

Places Nigerians visited during COVID-19 government stay-home policy: evidence from secondary analysis of data collected during the lockdown

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Key words: COVID-19 stay-home policy; lockdown, COVID-19 mobility; physical distancing.

Contributions: BO, OC, DA, SA, BE, conceived the idea; DA, MO, did the data analysis; DO, BO, BE, wrote the draft manuscript. IS, AS, OC, OM, OJ, NG, YD, ES, IE, reviewed the manuscript and made critical input. All authors agreed to this version and the submission to the journal.

Conflict of interest: the authors declare no potential conflict of interest.

Ethics approval and consent to participate ethical approval for this secondary analysis was granted by the University of Lagos Teaching Hospital Ethical Review Board: ADM/DSCST/HREC/APP/4583. De-identified survey datasets were used to maintain the anonymity of the participants in the original survey following obtaining permission from the data owners.

Funding: this study was funded by Expertise France and Agence Francaise De Development as part of the project: Understanding facilitators and barriers to compliance with non-pharmaceutical COVID-19 preventive measures in Nigeria (21-SB1781). This work received funding and support from the "#Data4COVID19 Africa Challenge", which is one of the many projects under the "COVID-19 – Health in Common" initiative launched by France via Agence Française de Développement (AFD) in response to the worldwide public health crisis caused by the COVID-19 pandemic. The challenge was designed and implemented in collaboration with Expertise France and The GovLab. It sought to spur projects that used traditional and non-traditional data in an innovative way to address COVID-19 and its consequences. The opinions expressed and the insights and findings listed herein are solely those of the authors of the challenges and do not necessarily represent the position of AFD, Expertise France, or The GovLab who will not be liable for the use made of the information presented. More information on the challenge can be found at: <https://datachallenge.africa/>

Availability of data and materials: data and materials are available by the authors.

Acknowledgments: the authors would like to thank GovLab for its coordination of the project.

Received for publication: 31 May 2022.

Accepted for publication: 1 July 2022.

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Journal of Public Health in Africa 2023; 14:2244

doi:10.4081/jphia.2023.2244

Abstract

Introduction. Compliance with the Government's lockdown policy is required to curtail community transmission of Covid-19 infection. The objective of this research was to identify places Nigerians visited during the lockdown to help prepare for a response towards future infectious diseases of public health importance similar to Covid-19

Methods. This was a secondary analysis of unconventional data collected using Google Forms and online social media platforms during the COVID-19 lockdown between April and June 2020 in Nigeria. Two datasets from: i) partnership for evidence-based response to COVID-19 (PERC) wave-1 and ii) College of Medicine, University of Lagos perception of and compliance with physical distancing survey (PCSH) were used. Data on places that people visited during the lockdown were extracted and compared with the sociodemographic characteristics of the respondents. Descriptive statistics were calculated for all independent variables and focused on frequencies and percentages. Chi-squared test was used to determine the significance between sociodemographic variables and places visited during the lockdown. Statistical significance was determined by $P < 0.05$. All statistical analyses were carried out using SPSS version 22.

Results. There were 1304 and 879 participants in the PERC wave-1 and PCSH datasets, respectively. The mean age of PERC wave-1 and PCSH survey respondents was 31.8 [standard deviation (SD)=8.5] and 33.1 (SD=8.3) years, respectively.

In the PCSH survey, 55.9% and 44.1% of respondents lived in locations with partial and complete covid-19 lockdowns, respectively. Irrespective of the type of lockdown, the most common place visited during the lockdown was the market (shopping); reported by 73% of respondents in states with partial lockdown and by 68% of respondents in states with the complete lockdown. Visits to families and friends happened more in states with complete (16.1%) than in states with partial (8.4%) lockdowns.

Conclusions. Markets (shopping) were the main places visited during the lockdown compared to visiting friends/family, places of worship, gyms, and workplaces. It is important in the future for the Government to plan how citizens can safely access markets and get other household items during lockdowns for better adherence to stay-at-home directives for future infectious disease epidemics.

Introduction

The current millennium has witnessed the outbreak of different kinds of viral respiratory infections from the Middle East

Respiratory Syndrome in 2012, to the West African Ebola Virus in 2013 and 2016, the Brazilian Zika virus in 2015, and then the Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) in 2019.¹ COVID-19, the disease caused by SARS-CoV-2 virus has impacted the global community in an unaccustomed manner. Since its outbreak, the disease has circulated to many countries including Nigeria.² Globally, the disease has accounted for more than 200 million infections with over 4 million deaths.² In Nigeria, there have been 200,000 infections and 2,856 deaths as of October 24, 2021.³

During the COVID-19 outbreak of 2020, many countries imposed different levels of restrictions to limit viral disease propagation. Some of the strategies to minimize human mobility and interactions include lockdowns involving the closure of public places such as restaurants, shopping malls, markets, schools, and international borders, limiting public gatherings, and putting measures in place for social distancing. Such preventive measures impacted the lifestyle, economic situation, and social interrelationships of people.⁴ Although further examination shows that imposing restrictions on international travels alone would be ineffective in preventing the spread of pandemic disease, this measure could help reduce the rate of disease propagation.⁵

Prior studies have shown, that people gravitate towards either delaying international travel or completely canceling it in periods of pandemics to prevent infection, although, this is influenced by factors such as age, race, and fear of infection.⁶ During the SARS outbreak in 2009, a study conducted in countries across Europe and Asia reported that about 75% of respondents were likely to stay away from public transportation.⁷ Also, studies conducted in Hong Kong, Hungary, and Turkey reported that many people adopted similar behavior by avoiding public transport.⁸⁻¹⁰ Generally, there was a large reduction in people's mobility during the COVID-19 pandemic with some cities experiencing up to a 90% reduction in mobility.¹¹ For instance, a study conducted in the Netherlands during the COVID-19 lockdown reported that out of 2500 respondents surveyed, 80% decreased outdoor activities, workers increased their working from home, and between 55 and 68% reduced their amount of public transport trips.¹²

Mobile phone-mobility based data have proved useful in determining places people are likely to visit during the COVID-19 pandemic while also offering insight into people's perception and compliance with preventive measures. In a study, mobile phone data of ninety-eight million individuals were plotted every 60 minutes from their residential areas to places visited like restaurants and worship centers. The researchers found that a small percentage of people (termed *super-spreaders*) were responsible for high rates of infections, and it was suggested that limiting the mobility of such a group to places of interest will be more effective than reducing the mobility of a large chunk of the population.¹³ They also found that people who are racially and economically disadvantaged are more likely to go to crowded areas for work or to obtain food irrespective of the lockdown measures.¹³ Another study on phone mobility data revealed a robust relationship between reduced mobility and decreased SARS-CoV-2 infection between 27th March and 20th April 2020.¹⁴ However, the relationship was weaker when the analysis was extended to between April and July 2020.¹⁴ This suggests other factors besides phone mobility tracking are responsible for the latter relationship. Another study that used mobility data compiled from Google, Facebook, and other social media platforms on the efficacy of non-pharmaceutical interventions (NPIs) in China, France, Italy, South Korea, and the United States revealed a significant relationship with decreased human mobility.¹⁵

In Nigeria, due to the continuous surge in the number of

COVID-19 cases, a nationwide lockdown was imposed by the federal government on 20th March 2020. Lagos and Ogun states, and the Federal Capital Territory, Abuja had complete lockdown while all other states in the country were on partial lockdown. Locations with complete lockdown had full enforcement and people were not allowed to leave their residences or mix with people from other families/residences. In states with partial lockdown, implementation varied from the limitation of the number of days they were allowed to go to work, to restrictions of certain activities, including fewer days of market opening to restricted attendance at religious gatherings. Although, there are few mobile phone mobility studies conducted in Nigeria, one of such study showed a decline in visitation to grocery stores and pharmacy, recreational spots, and transport parks in most states of Nigeria during the lockdown.¹⁶ Another investigator also found that the lockdown measure played a significant role in reducing viral disease propagation in the country.¹⁷ This implies that as the number of visits to places of interest such as grocery shops, transport stations etc decreased, the likelihood of being infected by SARS-CoV-2 decreased notably. However, besides phone mobility studies there is a paucity of data on the places that Nigerians visited during the pandemic lockdown. To better inform future outbreak response activities, the objective of this secondary data analysis was to document the places that Nigerians visited during the COVID-19 government's stay-home policy.

Materials and Methods

Study design

The COVID-19 study reported here was embedded within a larger multi-objective project that investigated the factors that influenced knowledge and perception of COVID-19 among Nigerians, and how behavior shaped the response to COVID-19 safety protocol. The larger mixed-methods project combined quantitative and qualitative datasets from the PCHS survey of the College of Medicine University of Lagos (CMUL), and the PERC-1 survey, conducted by Resolve to Save Lives (RTSL) on behalf of Africa Center for Disease Control (Africa CDC) to generate insights from existing data collected from respondents aged 18 years and above in six geopolitical zones (GPZs) of Nigeria.

The PCSH survey comprised a quantitative online survey with 879 respondents to explore among other questions places that Nigerians visited during the COVID-19 stay-home order. The PCSH survey was conducted from April 4 to May 8, 2020, and comprised of two parts: i) a quantitative Google survey to elicit responses from 879 participants; ii) qualitative interviews with 22 respondents across six GPZs of Nigeria.¹⁷ This study analyzed only the quantitative data from the PCSH survey and PERC wave-1 datasets.

Ethical considerations

Ethical approval for this secondary analysis was granted by the University of Lagos Teaching Hospital Ethical Review Board: ADM/DSCST/HREC/APP/4583. De-identified survey datasets were used to maintain the anonymity of the participants in the original survey following obtaining permission from the data owners.

Data collection and analysis

Quantitative data were exported from Google Forms and analyzed using the Statistical Package for Social Sciences (SPSS) version 22. Open-ended responses in Google Forms were re-coded as numeric data. Descriptive analysis was conducted using simple

frequency distribution tables and the chi-square statistics were used to understand factors that shaped compliance with COVID-19 stay-home order. For all analyses, we excluded observations if they were missing any outcome or required covariate data (*i.e.*, complete case analyses).

Results

Sociodemographic data

While the PERC wave-1 data had 1304 participants, the PCSH survey involved 879 participants. Their socio-demographic characteristics are presented in Tables 1 and 2. The mean age of respondents in PERC wave-1 and PCSH survey was 31.8 years [standard deviation (SD)=8.5] and 33.11 years (SD=8.3), respectively. Some participants (491; 55.9%) were in states with partial lockdown while 44.1% (388) of respondents were in states with the complete lockdown. Of 388 respondents in states with complete lockdown, 356 (91.8%) reported fully complying with the Government's stay-home policy.

Many respondents (776; 88.3%) believed that staying home was effective for the curtailing spread of COVID-19 infection. Those who believed staying home would curtail the spread were in states with complete (336; 43.3%) and partial (440; 56.7%) lockdowns, respectively. One hundred and three (103; 11.7%) respondents reported staying home will not curtail infection spread.

Most respondents (846; 96.2%) reported that COVID-19 has drastically reduced their movement, while 33 (3.8%) respondents reported no change in movement. Most respondents

(587; 66.8%) did not receive any guests after the lockdown was imposed, while 292 (33.2%) respondents received guests. A slightly higher proportion of females (380/410; 92.7%) than males (381/469; 81.2%) were compliant with the stay-home order ($P < 0.001$). Age ($P = 0.033$), gender ($P = 0.023$), geopolitical zone of residence (0.002), religion ($P = 0.048$), and category of monthly income ($P = 0.009$) had a statistically significant association with compliance with no movement policy of the government. See *Appendix 1* for the sociodemographic characteristics of PCSH participants as it relates to movement and having a visitor during the lockdown.

Across all age groups, more than three-quarters of respondents stayed at home during the lockdown ($P = 0.788$). Similarly, most respondents obeyed the stay-home policy irrespective of their geopolitical zone of residence. For instance, more respondents stayed home in the northeast (81; 76.4% vs 25; 23.6%), northcentral (108; 88.5% vs 14; 11.5%), and Northwest (104; 88.9% vs 13; 11.1%). Also, more respondents stayed home in the southeast (90; 88.2% vs 12; 11.8%), southwest (290; 91.2% vs 28; 8.8%), and the south-south (88; 77.2% vs 26; 22.8%), ($P < 0.001$).

From the PCSH dataset, residence in either an urban or rural location ($P = 0.636$), educational attainment ($P = 0.100$), religion ($P = 0.171$), age ($P = 0.324$), ethnicity ($P = 0.084$) and marital status ($P = 0.050$) had no statistically significant association with compliance with stay home policy. However, employment status ($P = 0.002$), financial earnings ($P < 0.001$), gender ($P < 0.001$) and geopolitical zone of residence ($P < 0.001$) had a statistically significant association with compliance with the stay-home policy.

As regards the PERC wave 1 dataset, participants were evenly distributed across the six geopolitical zones of Nigeria, with 27.6% (360) of participants from the Northwest zone, and many (709; 54.4%) respondents were 25-35 years old. Other sociodemographic characteristics of the participants are in Table 2.

Places visited during stay home policy

Eighty-one percent (711/879) of respondents in the PCSH survey reported visiting several places despite the lockdown. The most visited places and their proportions are shown in Figure 1. Fewer respondents resided in states with complete lockdown (272; 38%) compared to partial lockdown (439; 62%). When places respondents visited were compared based on the type of lockdown, more visits occurred in states with partial lockdown to markets/shops (73%; 320/439), religious places (8.7%; 38/439), family and friends (8.4%; 37/439) and work (6.4%; 28/439) while the most visited places in states with complete lockdown were markets/shopping (68%; 185/272), visits to families and friends (16.1%; 44/272) and religious places (3.7%; 10/272). Disaggregation based on lockdown type for hospital (12), party (5), and exercising (17) was not done because of the small proportion of respondents who reported these activities. The socio-demographic characteristics of respondents who went to places are presented in Table 3.

The PERC wave-1 dataset documented contact with others during the stay-home policy and had fewer options for the places where the contact occurred (see Tables 2 and Appendix 1. This is in contrast to the PCSH survey (in Table 1). Importantly, the majority of PERC respondents (92%) did not respond to any contact with others while only 67 of the 68 (8%) PERC wave-1 respondents reported contact with other people during the stay-home order. Contact was mainly with family and friends in many cases (64%; 44/68) followed by at the workplace (%; 23/68).

Discussion

The COVID-19 pandemic has led to movement restrictions to reduce the spread and health systems overwhelm by infected people needing health care for severe diseases. This paper identified places that Nigerians visited during the government's stay-home policy to propose how such places can be made safer for visits during future epidemics and pandemics. We found that many respondents in states with partial lockdown visited the market or went shopping, while those in locations with complete lockdown visited family and friends. The only significant factor associated with stay-home policy compliance was GPZ of residence. Findings from this study add to the body of knowledge on life events, showing that specific circumstance in a person's life can affect behavioral patterns immediately and structurally.^{18,19} The lockdown order in Nigeria impacted some states more than others. Two states, Lagos and Ogun states, and the Federal capital territory (FCT) were largely affected by the stay-home policy as the Nigerian Government declared a complete lockdown. This decision was informed by the international travel points of entry in Lagos and FCT and the contiguousness of Ogun state with Lagos. This is because many people commute to both Lagos and Ogun states daily for work, business, and social life. Also, the nation's index case of COVID-19 was identified in Ogun state. The high population, bustling economic activities, and access of foreigners due to the largest and busiest international airports in the state was major consideration for the complete lockdown in Lagos.²⁰ More so, the index Covid-19 case in Nigeria was a foreigner from Italy who came into the country through the Lagos international airport Lagos.²¹ While Lagos and Ogun states and the FCT represented just 8% of Nigerian States and had complete lockdown, the policy was ineffective in limiting community transmission of COVID-19 infection in the country. This is because irrespective of the lockdown, report still showed that Lagos state recorded the highest

Table 1. Sociodemographic characteristics of participants in the perception of and compliance with physical distancing survey quantitative survey.

Participants Characteristics	Total lockdown	Partial lockdown	Total	Chi-square
Gender				
Male	207	262	469	1.000
Female	181	229	410	
Age (years)				
18-24	48	76	124	0.46
25-35	199	245	364	
36-50	119	148	267	
51-59	10	11	22	
≥60	6	0	6	
Geopolitical zones				
Northeast	31	75	106	0.000
Northcentral	67	55	122	
Northwest	71	46	117	
Southeast	41	61	102	
Southwest	144	174	318	
Southsouth	34	80	114	
Location				
Urban	351	431	782	0.233
Rural	60	37	97	
Marital Status				
Married	181	244	425	0.161
Single	192	239	431	
Separated	4	4	8	
Divorced	6	1	7	
Widowed	5	3	8	
Religion				
Christianity	285	383	668	0.138
Islam	96	93	189	
Traditional Religion	3	5	8	
Others	4	10	14	
Marital status				
Married	181	244	425	0.161
Single	192	239	431	
Separated	4	4	8	
Divorced	6	1	7	
Widowed	5	3	8	
Ethnicity				
Yoruba	153	197	350	0.491
Hausa/Fulani	93	101	194	
Igbo	74	113	187	
Niger Deltan	43	54	97	
Middle Beltan	24	24	48	
Education				
Tertiary	371	479	850	0.255
Secondary	10	8	18	
No schooling	7	4	11	
Employment				
Employed	254	324	578	0.23
Unemployed	83	82	165	
Students	41	79	120	
Housewife	10	6	16	
Monthly income				
Less than 30,000	74	97	171	0.63
30,000-50,000	60	101	161	
51,000- 80,000	42	62	104	
81,000 – 100,000	44	46	90	
101,000 – 150,000	40	59	99	
151,000 – 220,000	35	29	64	
221,000- 250,000	9	12	21	
≥ 251,000	39	28	67	

number of COVID-19 cases in the country.²² Most of the other 33 states of Nigeria implemented a partial lockdown. This was adopted supposedly because of the less busy and the reduced population here. When put together, the population of these 33 states surpassed that of the initial 3 states, and this could have influenced having more respondents from states with partial lockdown in this study. In this study, more women complied with the stay-home policy, and this is consistent with other studies that found females are more likely to comply with protective behaviors than their male counterparts.^{23,24} Employment status, geopolitical zone of residence, and financial earnings were associated with the stay-home policy.

Places Nigerians visited during Government's lockdown must be documented as there might be other infectious diseases of public health importance in the future. This will help Government agencies and ministries of health at the sub-national levels to anticipate potential places of human interaction and infection spread and plan pre-emptive control measures to curtail infection spread. In places with partial lockdown, many people visited shopping malls and marketplaces to get food supplies and religious centers. Respondents in places with complete lockdown visited friends and family. The findings highlight people's priorities in emergencies. Having access to food supplies during a period of restricted movement is important as not many Nigerians are empowered to make purchases in bulk. Although there was a distribution of food and household supplies in the form of palliatives to people during the lockdown, it began in about May, way into the lockdown, and appeared not to have been received by many respondents or was too small to meet the needs of the household.²⁵ A high proportion of Nigerians are low- and middle-income earners with the former group earning their income daily.²⁶ This implies this group won't be able to access basic resources to survive during the lockdown. In addition, the small savings by the middle-income earners will quickly deplete leaving them with no option but to disregard the containment measures put in place by the government by trying to work or visit the marketplace either to sell or to buy, which is what was obtainable in our study.

In contrast, high-income countries (HICs) where stricter stay-home policies were implemented, had an adequate supply of palliative packages, which encouraged a high level of adherence.¹² Although in HICs, people were still found outside their homes for reasons such as exercise and others.¹² Regular power supplies and reliable ICT are other factors that need attention as people who are restricted from leaving their houses need these utilities during the lockdown.²⁷⁻²⁹ As a fact, ICT deployment went up during the lockdown as it was used for social interactions. Also, ICT was used for academic research activities, including data collection for this research, as survey forms were sent and completed using online platforms. Government and policymakers should improve ICT infrastructure in readiness for future needs, especially as more people work remotely. This will sustain life activities, including online grocery shopping on ICT platforms.

To make the places, including markets, shopping malls, and households that were visited during the lockdown safe, the Federal Government of Nigeria in opening the economy did come up with different measures to mitigate infection spread. This included the opening of markets on certain days for specific goods and services and reducing the operating hours of the markets. Religious places were made to re-open with the congregation occupying 50% of available space and short duration of worship. These measures were combined with massive campaigns on the use of non-pharmaceutical interventions. The need for the use of non-pharmaceutical interventions in these places cannot be over-emphasized. Temperature scanners at entrances of markets, shopping malls, and

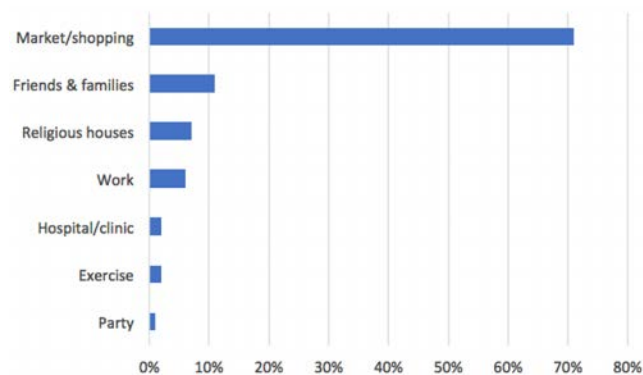


Figure 1. Places visited by Nigerians during stay home order, 2020 (Author Calculated from the perception of and compliance with physical distancing survey).

Table 2. Sociodemographic characteristics of participants in the partnership for evidence-based response to COVID-19 wave-1 quantitative survey.

Variables n=1304	Frequency	Percentage (%)
Gender		
Male	660	50.6
Female	644	49.4
Age group		
18-24	242	18.6
25-35	709	54.3
36-50	313	24.0
51-60	32	2.5
60+	8	0.6
Monthly Family income (USD)		
0 – 50	114	8.7
51 – 100	229	17.6
101 – 200	366	28.1
201 – 500	210	16.1
501 – 1000	60	4.6
1001 – 2000	14	1.1
2001 – 5000	17	1.3
Over 5000	14	1.1
Don't know	119	9.1
Refused	161	12.3
Education (n=1304)		
No formal education	16	1.2
Incomplete Primary	5	0.4
Completed primary school	44	3.4
Incomplete secondary school	41	3.1
Completed secondary school	522	40.0
Some university/CoE/Tech/Vocational	321	24.6
University (First Degree)	292	22.4
Postgraduate Degree	58	4.4
Don't know/refuse	5	0.4
Location		
Urban	722	55.4
Rural	582	44.6
Geopolitical Zones		
Northeast	176	13.5
Northcentral	191	14.7
Northwest	360	27.6
Southeast	148	11.3
Southwest	217	16.6
South-south	212	16.3

Table 3. Sociodemographic characteristics of individuals who visited specific public places during the stay-at-home policy.

	Market/Shop	Friends/Family	Religious places	Work	Hospital	Exercise	Party
Location							
Urban	412 (90.3%)	59 (85.2%)	40 (91.7%)	39 (95.3%)	12 (100.0%)	15 (94.1%)	3 (80.0%)
Rural	44 (9.7%)	10 (14.8%)	4 (8.3%)	2 (4.7%)	0.0%	1 (5.9%)	1 (20.0%)
Education							
Tertiary	481 (97.6%)	77 (97.5%)	48 (100.0%)	41 (97.7%)	12 (100.0%)	13 (88.2%)	5 (100.0%)
Secondary	8 (1.6%)	2 (2.5%)	0.0%	0.0%	0.0%	1 (5.9%)	0.0%
No schooling	4 (0.8%)	0.0%0.0%	1 (2.3%)	0.0%	1 (5.9%)	0.0%	
Employment							
Employed	255 (71.0%)	21 (50.6%)	18 (60.4%)	35 (90.7%)	8 (83.3%)	9 (70.6%)	3.2 (80.0%)
Unemployed	54 (14.9%)	10 (24.7%)	7 (25.0%)	0.0%	2 (16.7%)	1 (11.8%)	0.8 (20.0%)
Students	43 (12.1%)	10 (24.7%)	4 (14.6%)	4 (9.3%)	0%	2 (17.6%)	0%
Housewife	7 (2.0%)	0.0%0.0%	0.0%	0%	0%	0%	
Occupation sector							
Formal sector	209 (75.0%)	17 (70.6%)	22.5 (86.7%)	6 (87.5%)	769 (87.5%)	11 (100.0%)	0.8 (40.0%)
Informal sector	70 (25.0%)	7 (29.4%)	3.5 (13.3%)	1 (12.5%)	110 (12.5%)	0.0%	1.2 (60.0%)
Earnings							
Monthly income	278 (55.1%)	34(34.0%)	16.3 (58.3%)	31 (72.0%)	4 (58.3%)	2.9 (41.2%)	0.8 (40.0%)
Random income	152 (30.1%)	25 (25%)	7.6 (27.1%)	7 (16.3%)	1.8 (25.0%)	2.5 (35.3%)	1.2 (60.0%)
Daily income	39 (7.7%)	5 (5%)	1.2 (4.2%)	3 (7.0%)	0.6 (8.3%)	0%	0%
No earnings	36 (7.1%)	36(36.0%)	2.9 (10.4%)	2 (4.7%)	0.6 (8.3%)	1.6 (23.5%)	0.0%

religious houses encouraging people with febrile illnesses to stay away from public spaces, and persistent and correct use of face-masks and physical distancing in enclosed spaces need to be sustained. Also, the study shows the need to engage market leaders and market associations in enforcing compliance with NPIs in the markets.

Strength/ limitations

This study was limited since the source of information obtained was subjective (self-reports) instead of more objective movement-tracking technologies, such as mobile phone mobility data. Also, the self-report nature of the primary data collected may result in our findings being subject to recall bias as well as social desirability bias. Due to the secondary analysis nature of this study, attempts to minimise these limitations were unpracticable. Other limitations were fewer places of potential contact and a high non-response rate in the PECR-1 dataset.

In this study conducted in Nigeria, respondents accounted for their movements, and places visited were reported, which provides an alternative and pragmatic approach in a resource-limited setting. This study has two key strengths. The first one is the use of datasets that involved participants in all geopolitical regions of Nigeria, providing a national spread of people's movement based on the local context as the stay-home policy varied. The second one is the use of non-conventional datasets that also shows the acceptance of social media survey tools in a resource-limited setting. This will also be the first study to the knowledge of the authors that provides evidence-based information on places that Nigerians visited during the government lockdown policy to curtail covid-19 infections.

Conclusions

In conclusion, this study found that people did not fully obey the stay-home policy in their locations irrespective of the nature of the lockdown (partial or complete) with those on partial lockdown visiting the markets the most while areas with complete lockdown visiting friends and families the most. There is therefore an urgent

need to explore ways that will increase compliance with government policies during national emergencies as restricting the movement of people during the COVID-19 pandemic lockdown is a known global initiative to curtail the spread of covid-19 infection.

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Online supplementary material:

Table S1. Perception and compliance with physical distancing survey participants' movement and hosting of visitors based on sociodemographic characteristics.