EPIDEMIOLOGY OF COVID-19 IN THE FEDERAL CAPITAL TERRITORY, ABUJA, NIGERIA, 2020

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ABSTRACT: *Background: Coronavirus disease (COVID-19) is a global pandemic. COVID-19 epidemiology varies from one area to another. Appreciation of local COVID-19 epidemiology allows for better understanding of its distribution, description, transmission and risk patterns, clinical course, and management. In addition, through better understanding of COVID-19 epidemiology, socio-cultural factors that exacerbate the disease are revealed, hence control measures can be identified. Objective: The objective of this study is to determine the epidemiological characteristics and transmission patterns of COVID-19 cases in the Federal Capital Territory (FCT), Abuja, Nigeria. Materials and Methods: We retrospectively reviewed the COVID-19 database in the Public Health Department of the Federal Capital Territory, Abuja from the confirmation of initial case on March 20th, 2020 to June 30th, 2020. We evaluated the performance of COVID-19 surveillance, determined the epidemiological characteristics of confirmed COVID-19 cases, the transmissibility of the disease, and identified groups of people at higher risk of contracting the disease and those at higher risk of dying from the disease. Results: A total of 1,870 confirmed COVID-19 cases were reported during the study period. Of these confirmed cases, a total of 1,198(64%) were males. The number of deaths among confirmed cases was 33 (CFR, 1.8%). The male to female ratio of the confirmed cases was 3:1 and the most (56%) affected age group was 20-40 years with mean age of 36 years (range: 6 months to 87 years). The number of COVID-19 cases among health workers was 158. The number of contacts line listed was 3,358 out of which 3,266(97%) were followed up and 92(3%) were lost to follow up. The case to contact ratio was 1.8 and the number of contacts that were positive for COVID-19 was 85(2.6%). The basic reproductive number (R) based on the SEIR model ranged from 1.1-1.4 Conclusion: There was intense transmission of COVID-19 in the Federal Capital Territory, Abuja during the study period. The surveillance for COVID-19 should extend to other area councils apart from the Municipal council. Timely detection, reporting, isolation and management of confirmed cases as well as contact tracing and monitoring are essential to curbing the spread of COVID-19.*

KEYWORDS: COVID-19, Community, Surveillance, Epidemiology, Abuja, Nigeria

INTRODUCTION

In late December 2019, a novel corona viral disease caused by the SARS-CoV-2 virus was first identified in Wuhan, China. The disease, initially known by various names including 'Severe Pneumonia with Novel Pathogens' by the Taiwan Centre for Disease Control (CDC), has been officially named by the World Health Organization (WHO) as 'Coronavirus Disease-2019 (COVID-19), on February 11, 2020[1]. The first COVID-19 cases in Nigeria and the FCT were confirmed on the 27th of February and 20th of March 2020 respectively[2,3]. The outbreak of COVID-19 has currently spread widely around the world, affecting more than 120 countries and territories. As of May 18, 2020, there were 4, 618, 821 and 6,175 cases of COVID-19 globally and in Nigeria respectively. The corresponding number of deaths was 311, 847 and 216[4]. The disease was declared a public health emergency of international concern (PHEIC) by the WHO on 30 January 2020 and subsequently a global pandemic on March 11, 2020[5,6].

Transmission of COVID-19 is through droplets from close contacts or contaminated fomites. There is no sufficient evidence to support airborne or faeco-oral transmission. The mean incubation period is 3-9 days with a range between 0-24 days[7]. Symptoms of COVID-19 infection appear after an incubation period of approximately 5 days. The most common symptoms are fever, cough, and fatigue, while other symptoms include headache, diarrhoea, dyspnoea, and sore throat[8]. While patients with confirmed COVID-19 disease can be asymptomatic or pre-symptomatic (patients not yet symptomatic); however, both categories of cases have been shown to transmit the disease and constitute a group of 'silent spreaders' together with the very mildly symptomatic. Indeed, abnormalities on chest imaging have been noted in some patients before the onset of symptoms[10].

The preferred specimens for COVID-19 diagnosis are nasopharyngeal and oropharyngeal swabs preferably during the early stage of the disease. The molecular test of choice is the reverse-transcription polymerase chain reaction (RT-PCR) assays. There however exist other supplementary diagnostic tools such as the antibody -based serological techniques which are gradually being introduced[11].

There is no current evidence from randomized controlled trials (RCTs) to recommend any specific anti-COVID-19 treatment for patients with a suspected or confirmed COVID-19 infection and vaccine is not yet available. Management is largely supportive in isolation centres to prevent disease transmission to others. Several treatment modalities have however been tried including use of anti-viral drugs (Remdesivir, lopinavir/ritonavir), anti-malarial drugs (chloroquine phosphate, hydroxyl-chloroquine), anti-parasitic drug (Ivermectin), steroids and serum antibodies[12-15].

Case fatality rate from COVID-19 ranges from 1% to 2% depending on the study and Country. Majority of deaths have occurred in elderly patients (over 65 years of age) with pre-existing diseases such as cancer hypertension, coronary heart disease and diabetes. In patients with severe disease, the usual cause of death is progressive respiratory failure due to alveolar damage from the virus. Although young children appear to have mild symptoms, they may infect others and perpetuate transmission[16-18].

Robust and enhanced surveillance for COVID-19 is critical for effective control of the spread of the disease as well as guide the implementation of control measures. He main objective of a sensitive COVID-19 surveillance is to control the spread of disease such that normal socio-

economic activities can resume as early as possible. In addition, surveillance also enables monitoring trends of COVID-19 transmission and risk assessments[19].

Following the Laboratory confirmation of the first 3 COVID-19 cases in the FCT March 20, 2020, a multi-sectoral COVID-19 Emergency Operations Centre (EOC) was activated on March 23, 2020. The EOC is made up of personnel from the FCT Health and Human Services Secretariat (HHSS), Nigeria Centre for Disease Control (NCDC), World Health Organization (WHO), African Field Epidemiology Network (AFENET), Medical and Dental Consultants Association of Nigeria (MDCAN), Private Health Practitioners and other partners who coordinate nine pillars (coordination, logistics, infection prevention and control, epidemiology/surveillance/point of entry, laboratory, risk communication, case management health and safety and research) of response activities as contained in the Incident Action Plan.

METHODS

Study area and population

The Federal Capital Territory (FCT), Abuja is the Capital of Nigeria and lies between latitude 8.25 and 9.20 north of the equator and longitude 6.45 and 7.39 east of Greenwich Meridian. It is geographically located in the centre of the country. The FCT is bordered by the states of Niger to the West and North, Kaduna to the northeast, Nasarawa to the east and south and Kogi to the southwest. The total population is close to five million and is sub-divided into 6 Area Councils (Abaji, Bwari, Gwagwalada, Kuje, Kwali and Municipal) which are equivalent to Local Government Areas (LGAs) in other states of Nigeria. The Municipal Area Council is the largest of all the area councils in the FCT accounting for over 55% of the total population. In addition, there are 62 political wards and 2,652 settlements. This study is however, confined to the rural slums which did not report any COVID-19 case but thought to have possibility of significant contacts with confirmed cases that were mainly from the urban locations of the FCT.

Brief Description of COVID-19 Outbreak Response in FCT, Abuja

The FCT reported its first case of COVID-19 on March 20th, 2020 and this was followed by setting up of a multisectoral COVID-19 Emergency Operations Centre (EOC) on March 23rd, 2020. Members were drawn from the FCT public health department, private health practitioners, medical associations, and partners (WHO, AFENET, NCDC). The main role of the COVID-19 EOC was to coordinate the response activities as enshrined in the incident action plan. The EOC had 9 pillars of response activities (coordination, logistics, infection prevention and control, epidemiology/surveillance/point of entry, laboratory, risk communication, case management health and safety and research). The Ministerial Expert Advisory Committee was inaugurated on March 26th, 2020. The surveillance for COVID-19 in the FCT was initially dependent on phone calls received by the EOC from suspected cases. Later, on April 13th, 2020 community active surveillance for COVID-19 was initiated followed by health facility active cases search. There were 45 three-member sample collection teams in the FCT. Collected samples from all suspected cases in FCT were analyzed at the Nigeria Centre for Disease Control (NCDC) Gaduwa Reference Laboratory and confirmed COVID-19 cases in the FCT were managed at one of the eight isolation centres in the FCT with collective bed capacity of over 1,000.

Data Collection and Analysis

Data sources for analysis were from the COVID-19 excel database of the Public Health Department of the FCT as well as the master list of FCT settlements at the WHO office in the FCT. We abstracted data from the start of the outbreak on March 20, to June 30, 2020. We conducted key analysis using Microsoft Office Excel 2010 to highlight the epidemiological characteristics of the disease and transmission patterns. We also used the SEIR model to estimate basic reproductive number (R).

RESULTS

A total of 1,870 confirmed COVID-19 cases were reported during the study period. Of these confirmed cases, a total of 1,198(64%) were males. The number of deaths among confirmed cases was 33 (CFR, 1.8%) of which 29(88%) were males. The male to female ratio of the confirmed cases was 3:1 and the most (56%) affected age group was 20-40 years with mean age of 36 years (range: 6 months to 87 years). The number of COVID-19 cases among health workers was 158. The number of suspected cases from whom samples were collected was 15,248. All the confirmed COVID-19 cases were reported from the six area councils with Municipal council accounting for 12,418(81%) of samples collected and 1,564(84%) of confirmed cases. The most affected communities were Mabushi, Maitama, Garki, Lugbe, Asokoro and Gwarimpa.

The number of contacts line listed was 3,358 out of which 3,266(97%) were followed up and 92(3%) were lost to follow up. The number of contacts that exited the mandatory 14 days follow up period was 2766(85%). The number of symptomatic contacts was 85(2.6%) and the number of contacts that are currently under follow up was 500(15%). The case to contact ratio was 1.8 and the number of contacts that were positive for COVID-19 was 85(2.6%). The basic reproductive number (R) based on the SEIR model ranged from 1.1-1.4.

DISCUSSION

As at the reporting period, the FCT had the highest testing rate per million (3,177) in the country. This was because of the intense community surveillance for COVID-19 embarked upon by the Department of Public Health[20]. This testing rate was still below the target of testing 1% of the population of almost five million in the FCT. Initially as with every region of the world, the first COVID-19 cases in the country and indeed the FCT came from exposure to international contacts—travel, trade, tourism, or business. These initial cases were mostly clustered in Maitama settlement in the Municipal Area Council. Subsequently, community transmission set in and cases spread to other area councils[21,22]. More COVID-19 testing (81%) was conducted in the municipal area council by virtue of its population (55%) and high-risk settings than in other area councils. This resulted into more (84%) confirmed COVID-19 cases compared to other area councils. The male to female ratio of COVID-19 cases in the FCT was high at 3:1. While some countries have similar pattern of sex ratios, in others no difference in the proportion of males and females with confirmed COVID-19 was observed[23]. If the proportion of people tested from each sex that are tested is not known, it will be difficult to

fully interpret these sex figures. In addition, many countries are yet to disaggregate their COVID-19 data by sex.

Of the 33 COVID-19 cases that died in the FCT, 29(88%) were males. While men and women may have the same prevalence, men with COVID-19 are more at risk for worse outcomes including need of intensive care and death, independent of age. The explanation for this observation may be genetic, hormonal, variation in the immune system, behavior (e.g. smoking) and prevalence of chronic diseases (e.g. heart disease, diabetes and cancer)[24,25].

The FCT has relatively younger age group of COVID-19 cases. The most affected age group was 20-40 with a mean age of 36 years. This may have contributed to the observed relatively low case fatality (1.8%); but the economic impact may be significant considering the productivity of this age group. The low case to contact ratio of 1.8 was due to many factors including paucity of personnel and inadequate logistics. This situation was akin to what obtained in other middle and low income countries[26]. The basic reproductive number of 1.1-1.4 based on the SEIR statiscal model indicated the high transmissibility and explained the continuing expansion of the outbreak in the FCT. Another model (Bayesian framework and compartmental model) used to estimate the basic reproductive number for the country, estimated the R_0 to be between 2.37 and 2.47 and that the number has been above one since the second week of April, 2020[27].

Some of the key challenges of this study are inadequate personnel and logistics support for optimal contact tracing and inadequate testing in other area councils apart from the municipal. In addition, we encountered some data quality issues relating to missing variables of some suspected and confirmed COVID-19 cases in the database.

We conclude that COVID-19 burden in the FCT is high and community transmission is intense. Active case search for COVID-19 has significantly improved COVID-19 detection in the FCT and has demonstrated intense community transmission of the disease. The settlements most affected were Mabushi, Maitama, Garki, Lugbe, Asokoro and Gwarimpa.

There was skewing of COVID-19 testing to the disadvantage of other area councils other than the municipal.

With increasing community transmission of COVID-19, we recommend that the FCT adopts the four strategies of preparedness and response framework of prevention, detection, containing and treating COVID-19 cases. To achieve this, all the EOC pillars of response should be further strengthened. Particular attention should be given to expanded testing capacity (in communities and health facilities) in the five other area councils with low testing performance. Contact tracing should be accorded high priority through training of more personnel and provision of adequate logistics support.

Author Contributions

All authors have made significant contributions to the conception of the work, data collection and to literature search. They also contributed substantially to writing the manuscript, its critical review for quality, approved its final version, and agreed to its submission.

Conflict of Interest

The authors declare no conflict of interest, be it commercial, financial or sentimental.

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APPENDIX

Table 1: Distribution of COVID-19 sample collection and confirmed cases in the FCT as of June 30th, 2020

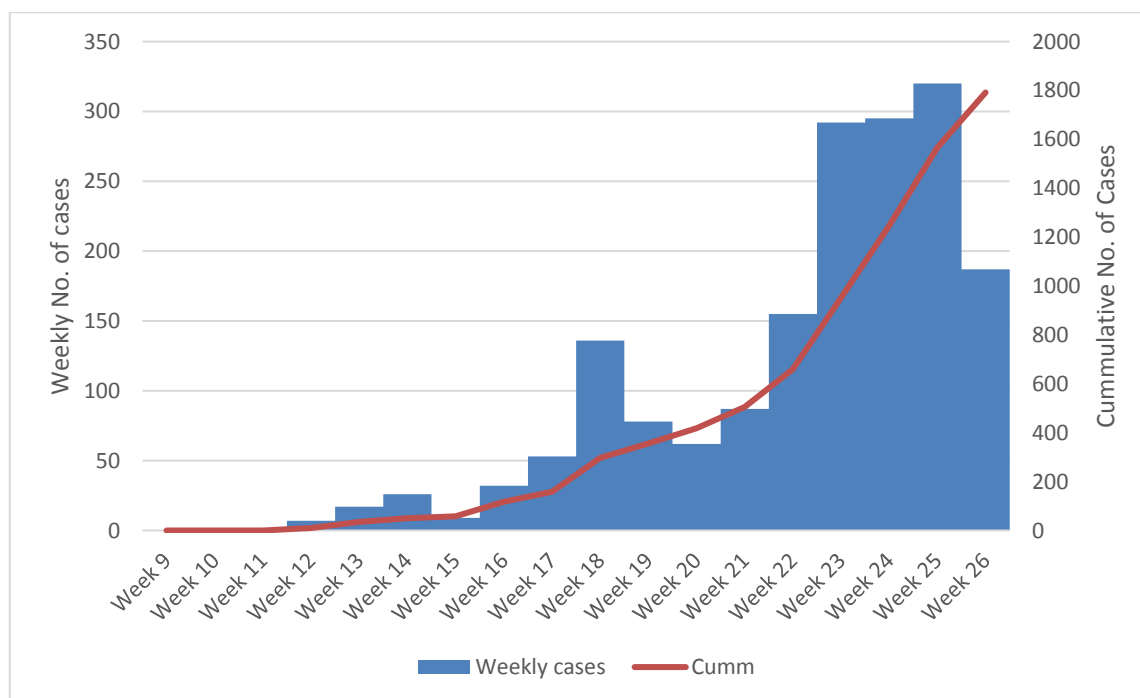| Area Council	Total population(%)	Total samples collected(%)	No. of confirmed COVID-19 cases(%)	% positivity rate	No. of tests/million popoulation
Abaji	202,965(4)	340(2)	50(3)	14.7	1,675
Bwari	789,080(16)	1295(9)	127(6)	9.8	1,641
Gwagwalada	547,907(11)	595(4)	51(3)	8.6	1,086
Kuje	338,138(7)	300(2)	41(2)	13.7	887
Kwali	298,096(6)	300(2)	37(2)	12.3	1,006
Municipal	2,703,823(56)	12418(81)	1564(84)	12.6	4,593
Total	**4,880,010(100)**	**15,248(100)**	**1870(100)**	**12.3**	**3,125**

Figure 1: Epidemic curve of COVID-19 in the FCT as of June 30th, 2020
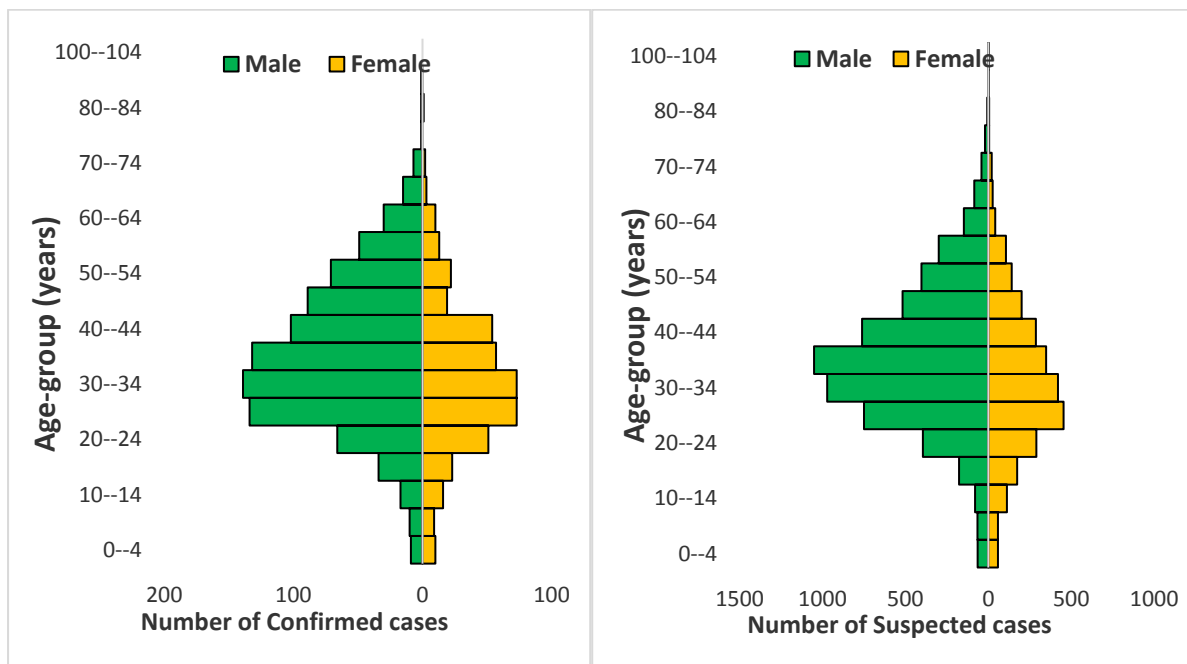
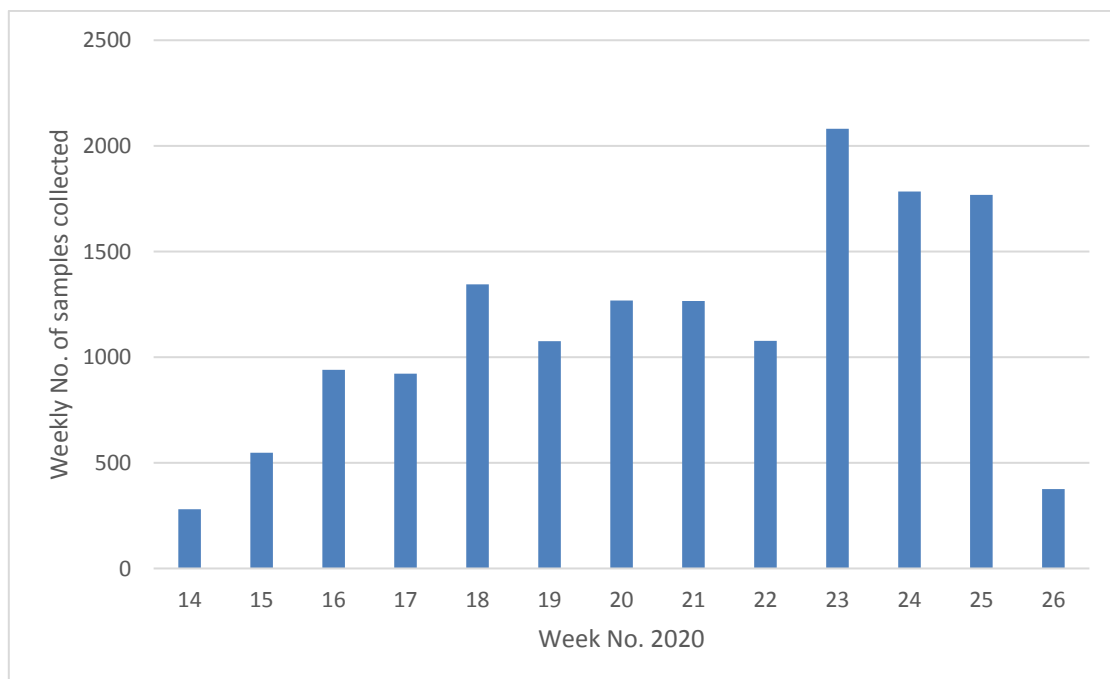**Figure 2: Age – Sex distribution of Suspected and confirmed COVID – 19 cases as of 30th June 2020**

Fig 3. Weekly sample collection in the FCT as of 30th June 2020