APPLIED DATA SCIENCE CAPSTONE PROJECT

FLATTENING THE CURVE AS ECONOMIC ACTIVITIES RESUME: LOCATION DATA ANALYSIS OF LAGOS STATE IN REFERENCE TO THE COVID 19 PANDEMIC

Figure1: Health Workers with a COVID-19 Patient. Source: Nairametrics.com

1.0 DESCRIPTION OF THE PROBLEM: INTRODUCTION

1.1 BACKGROUND

Coronavirus Disease 2019 (COVID-19) is an infectious disease caused by the novel coronavirus.[1] This disease which is currently a pandemic broke out in Wuhan, China in December 2019. As at 27 April 2020, there were 2,878,196 confirmed cases and 198,668 deaths recorded from the disease globally.[2] Due to its highly infectious nature, countries have had to take up strict social distancing measures such as imposing a lockdown. One of the adverse effects of these measures is the impact on the economy.

In Nigeria, the index case of COVID-19 was confirmed on 27 February 2020, when an Italian tested positive in Lagos two days after arrival from Milan, Italy.[3] Based on the Nigerian Center for Disease Control (NCDC)'s COVID-19 data, as at 27 April 2020, the country confirmed 1,337 cases, 255 cases discharged, and 40 deaths recorded.[4] Total active cases as at 27 April 2020, were 1,042.[5]

Lagos State, being the business centre of the country has been the most hit with 764 confirmed cases, 143 discharged and 19 deaths recorded. The active cases as at 27 April 2020 were 602, representing 57.77% of the country's total active cases.[5]

On the 29th of March 2020, the president of the Federal Republic of Nigeria announced a two-week lockdown of Lagos state, Ogun state and the Federal Capital Territory (FCT), Abuja.[3] The lockdown was extended for another two weeks on 13 April 2020, and for another one week on 27 April 2020; however, the president announced that the lockdown will be relaxed after the one-week extension (04 May 2020) but with an indefinite curfew from 8 pm to 6 am.[3]

Figure2: The City of Lagos. Source: nomadaafricamag.com

1.2 THE PROBLEM

Lagos is a state in South-Western Nigeria. Although it is the smallest in area per km^2 among all 36 states in Nigeria, it currently has the highest population density. [6] According to Ekundayo (2013), if Lagos state was a country, it would be the fifth-largest economy in Africa. [7] Lagos, Nigeria is not the Federal Capital Territory, but it is popularly tagged as the Business/Economic Capital of Nigeria as it is home to various enterprises, investors and headquarters of multinationals/conglomerates. The search for employment and source of living is one of the reasons for its high population density, as there is a constant inflow of citizens from other states. It is obvious that a continuous or an extended lockdown of the state will largely impact the economy negatively. On the other hand, Lagos state is at high risk of a surge in the number of COVID-19 cases once the lockdown is eased due to its population and business activities. A surge in the number of cases could result in repeated lockdowns and an unpalatable cycle that can negatively affect public health and the economy.

The phrase "the new normal" has become popular in the social media space; companies and business owners have been advised to embrace it to adapt and survive the COVID-19 crisis.

The question is: How can Lagos State flatten the curve while economic activities take place?

This project will involve the use of location data of the twenty (20) LGAs in Lagos state and their COVID-19 distribution to identify venues that require strict focus in terms of public health measures to curb the spread. The idea is to curb the spread of COVID-19 in the most common venues in the LGAs as economic activities resume.

AIM: This project aims to develop strategies based on location data analysis, to reduce the spread of the COVID-19 virus in Lagos state as economic activities resume.

OBJECTIVES: The objectives of this project are as follows:

1. Identification of Lagos state Local Government Areas (LGAs) most affected by the COVID-19 virus.
2. Exploration of location data of LGAs with the highest COVID-19 cases using Foursquare API.
3. Segmenting and clustering of LGAs to identify defining features concerning COVID -19 spread by leveraging on Foursquare location data.
4. Development of strategies to reduce the spread of the virus based on the result of the analysis.

1.3 JUSTIFICATION

The COVID-19 pandemic has been established as a threat to both the economy of Lagos state and the health of its populace. A lot of people are scared of death from the virus or its negative impact on their income. As a Biostatistician and Public Health Data Scientist, I am worried about the possibility of a surge in the number of COVID-19 cases in the state when the lockdown is relaxed on 04 May 2020, as stipulated by the Federal Government. However, I also understand that the state cannot afford an economic shutdown as the economy already had challenges pre-COVID 19. An economic shutdown would not only affect the Lagos state economy but also Nigeria's economy at large. The need to devise strategies to flatten the curve without gross negative impact on the economy cannot be overemphasized. I believe without a doubt that this is the solution Lagos state needs at the moment.

1.4 TARGET AUDIENCE

The target audience for this report includes the following:

1. **The Lagos State Government:** This report would be beneficial for decision-makers in the areas of health and commerce in Lagos state. These decision-makers include the Governor of the state, Lagos State Ministry of Health, Lagos State Ministry of Commerce and Industry and Lagos state Ministry of Finance. The recommendations of this report will be useful to them as they strategize together to flatten the curve and keep the economy thriving.
2. **NCDC and Federal Government:** The NCDC and the Federal Government must work with the Lagos state government in strategizing and implementing solutions that would help flatten the curve and protect the economy.
3. **Chief Executives and Business Owners:** Decision makers of companies, conglomerates, multinationals, banks, entrepreneurs need to understand how they can protect their staff, customers and businesses. The analysis using location data would help to identify venues especially business locations that require strict social distancing measures. This report might help some businesses decide to adapt their business to work without a physical location. Ignoring the public health measures for the sake of profit is counterproductive as increased outbreak would only result in

repeated lockdowns. This category needs all the information they can get to balance it all, part of which they will get from this report.

4. **Lagos State Residents:** A COVID-19 LGA analysis based on location data will be beneficial to residents of the states as it can guide them on venues to avoid or venues where they have to take extra caution.

5. **Data Scientist and Public Health Scientists:** This report will be informative for upcoming data scientists, data scientists and public health professionals interested in learning how to solve problems with Data Science.

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