sources [34].

Just a little below half (49%) of our respondents would be willing to take a COVID-19 vaccine if available, while the rest were either not sure or not willing to take the vaccine. This was

higher than the study done in North-Central Nigeria, Democratic Republic of Congo and Kuwait, where only about 29% will be willing to take the vaccine [35-37]. The main reason why the respondents would not take the COVID-19 vaccine if made available was due to safety concerns. This appears to be a universal concern as noticed in several regions of the world and this belief has been worsened with the accelerated rate of development of the COVID-19 vaccine [38]. It is a bit reassuring that just about one-tenth of the respondents' reason for not taking the vaccine is due to conspiracy theory that COVID-19 vaccine injects a microchip into the body which is a sign of the beast.

The strength of this study lies in the fact that respondents were from a focal group and the ideas explored in the aims of the research have a significant relationship in their understanding of the eye and how the eye can be a vital component of systemic diseases like COVID-19. Limitation of this study is that only stable eye clinic patients were able to participate in the study as the COVID-19 lockdown of the LASUTH eye clinic services in response to the multiple waves of increasing morbidity and mortality created a delay in data collection.

## Conclusion

The ongoing COVID-19 pandemic has led to a lot of disruptions in the health care delivery globally. A lot of morbidity and mortality from other conditions due to disruption in this health care delivery has been reported and, in our study, the negative impact from missed appointments, missed surgery on patients seeking eye care at LASUTH are important consideration that requires innovative approach in addressing them and ensuring continual eye care delivery so as to avert irreversible eye complications from occurring. And taking into context that LASUTH is one of the two tertiary institutions where the over 10million inhabitants of the population seek health care, this can lead to public health tragedy if urgent steps are not taken.

## List of abbreviations

ACE	Angiotensin converting enzyme
COVID-19	Coronavirus disease
HREC	Health research and ethics committee
LASUTH	Lagos State University Teaching Hospital
SARS-CoV	Severe Acute Respiratory Syndrome Coronavirus
UK	United Kingdom
USA	United States of America
WHO	World Health Organization

## Declarations

### Ethics approval and consent to participate

The study was approved by the Lagos State University Teaching Hospital (LASUTH) health research and Ethics committee (HREC). Written informed consent was obtained from all participants.

### Consent for publication

Not applicable.

### Availability of data and materials

The data that supports the findings in this study are available on reasonable request from the investigator - Dr Saka Idris – idris.sansan@gmail.com.

### Competing Interest

The authors declare that they have no competing interests.

## Funding

This study was self-funded by the investigators.

For this publication, the corresponding author had full access to the study data and was responsible for the decision to submit for publication.

## Authors' Contributions

SI contributed to the study design, conduct of the study, data analysis and data interpretation and wrote the initial draft of this study report. AB did the data analysis, interpretation and review of the draft manuscript. BA contributed to the review of the draft manuscript.

All authors have read through the manuscript and approved it for submission towards publication in an open access journal.

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