COVID–19 Impacts: Government Interventions and Residential Housing Prices in Lagos Metropolis

Victor Ilechukwu[1]

Abstract

The outbreak of the COVID-19 pandemic had profound impact on global economies. Various studies have focused on the impact of COVID-19 interventions on the financial market such as stocks markets, but few studies examined government interventions influence on housing market, particularly the housing price. This paper explores the influence of the government interventions during COVID-19 on housing prices in the residential areas of Lagos Metropolis in Nigeria. The aim is to understand whether price variations can be attributed to the epidemic shocks, by employing a review of literature on government interventions for COVID 19 pandemic and housing prices (2009 & 2015) before the pandemic and 2020 Lagos Property Market Consensus Report during the pandemic. Descriptive statistics were deployed in the application of difference-in-difference method for data analysis. The findings revealed that a lesser percentage of housing price increase was associated with the decrease in the number of COVID-19 cases and less partial lockdown measures. While a higher percentage housing price increase was associated with an increase in the number of COVID-19 cases along with more stringent full lockdown measures. The study concluded that housing price change was influenced by government interventions during COVID-19 pandemic in the Lagos Metropolis. The study recommends that to reduce the spread of COVID-19 infections in order to ensure a lesser percentage increase in housing price, spacious and more affordable housing units should be encouraged. Therefore, the effectiveness of lockdown and restriction measures should be further assessed, given their impacts on individual liberties and housing affordability.

Keywords: COVID-19 cases, difference-in-difference, government interventions, housing prices, Lagos Metropolis

[1]Department of Urban and Regional Planning, University of Lagos, Nigeria

*Corresponding author's email: vilechukwu@unilag.edu.ng

Received on November 9th, 2023/Accepted on December 29th, 2023

Ghana Journal of Geography Vol. 16 (1), 2024 pages 221-255

Doi: https://dx.doi.org/10.4314/gjg.v16i1.8

Introduction

The ubiquitous unfolding of COVID-19 in early 2020 later resulted in the pandemic being declared as a worldwide health emergency on 30 January 2020. According to the Nigerian Center for Disease Control (NCDC) (2020), as of July 18th, 2022, the total number of confirmed cases was 259,485 out of which were 3,146 deaths and 253,037 recovered or discharged. Also, the Presidential Task Force (PTF) on COVID-19 and Punch Newspaper report of June 1, 2020 showed that 20 Local Government Areas (LGAs) accounted for 60% of COVID-19 cases in Nigeria and eleven of those LGAs are in Lagos State, namely Mainland (1274 cases), Mushin (458), Eti-Osa (403), Alimosho (239), Kosofe (175), Ikeja (168), Oshodi/Isolo (132), Apapa (131), Amuwo-Odofin (129), Lagos Island (111) and Surulere (110). Generally, in Lagos State, there were 102,008 confirmed cases out of which were 771 deaths, and 100,582 recovered or discharged in July, 2022 (NCDC, 2022). In all, COVID–19 has had a destructive impact not only on global healthcare systems, but also, on all components of society, along with housing or real property development (Nicola et al., 2020).

In order to deal with the effect of this pandemic, numerous governments of the world, including African nations, adopted a range of interventions or measures including non-pharmaceutical interventions that comprised testing, contact tracing, isolation and treatment; containment measures to enforce hygienic practices including hand-washing, observation of social/physical distancing, use of face masks, travel restrictions; full and partial lockdowns that involved banning of public gatherings, closure of open markets and micro small and medium scale businesses due to their characteristics, and restriction of inter-state movements (Adebayo et al., 2022; Ndinda et al., 2021). These measures resulted in diverse levels of risk factors, shocks or impacts on national economies (Anenberg & Scharlemann, 2021).

Past studies have used interventions in risk factors like terrorism (Abadie and Dermisi, 2008; Arbel et al., 2010; Mills, 2002), violence (Besley and Mueller, 2012), earthquakes (Deng et al., 2015) and nuclear accidents (Zhu et al., 2016), to examine the events' impacts on housing price. Most research on the recent risk factor of the COVID–19 pandemics has explained the effect of the pandemic on the financial market, which includes shares or the stock market (Baek et al., 2020; Gormsen and Koijen, 2020; Just and Echaust, 2020), but there are few or no studies on the effect of the COVID – 19 pandemic's interventions on the housing market generally, and housing price in particular, in terms of supply and demand implications. As cited in the study by Francke and Korevaar (2021) in United Kingdom, the impact of the COVID-19 pandemic or government interventions on housing markets is a rather unexplored area, and more specifically there is a lack of research linking COVID-19 and housing prices in Nigeria. Consequently, this paper examined the impacts of government interventions to COVID-19 on housing price. As such, the research questions that this work seeks to answer were: how did housing price respond to government interventions during the pandemic? Were there variations in house pricing performance in relation to the localities due to the COVID-19 interventions or measures? Therefore, the objectives of the study were to examine: house prices before and during the pandemic; government interventions to the pandemic; and if the house price changes can be explained by the interventions.

Housing price is the price money paid monthly/annually per room or floor space of a house, which is a fixed commodity whose resultant market price is not only determined by its location, but by variety of other factors including risk factors, (Ilechukwu, 2012). In general, assessing the influence of government interventions to the epidemic on housing price is difficult due to lack of data (Francke and Korevaar, 2021). The study is of the opinion that in theory, most urban

economists have studied the locational value of property ignoring non-locational factors like the pandemic, whose lockdown orders alter property purchasing behaviors by disrupting the livelihoods and search process of property buyers and subsequently lengthen sale competition or price increase. Hence, the focus of the study is to examine the extent to which the housing prices variations before and during the pandemics are influenced by the government intervention measures. The practical knowledge expectation is the need to reassess the measures to ensure individual liberties and the ability to pay for housing.

Literature Review

COVID-19 Cases and Government Interventions

The Coronavirus (COVID-19) pandemic emerged for the first time in China in the highly populated Hubei province in animal market of Wuhan in December 2019, escalating in 2020 to affect almost the entire world community (Biswasa et al., 2020). Visitors to the market contracted the disease and also infected their contacts, thus leading to the realization that the virus was transmitted from person-to-person. The person–to–person transmission is through the eyes, nose, and mouth, via droplets from coughs and sneezes, close contact with an infected person and contaminated surfaces (Olapegba et al., 2020). With these transmission channels, the virus spread to almost the entire world. The United Kingdom, Ireland, Portugal, France and Germany in February/March 2021 demonstrated enhanced transmissibility, a longer duration of acute infection, a higher hospitalization rate, and probably, a higher infection fatality rate (Davies et al., 2021). In the United States, the worldwide pandemic of COVID-19) caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) resulted in 103,436,829 confirmed cases with 1,144,877 all-time deaths, the most of any country, and the 20th-highest per capita worldwide (Ritchie et al., 2022).

The COVID-19 pandemic was confirmed to have spread to Africa on 14 February 2020, with the first confirmed case announced in Egypt. The first confirmed case in sub-Saharan Africa was announced in Nigeria at the end of February 2020. Within three months, the virus had spread throughout the continent, as Lesotho, the last African sovereign state to have remained free of the virus, reported a case on 13 May 2020. By 26 May 2020, it appeared that most African countries were experiencing community transmission, although testing capacity was limited. Most of the identified imported cases arrived from Europe and the United States rather than from China where the virus originated (Maclean, 2020). There were high rates of infections and deaths in Africa, and Nigeria specifically, as a result of the outbreak and spread of coronavirus disease (COVID–19). Nigeria's COVID-19 index case was recorded on Feb 27, 2020 in Lagos from an Italian citizen on travel to Nigeria with a total of 216 contacts linked to the index case (Nigerian Center for Disease Control (NCDC), 2020)) and since then, the disease spread. The total number of confirmed cases was 259,485 out of which there are 3,146 deaths and 253,037 recovered or discharged cases, as of July 18th, 2022 (NCDC, 2020). Nigeria had over 21% of deaths but approximately 70% of recoveries in Africa (NCDE, 2020). In Lagos State alone, there were 102,008 confirmed cases out of which were 771 deaths and 100,582 recovery or discharged cases in July, 2022 (NCDC, 2022). However, there was fear of a fifth wave of COVID-19, with 1,332 cases recorded in one week. The affected regions were Lagos, Rivers and Kano states as well as the Federal Capital Territory (FCT), Abuja (Sunday Punch, 2022).

The disease, which was eventually confirmed by the World Health Organization (WHO), prompted governments all over the world to formulate measures on how to contain the virus. In Africa, the measures included testing, contact tracing, isolation and treatment; containment

measures, hand-washing to enforce hygienic practices, observation of social/physical distancing, use of nose mask, and travel restrictions; lockdowns and banning of public gatherings, closure of open markets, micro small and medium scale businesses, that are mainly informal economic activities, and intra & inter-state movements restrictions (Kihato and Landau, 2020). In South Africa, the lockdown forced everybody to stay at homes (except essential service workers), banned all social gatherings, enforced a mandatory quarantine of at least 14 days for people already infected, and social distancing of 1.2 meters between two people (Ramaphosa, 2020); and citizens were mandated to regularly wash their hands and wear face masks in public places as precautionary measures. In Kenya, the containment measures announced by the government in March 2020, included a raft of measures such as curfews, locking off high risk counties (where infection rates were high), mandatory wearing of masks, sanitizing of hands, social distancing, restricted movements, banned public gatherings which resulted in closure of learning institutions, businesses, churches, eateries amongst many others (Wanjau, 2022).

Mostly, Adebayo et al. (2022) and Ndinda et al. (2021) have explained the measures that African countries employed to contain the spread of COVID-19. In Nigeria, additional social and economic measures were put in place to cushion the impact of COVID-19 (Dixit et al., 2020; NCDC, 2020). The Federal and State governments, non-governmental organizations (NGOs), religious bodies and well-meaning individuals contributed funds for social welfare and palliatives (majorly food stuffs) to lessen the burden associated with the pandemic (Ayo-Lawal et al., 2022). This was due to the massive effects of the lockdown measure which brought about the distribution of food rations, food vouchers, conditional cash transfers, and support targeted at the vulnerable groups in society (Human Rights Watch, 2020). Non-pharmaceuticals included increased testing capability through the use of on-line platforms to fast-track test outcomes. The

government waived import duties on medical equipment, medicines and safety devices for the treatment of COVID-19. Isolation facilities were also expanded (Maruf et al., 2022). The government-imposed restrictions on movement to control the spread of the pandemic.

Nevertheless, little or nothing is known about the impact of the implementation of government interventions on house prices, and the implications of this on the ability to pay for housing. Therefore, despite the various laudable interventions, there were challenges in the housing market in terms of supply and demand and housing affordability. Also, it is noteworthy that a significant proportion of Nigerian workers are employed in the informal sector (like housing construction) of different cities, whose survival depends on daily earnings from outside the home, with these being factors that inevitably necessitate constant and regular movement and interactions (Duerksen, 2020). Under these emergency disease conditions, businesses like housing construction, were forced to shut down without alternative plans, while the large informal workforce, consisting of street vendors, petty traders, artisans, cart pushers, waste pickers, commercial motorcycle opera-tors, roadside motor mechanics among others, who were deprived of their income were rendered vulnerable, even to afford house which was in short supply (Federal Government of Nigeria, 2020).

Epidemics, COVID–19 Pandemic Interventions and House Price

Few studies have evaluated the effects of epidemic risks, including COVID-19, on the real estate market or housing markets. Various studies have, however, examined the effects of natural disasters on house prices (Apergis, 2021; Bosker et al., 2019; Hallstrom & Smith, 2005; Mueller et al., 2009; Smith et al., 2006; Zhang & Peacock, 2009). The studies showed that the marked differences in the behavior of buyers and sellers, willingness to pay premiums and discounts, were partly attributed to disasters and a consequence or combination of local economic and

demographic factors characterized by socio-economic status, and driven by the different financial capacities of homebuyers.

In terms of epidemics, Francke and Korevaar (2021) reviewed evidence from historic pandemic outbreaks from the 17th-century plague in Amsterdam and 19th century cholera outbreak in Paris. Using micro-level transaction data, Francke and Korevaar (2021) found that both outbreaks resulted in sizeable declines in house prices between 10% and 13%, particularly in the short-term. During the SARs epidemic in the early 2000s in Hong Kong, Wong (2008) found that house prices declined up to 3% and 1.6% on average, with housing market characteristics limiting any real price shock. This finding was consistent with findings by Argyroudis and Siokis (2019) who found that the underlying structure of the housing market was impacted by pandemics like the SARS epidemic. Wang (2021) explored the effect of COVID-19 on house prices across five regions in the US during the lockdowns by applying difference-in-differences method and found that four regions displayed house price increase due to stronger housing market fundamentals, better amenities, and less dependence on service industries.

Government intervention measures like the social distancing implies more space demand in housing units, which means that households are expected to increase living units with its cost implications. Duca et al. (2021) contended that this behavioral factor of more space demand is responsible for house price increases, especially among the wealthier households. Such more space demand factor as a result of COVID-19 lockdown was supported by Ouazad (2020), who averred that within metropolitan areas, housing prices increased more rapidly than in less dense localities and in neighborhoods further away from urban centers. Cheshire et al. (2021) observed that housing supply in the United Kingdom fell by 65% when compared with corresponding trends in the year before the pandemic mainly due to a reduction in construction activity as a

result of movement restrictions or lockdowns, which were associated with house price increase because of the increase in demand and a decline in supply. Housing prices variations due to government interventions like in COVID 19 pandemic have a lot of challenges to resolve. This is because such an intervention requires the actions of all aspects of society and it cannot take place without linkages and interactions between physical, institutional, economic and social structures.

Urban economists have long studied the locational value of properties, pioneered by Von Thunen (1826) and modernized by Alonso (1964) through bid-rent curve analysis. Since then, many studies have emerged in urban spatial models' predictability by applying hedonic regressions and repeat sales methods. These studies showed that the prices of housing decrease away from the city center or central business district, CBD (Alonso, 1964; Mills, 1967; Muth, 1969). However, in the hedonic regression analysis, other studies have added non-distance variables like COVID-19 pandemic and concluded that house prices are found to be significantly affected. In theory, lockdown orders should inevitably disrupt the search processes of property buyers and subsequently lengthen sale completions, leading to variations in house price (Alexander and Kargr, 2020; Koren and Peto, 2020). The hedonic pricing and the price gradient models suggest that there was, respectively, a 4.8% and a 5.0–7.0% year-on-year fall in house prices immediately after the pandemic outbreak in Wuhan, China (Cheung et al., 2021). However, in contrast to this theoretical belief, house prices have surged upwards in almost all countries. For example, Knight Frank's (2020) Global House Price Index model revealed that, even though most countries faced unprecedented economic devastation, 91.1% of the 56 sampled countries recorded house price increases year-on year in the second quarter of 2020. A commonly accepted explanation is that synchronized countercyclical measures, such as interest

rate cuts by various central banks, lockdowns, have disguised the real impacts of COVID-19 on house prices. In explaining this theoretical belief of house price increase, Tanrıvermi (2020) observed that the global supply chain disruptions due to COVID-19 measures, have significantly reduced housing construction schedules, increased operation costs, and adversely affected the return rates of the real estate sector in Turkey. Even, Yang and Zhou (2021) suggested a positive impact of COVID-19 on housing prices in the second and third tier cities in China, using the average selling price of commercial housing within the city level. Further theoretical explanations in the literature showed that COVID-19 impacts and measures have both positive and negative impacts on housing market. For instance, Verma and Husain (2020) in assessing the lockdown, which made people spend more time at home during the pandemic, observed that the Canadian cities with proximity to large urban centres witnessed a rise in housing prices. In terms of reported cases, Arcaya et al. (2020) reported that housing value increases with increasing COVID-19 cases because of housing displacement pressure due to the pandemic. However, a research work conducted by Del Giudice et al. (2020) on short and mid-term effects of COVID-19 on housing prices in the Campania region of Italy indicates a drop of 4.16% in the short-run and 6.49% in the mid-term between late 2020 and early 2021 as a result of the global pandemic. Similarly, another study by Hu et al. (2021) on COVID-19 and housing prices of Australian cities revealed that every doubling of newly confirmed COVID-19 cases, it results in dropping of housing prices by 0.35% to 1.26% annually.

Within the COVID-19 intervention studies, there have been mixed findings regarding the impact on house prices. Some studies have pointed to house price increases and a few to house price decreases. These mixed findings suggest that housing price differentials can be explained by the COVID-19 pandemic and associated measures. This paper examined the influence of the

COVID-19 interventions on house prices in Lagos, to establish whether the arguably altered housing market structures by the COVID-19 pandemic and the realignment of house prices revealed by the literature review are discernible in the Lagos metropolis.

Study Area, Methods and Data

Study Area

The study area is the Lagos Metropolis which consists of 16 Local government areas in Lagos State as shown in Fig. 1. The study adopted the method used by the Lagos State Branch of the Nigerian Institution of Estate Surveyors and Valuers (2020) in Lagos Property Market Consensus Report of using the 7 zones in Lagos Metropolis categorized under Island and Mainland, as shown in fig. 2, to collect data on house or property prices. The 7 zones consist of neighbourhoods selected from the 16 Local Government Areas (LGAs) that make up Lagos Metropolis. In the adopted method, 30 neighbourhoods from the 7 zones were randomly selected for data collection.

Reporting the method used by the Nigerian Institution of Estate Surveyors and Valuers, the Island zone 1 is mainly the Lagos Island Local Government Area while Island zones 2 & 3 constitute the Eti-Osa Local Government Area. The Local Government Areas (LGAs) in Mainland zone 1 are Surulere, Mushin, Lagos Mainland and Shomolu. The Mainland zone 2 consists of Amuwo Odofin, Ajeromi/Ifelodun, Ojo, Oshodi/Isolo and Apapa while Ikeja, Agege and Alimosho LGAs are in Mainland zone 3. Finally, Mainland zone 4 consists of Kosofe and Ifako/Ijaye LGAs.

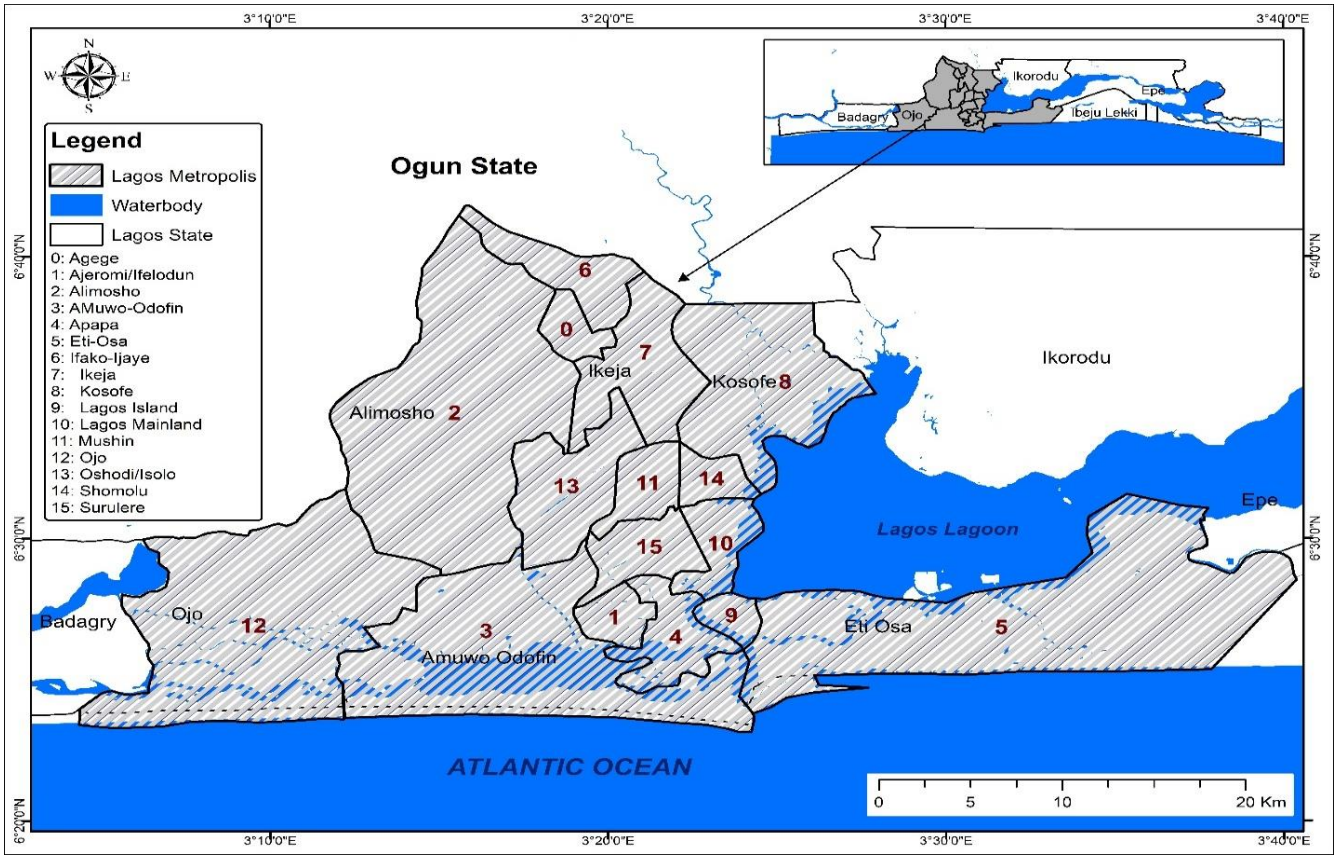

Fig.1: The sixteen metropolitan local government areas (0 – 15) in Lagos State

Source: Lagos State Ministry of Physical Planning and Urban Development, 2014

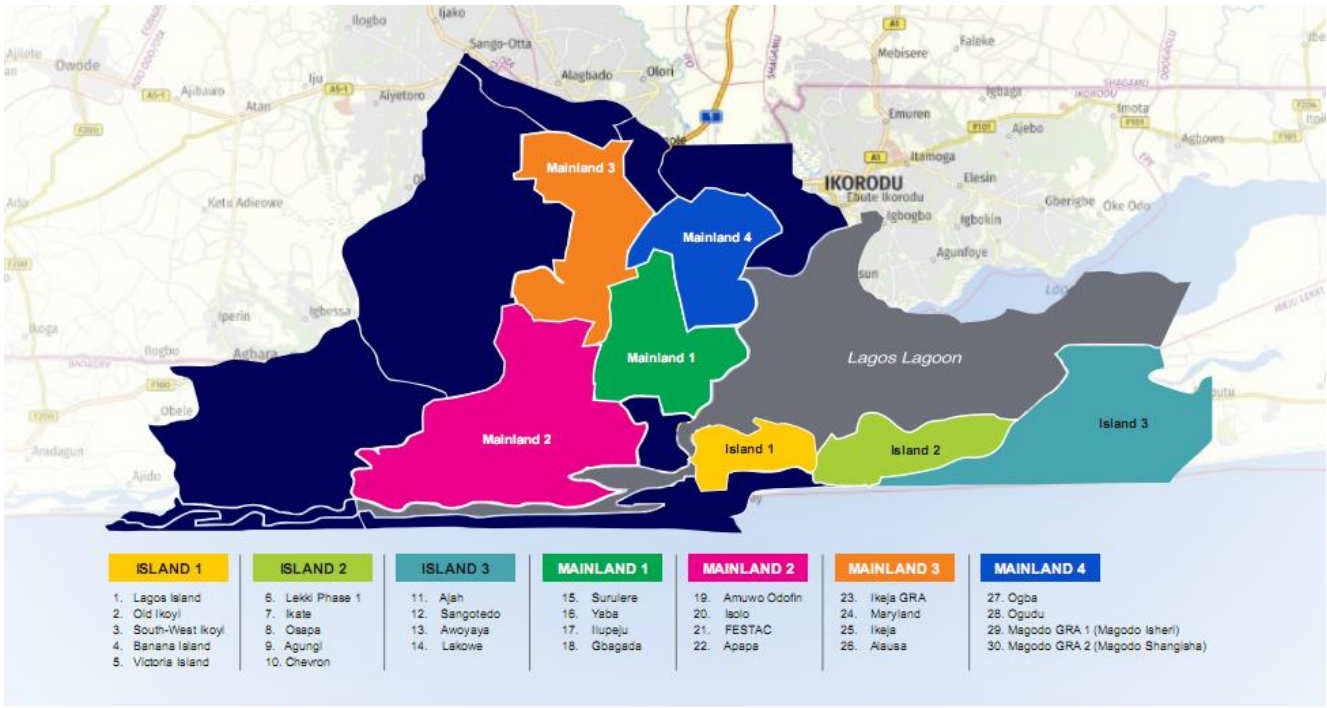

Fig.2: Map of Lagos State Showing the Zones of the Study in Lagos Metropolis

Source: Lagos Property Market Consensus Report, 2020

Methods

Two sets of data on house prices from the literature were used. First set was data on house prices during the COVID-19 pandemic from January – June, 2020 (courtesy of Lagos Property Market Consensus Report, 2020); and the second set was house prices before COVID-19 in 2009 & 2015, compiled by Pison Housing Company and Lamudi Barometer respectively. In addition, the narratives on government interventions in the COVID-19 pandemic in Lagos Metropolis were presented, to unpack whether the extant prices were due to the government interventions. To explain this, descriptive tools such as means and percentages were adopted in the application of the difference-in-differences method of analysis of the data used.

To analyze the outcome of house prices where the interventions had taken place and before the intervention, difference-in-difference method was adopted. Difference-in-differences is an analytical approach that facilitates causal inference and it considers the before-after difference in the outcomes of the treatment and control groups, to make decision (Wooldridge, 2002; Stock and Watson, 2011). In this study, the approach was adopted in the policy interventions analysis for estimating their impacts on housing prices. Interventions such as lockdown and social distancing were considered to understand their crucial impacts on house prices. The fact that Lagos State government implement these intervention across place and time strongly suggests a difference – in- difference design for estimating the casual effects in the context of COVID-19. In this case, the Difference-in- Difference design compares changes in COVID-19 related outcomes like in the house prices outcome before and after the intervention measure takes effect in the selected metropolitan areas of the State. House prices before the introduction of COVID-19 intervention measures were seen as control price group, which is the first difference, while the house prices during the implementation of the COVID-19 intervention measures were the treatment price group, which is the second difference. Then the differences in the outcome from both groups were examined and the interventions were considered to have the necessary impact if differences in outcomes between the treatment price group and control price group were significant.

The Difference-in-Difference (DD) estimate was expressed in percentage price increase per year between the two groups and mathematically illustrated as

DD estimate = $Y^1_{zim} - Y^2_{zim!}$

The subscripts (zim and zim!) denote the zones in Inland and Mainland areas of Metropolitan Lagos during the implementation of the intervention measures and before the implementation

respectively, where the houses were located while the superscripts (Y^1 and Y^2) are the house prices in the zones during the implementation from January to June, 2020 and before the implementation between 2009 and 2015, respectively. The results were descriptively presented.

Data

Housing Prices during the COVID-19 pandemic in 2020

Secondary data on housing prices during COVID-19 was obtained from the Lagos Property Market Consensus Report (January – June 2020) of average property values across various locations in Lagos State, published by the Lagos State Branch of the Nigerian Institution of Estate Surveyors and Valuers. The data covered 30 major neighbourhoods/locations in all the LGAs in Lagos Metropolis, categorized under seven (7) zones (as shown in Table 1), which consist of 3 zones in Island and 4 zones in Mainland. The data used were provided by the survey conducted by 14 Fellows of the Institution (FNIVS), 86 Associate members (ANIVS) and 78 Probationers/Graduates intending members. A controlled consensus survey was adapted to ascertain the average property values per location. The values are based on the exchange rate of One United States Dollar (1$) to 905.10 Nigerian Naira as at 27th December, 2023.

Table 1: Average Annual Residential Housing Rental and Sale Prices in Lagos, 2020

Zones	Neighbourhoods	Rental (in $ per year)		Sale (in $)	
		3 – Bed Flat	4 – Bed Flat	3 – Bed Flat	4 – Bed Flat
Island 1	Lagos Island, Old Ikoyi, S/West Ikoyi, Banana Island, Victoria Island	6,454	12,250	118,976	266,019
Island 2	Lekki Phase 1, Ikate, Osapa, Agungi & Chevron	2,960	4,094	48,750	85,042
Island 3	Ajah, Sangotedo, Awoyaya & Lakowe	932	1,625	23,540	37,753
Mainland 1	Surulere, Yaba, Ilupeju & Gbagada	1,622	2,943	37,216	65,179
Mainland 2	Amuwo Odofin, Isolo, Festac, Apapa	1,362	2,147	26,518	65,093
Mainland 3	Ikeja GRA, Maryland, Ikeja & Alausa	2,498	4,348	55,526	114,235
Mainland 4	Ogba, Ogudu, Magodo GRA 1 (Isheri) & Magodo GRA 2 (Shangisha)	1,365	2,303	48,538	63,930

Source: Lagos Property Market Consensus Report, 2020

From Table 1, data were gathered on the average rentals paid per annum for 3-bedroom and 4-bedroom rental houses and their sale prices, in the various zones as mentioned. For the rental housing price of 3 – bedroom flat, Island zone 1 recorded the highest value, followed by Mainland zone 3 and Island zone 2, during the COVID – 19 lockdowns. The same trend is observed in the rental housing price of 4 – bed room flat. This rental price trend is replicated in the sale prices in the zones with Island zone 1 having the highest values for both 3 – bed and 4 – bed flats followed by Mainland zone 3 and Island zone 2, during the COVID – 19 lockdowns. These average prices were derived from the prices obtained in various neighbourhoods in each

zone. The consensus pricing data from each neighbourhood of the zones are presented in Tables 2 & 3

Table 2: Housing Rental Prices and Sales in Island zone 1, 2 & 3 Neighbourhoods, 2020

Zones	Neighbourhoods	Rental (in $ per year)		Sale (in $)	
		3 – Bed Flat	4 – Bed Flat	3 – Bed Flat	4 – Bed Flat
Island 1	Lagos Island	2,534	3,967	59,846	116,022
	Old Ikoyi	7,513	17,033	136,311	285,874
	S/West Ikoyi	5,056	9,328	104,798	205,778
	Banana Island	10,996	18,757	178,528	447,755
	Victoria Island	6,173	12,166	115,395	274,678
Island 2	Lekki Phase 1	3,662	5,012	81,008	155,272
	Ikate	2,905	3,904	44,534	72,184
	Osapa	2,719	3,924	40,816	71,971
	Agungi	2,515	3,570	37,512	60,413
	Chevron	3,000	4,059	39,881	65,370
Island 3	Ajah	1,317	2,228	29,647	50,271
	Sangotedo	1,040	1,851	25,412	39,192
	Awoyaya	750	1,235	21,766	33,346
	Lakowe	619	1,185	17,336	28,204

Source: Lagos Property Market Consensus Report, 2020

As seen from Table 2, the consensus housing pricing in the neighbourhoods in Island zone 1 showed that Banana Island commanded the highest value across all property categories, both for rental and sale during the COVID 19 lockdown. This is followed by Old Ikoyi, Victoria Island and S/West Ikoyi, while Lagos Island commanded the lowest value in house prices across all property categories in the zone, during the Covid 19 pandemic.

Data from Island zone 2 reflected in Table 2, showed that Lekki Phase 1 commanded the highest values both for housing rental and sale for all property types during the COVID 19 lockdown,

followed by Ikate, because of its close proximity to Lekki Phase 1, Osapa, Chevron, and Agungi neighbourhoods.

In Island zone 3, Ajah has the highest values followed by Sangotedo. Awoyaya and Lakowe, during the pandemic.

Table 3: Housing Rental Prices and Sales in Mainland zones 1, 2, 3 & 4 Neighbourhoods

Zones	Neighbourhoods	Rental (in $ per year)		Sale (in $)	
		3 – Bed Flat	4 – Bed Flat	3 – Bed Flat	4 – Bed Flat
Mainland 1	Surulere	1,623	2,759	33,145	56,384
	Yaba	1,443	2,678	34,668	59,613
	Ilupeju	1,801	3,236	43,535	75,803
	Gbagada	1,620	3,100	37,513	57,867
Mainland 2	Amuwo Odofin	1,112	1,797	24,228	63,371
	Isolo	965	1,446	19,935	37,881
	Festac	1,036	1,900	24,030	61.973
	Apapa	2,334	3,446	37,881	96,932
Mainland 3	Ikeja GRA	3,754	6,587	76,748	175,493
	Maryland	2,283	3,648	48,391	88,563
	Ikeja	1,897	3,629	47,143	100,317
	Alausa	2,060	3,529	49,823	92,568
Mainland 4	Ogba	835	1,698	26,740	42,945
	Ogudu	1,239	2,159	55,321	54,339
	MagodoGRA1(Isheri)	1,475	2,455	48,824	72,473
	Magodo GRA 2 (Shangisha)	1,912	2,899	63,266	85,962

Source: Lagos Property Market Consensus Report, 2020

As reflected in Table 3, responses in Mainland zone 1 showed that Ilupeju had the highest rental and sale values, followed by Gbagada, Yaba and Surulere locations during the pandemic. In Mainland zone 2, Apapa recorded the highest rental and sale values during the COVID 19

lockdown, followed by Amuwo Odofin, Festac and then Isolo with the lowest rental and sale values in the zone.

In Mainland zone 3, Ikeja GRA had the highest rental and sale values during the pandemic, followed by Maryland, Alausa and Ikeja with least value. Finally, in Mainland zone 4, Magodo GRA 2 (Shangisha) had the highest rental and sale values during the pandemic, followed by Magodo GRA 1 (Isheri), Ogudu and Ogba, which command the lowest rental and sale values.

These variations in housing pricing were witnessed in the face of the enforcement of the government interventions such as the lockdowns, social distancing in the wake of the rising number of COVID 19 cases. This situation prompted the need to examine the contribution of the COVID-19 interventions measures to the variations in housing prices in the study area. To be able to explain this, housing prices in 2009 and 2015 before COVID-19 were examined.

Housing Prices before COVID-19 in 2009 & 2015

Available data on housing prices for 3-bedroom flats in Lagos metropolis were obtained from the neighborhoods in the Local Government Areas (LGAs), which were later categorized into the 7 zones for the purpose of this study. Housing prices from the LGAs in 2009 were obtained by the Pison Housing Company while the 2015 housing prices, also in the LGAs, were recorded by the Lamudi Barometer. The choice of these periods for the study is partly because of their availability and partly to examine the influence of government interventions on housing prices with the advent of COVID-19. Table 4 shows the average annual housing prices for a 3-bedroom flat in 2009 and 2015 in the selected neighborhoods of the LGAs, according to the classified zones. The prices were based on the zones characteristics as discussed in Tables 2 & 3.

Table 4: Average Annual Housing Prices (3-bedroom flat) in 2009 and 2015 in the selected Neighbourhoods

Zones	Selected Neighbourhoods	Year 2009	Year 2015	% Price increase per year
		Ave.Price/3 Bedroom ($)	Ave.Price/3 Bedroom ($)	
Island 1	Lagos Island Victoria Island Ikoyi	1,897	2,105	1.84
Island 2	Lekki	586	804	6.23
Island 3	Aja	171	348	17.21
Mainland 1	Yaba Surulere Gbagada	276	470	11.69
Mainland 2	Apapa Festac Isolo	460	611	5.47
Mainland 3	Ikeja Maryland	608	842	6.43
Mainland 4	Ogba Ogudu Magodo	497	829	11.11

Source: Pison Housing Company (2009), Lamudi Barometer (2015)

As shown in Table 4, the average rental housing price of a 3 – bedroom in 2009 was the highest flat in Island zone 1 before COVID-19 lockdown or interventions, followed by Mainland zone 3 and Island zone 2. Others in the order of decreasing value before the interventions include Mainland zone 4, Mainland zone 2 and Mainland zone 1 while Island zone 3 is the least. Specifically, the average highest rental housing prices were observed in Victoria Island, Ikoyi and Lagos Island communities before the interventions. This is followed by Ikeja, Maryland, Lekki, Ogba, Ogudu, Magodo, Apapa, Festac and Isolo. Others are Yaba, Surulere, Gbagada and Aja.

After about 6 years in 2015, the same trend is observed in the increasing rental housing price of 3-bedroom flats in the zones as shown in Table 4. Island zone 1, which consists of Victoria Island, Ikoyi and Lagos Island has 1.84 % price increase per year from 2009 to 2015. Island zone 2, specifically Lekki, had a 6.23% price increase per year and Island zone, which is mainly Aja, had a17.21% price increase per year.

In the Mainland zones, zone 1 consisting of Yaba, Surulere and Gbagada had a 11.69% price increase per year, while zone 2 comprising Apapa, Festac and Isolo had a 5.47% price increase per year. Zone 3 had 6.43% price increase per year from 2009 to 2015, especially in Ikeja and Maryland, while zone 4 which consists of Magodo, Ogudu and Ogba had a 11.11% price increase.

The trend in variations of the rental housing price from 2009 to 2015 is less than in the prices obtained in 2020 during the COVID 19 interventions. Hence, the need to examine these the housing prices before and during the COVID-19 cases in the context of number of cases and the interventions to see the extent of variations in the prices.

Characteristics of the Zones

Data on the characteristics or attributes of the zones such as housing provision and demand as well as COVID 19 cases and government interventions, which could influence the housing rental or sale prices were obtained from past urban studies in Lagos Metropolis.

Housing Provision and Demand

There have been various efforts by Lagos State Government to provide decent housing for people, but the efforts are short of expectations, resulting in the demand outstripping the supply, which leads to house price increases, irrespective of the characteristics or status of the area. For instance, according to Oshodi/Isolo Model City Plan (2016), 4,502 housing units were developed

by the Lagos Executive Development Board (LEDB) between 1955 – 1972, and 20,120 housing units between 1972 and 1999 by the Lagos State Development and Property Corporation (LSDPC). Since then, government has adopted several strategies to increase these units for a State that requires an average of 500,000 housing units per annum, to bridge the deficit of an estimated 5 million houses. Corroborating this, Oyalowo (2022) observes that 77% of the current population of about 28 million people in Lagos, do not have access to adequate housing, which translates to a 3 million house deficit at an average of 7 households per house. This situation has implications for the housing market, especially in respect of housing pricing, because if there is more demand than supply, prices go up, as the case in the Lagos Metropolis.

COVID-19 Cases and Government Interventions in Lagos Metropolis

Based on this information, the LGAs are grouped into the 7 zones of the Island and Mainland areas of Lagos Metropolis to examine the number of COVID-19 cases and their interventions for a possible explanation of their impact on housing prices. According to the list released on May 2020 by the Lagos State Commissioner of Health, Lagos mainland LGA in Mainland zone 1 had the highest number of infections, followed by Eti-Osa LGA in Island zone 3, and others as shown in Table 5. The summary of the cases by zones showed that Mainland zone 1 had the highest number of cases, followed by Island zone 3, Mainland zones3, 2 and 4. The least number of cases were in Island zones 1 and 2 respectively. These cases are examined to see how their prevalence reflected in the housing prices observed in these zones in 2020, along with the examination of the government interventions in the pandemic.

Table 5: List of Number of COVID–19 Cases by LGA and Zones in Lagos Metropolis

Zones	LGAs	LGA Cases	Zone Cases
Island 1	Lagos Island	30	30
Island 2	Ibeju Lekki area	26	26
Island 3	Eti-Osa	200	200
Mainland 1	Surulere Lagos Mainland Mushin Shomolu	31 500 138 40	709
Mainland 2	Amuwo Odofin Oshodi/Isolo Ajeromi/Ifelodun Ojo Apapa	35 34 18 4 55	146
Mainland 3	Ikeja Alimosho Agege	73 69 13	155
Mainland 4	Kosofe Ifako/Ijaye	59 12	71
Total			1,337

Source: Lagos State Commissioner of Health, 2020.

Government interventions such as hand washing measures meant to ensure adequate hygiene practices require adequate water supply in houses, which is one of the facilities that determine housing quality and hence its price. To be able to observe social distancing of two meters, houses must be spacious enough, both in rooms and other indoor spaces, which has price implications. More importantly are the lockdown measures, which prevented people from going out to earn their livelihoods, which made it difficult for households to fulfill their responsibilities including rental and other payments for housing. In addition, the lockdown restricted business

activities, including the current policy of housing construction of 700,000 units per year in Nigeria, but end up constructing less than 100,000 units per year, thereby limiting housing supply and increasing housing deficits, which leads to high price demand.

Therefore, the findings from a holistic analysis of house prices between 2009 and 2020, the incidence of Covid-19 and the government interventions is presented to explain their influence on housing prices.

Findings and Discussions

On the basis of the data presented in Tables 1, 4 & 5 as well as the narratives of the zones' attributes and number of COVID-19 cases in certain zones, housing prices before and during the COVID-19 pandemic were compared in terms of the percentage price change to explain the differences. Table 6 shows that there was a steady increase in the housing prices in the zones of the metropolis, before and during the COVID-19 pandemic, which could be attributed to government interventions to the epidemics.

Table 6: Analysis of Housing Prices Before and During COVID-19 Cases in Lagos Metropolis

	Before COVID 19			During COVID 19		
Zones	Year 2009 Ave. 3-Bedrom Price ($)	Year 2015 Ave. 3-Bedrom Price ($)	% Price increase per year	No of COVID 19 Cases	Year 2020 Ave. 3-Bedrom Price ($)	% Price increase per year
Island 1	1,897	2,105	1.84	30	6,454	41.31
Island 2	586	804	6.23	26	2,960	53.61
Island 3	171	348	17.21	200	932	33.53
Mainland 1	276	470	11.69	709	1,622	49.03
Mainland 2	460	611	5.47	146	1,362	24.55
Mainland 3	608	842	6.43	155	2,498	39.35
Mainland 4	497	829	11.11	71	1,365	12.96

Source: Literature review and Content Analysis, 2022

Table 6 shows that there are variations in house prices before and during the COVID 19 pandemic, of which various intervention measures were put in place to contain it. Among these measures mostly used by the government in Lagos metropolis include movement restrictions and lockdown, social distancing and banning of gathering in public places, testing, contact tracing, isolation and treatment; hand washing to enforce hygienic practices, and use of face masks. In zones Island 1, 2 and Mainland 4, the cases were less than 100 but increasing number of cases were observed in other zones especially in Mainland 1 with 709 cases. Before COVID 19 cases, the housing prices were not as increased as during the COVID 19 cases due to government interventions measures, especially the lockdown measure. For instance, in Island zone 1, the housing price increased from 1.84% in 2015 to 41.31% in 2020, from 6.23% to 53.61% in Island

zone 2, and 17.21% to 33.53% in Island zone 3, while in the Mainland zones 1,2, 3, and 4 housing prices increased from 11.69% in 2015 to 49.03% in 2020, 5.47% to 24.55%, 6.43% to 39.35% and 11.11% to 12.96%, respectively. Corroborating these findings, Verma and Husain (2020) observed that the Canadian cities with proximity to large urban centres witnessed a rise in housing prices in the assessment of the lockdown, which made people spend more time at home during the pandemic. With respect to the number of cases, Arcaya et al. (2020) also reported that housing value increases with increasing COVID-19 cases. In this study, the price increase results were mixed, in the sense that some zones with fewer cases experienced a higher percentage housing price increase, which could be explained by the level of implementation of government interventions, mainly the lockdown and social distancing measures. This is because Table 6 indicates that percentage house price increase (53.61%) in Island zone 2 with fewer cases (26) is relatively higher than percentage housing price increase (49.03%) in Mainland 1 with higher number of cases (709). In other findings, Island 1 with fewer cases (30) is associated with higher percentage price increase than Island 3 cases (200), Mainland 1 cases (709), Mainland 2 cases (146), Mainland 3 cases (155) and Mainland 4 (71).

This scenario is further subjected to correlation analysis to determine the various strengths in the association as shown in Table 7. The correlation analysis presents that there is a significant relationship between percentage housing price increase and number of COVID 19 cases in Lagos Metropolis. These relationships were either positive or negative. For instance, in Island zones 1 and 2 percentage housing price increase respectively had -0.451 & -0.530 correlation coefficients, which is fairly significant negative relationship with number of cases at 0.05% level of significance. This implies that the housing price increase is associated with less number of COVID 19 cases. However, there are other positive relationship but with poor coefficient in

explaining that the percentage housing price increase is associated with higher number of COVID 19 cases as seen in Island zone 3 and Mainland 1.

Table 7: Correlates of Percentage Housing Price Increase and Number of COVID 19 Cases in Lagos Metropolis

		1	2	3	4	5	6	7	8
(1) %Price Increase	Correlation Coefficient	1							
(2) Island1 Case	Correlation Coefficient	-.451*	.1						
(3) Island2 Case	Correlation Coefficient	-.530*	.020	1					
(4) Island3 Case	Correlation Coefficient	.150*	.147	-.027	1				
(5) Mainland 1 Case	Correlation Coefficient	.361*	.038	.024	.086	1			
(6) Mainland 2 Case	Correlation Coefficient	-.108*	.046	-.252*	-.005	-.213*	1		
(7) Mainland 3 Case	Correlation Coefficient	-.115*	.038	.038	-.026	-.226*	-.165	1	
(8) Mainland 4 Case	Correlation coefficient	.124*	.019	.021	-.181	.070	-.078	.016	1

Correlation significant at * $p<0.05$

Therefore, the deduction from the analysis in Tables 6 & 7 is that a lesser percentage housing price increase was associated with a decrease in COVID-19 cases and less stringent lockdown measures while a higher percentage housing price increase was associated with an increase in number of COVID 19 cases along with more stringent full lockdown measures.

These findings were corroborated by various National Newspapers reports between March and June 2020 in Lagos State. The Guardian Newspaper of March 23rd, 2020, report on "How Coronavirus affect Nigeria's real estate, house prices" was presented by Chinedum Uwaegbulam. He reported that the property developers/owners, in their effort to comply with the non-pharmaceutical measures increased services in their houses such as adequate and regular water supply and private water closet toilets to improve hygiene, which forced them to increase house prices. This increase in prices made the houses unaffordable by the buyers or renters whose economic activities or sources of livelihoods were slowed or stopped due to lockdown measures; or who were in jobs but face uncertainty whether they would keep their jobs at all due to COVID 19 measures. Also, Business Day Newspaper of May 27, 2020 report on "Covid19 is yet to affect Nigeria's property value as price surge 5% in April" was presented by Okafor Endurance. He reported that the impact of the coronavirus pandemic is yet to rob off on the value of properties in Nigeria as prices increased by an average of 5 percent in April, two months after the virus was imported into the country. He further reported that the monthly data by Nigeria Property Centre (NPC), a Nigerian real estate company, showed that the prices of properties in major cities like Lagos and Abuja were either stable or on the increase since Nigeria reported its first Covid-19 case in February. Analysis of the data showed that a two-bedroom house that was sold in Lagos for $22,097 in March increased by 10 percent and was valued at $24,307 in April. Meanwhile, in February, the same property was put up for $20,440. For rent, the prices of two-bedroom apartments increased from $13,811 in March to $14,032 in April in Lagos. However, it is important to note that the market supply factor during COVID 19 restriction measures limit housing constructions or provision with effect on shortage whereby demand increases, thus influencing house price variations as observed.

Francke and Korevaar (2021) and Duca et al. (2021) illustrated that changes in housing price were ephemeral to major shocks from epidemics. This is also evident in this study's findings, which reveal increasing percentage housing price in the zones because of the intervention measures (lockdown) applied as a result of the increasing number of COVID-19 cases. However, other market forces like the attributes of the localities had some influence on the price increase. This is confirmed by Wang (2021) and Liu and Tang (2021), who argue that the difference in housing price increase in the wake of COVID-19 was heterogeneous across the housing types. This is true in this study in the case of the 3-bedroom flats observed, where the percentage price increase varied among the zones. This is also concomitant with the findings of Duca et al. (2021) who observed condominium pricing levels to decline in detached buildings in observing social distancing measure to COVID-19 pandemic.

Wang (2021) argued that differential pricing effects due to COVID-19 were notable across market areas due to stronger housing market fundamentals like space, amenities and income. Duca et al (2021) also noted that with better amenities, wealthier households prefer more space in peripheral or peri-urban areas, irrespective of the price. Findings in this study are similar to these past studies in that they show that price increase before COVID-19 were also due to attributes of the locales. This is corroborated by Liu and Tang (2021), Wang (2021), and Argyroudis and Siokis (2019), who argued that the structure of the housing market due to neighborhood and community characteristics assisted these price increases.

This study recognized the fact that underlying neighborhood determinants, particularly socio-economic profile of residents, during the COVID-19 pandemic could see such community witness increased prices due to preference for housing in these areas. In other words, the percentage housing price increase can be explained by the attributes of the localities and

implementation of COVID-19 impact interventions. This is because previous academic research such as Lima et al. (2020) and Liu and Tang (2021) have shown that infection rates have negative effects on house prices only in the short-run and illustrated that the price was heterogeneous due to community and city characteristics.

Conclusion and Recommendations

This study sought to explain housing prices' immediate response to the interventions to the COVID-19 pandemic in Lagos Metropolis of Nigeria. The paper revealed that housing price were on the increase before the COVID-19 pandemic due to the attributes of the localities. However, in the wake of the COVID-19 pandemic, the prices continued to increase relative to the number of cases and level of interventions enforced. The study therefore, concluded that considering the underlying attributes of the localities, higher percentage housing price changes are associated with increase in the number of COVID-19 cases, along with more stringent full lockdown measure and vice versa.

This conclusion is of both economic and social significance in that it does not only contribute to the understanding of the risk-aversion nature of homebuyers and property traders in times of epidemics, which are viewed as negative externalities, but perhaps more crucially, illustrate how effective and timely prevention and public control measures such as the lockdown, social distancing, and the general awareness of public hygiene could have a profound influence on the housing price, that justifies government interventions in a time of public health crisis and economic vulnerability.

To reduce the spread of the COVID-19 pandemic through the intervention measures in order to ensure a lesser percentage increase in housing price, provision of spacious and well serviced

housing that is affordable should be promoted. This includes the provision of basic facilities in the houses like regular water supply to maintain hand-washing measures, reduction in residential density living through the use of space standards that can achieve social distancing. In addition to these, the study recommends that there should be sufficient evidence on critical sectors' preparedness for future pandemics, particularly in light of the major human and financial costs associated with the COVID-19 Virus; the effectiveness of lockdown and restriction measures should probably be further assessed, given their impacts on individual liberties and housing affordability; and the impact of lockdowns on domestic violence, alcohol consumption, youth, and mental health, is worth exploring adequate institutional framework for counselling, palliatives distribution and good health care.

References

Adebayo, P., Ndinda, C., and Ndhlovu, T. (2022). South African cities, housing precarity and women's inclusion during COVID-19. *Agenda*, 1-13.

Abadie, A., and Dermisi, S. (2008). Is terrorism eroding agglomeration economies in central business districts? Lessons from the office real estate market in downtown Chicago. *Journal of Urban Economics* 64 (2), 451–463.

Africa Centres for Disease Control and Prevention (2020). Coronavirus disease 2019 (COVID-19): Latest updates on the COVID-19 crisis from Africa Centres for Disease Control and Prevention. Africa Centres for Disease Control and Prevention Dashboard. https://africacdc.org/covid-19/(accessed 17 July 2022).

Alexander, D. and Kragr, E. (2020). Do Stay at Home Orders Cause People to Stay at Home? Effects of Stay -at- Home Orders on Consumer Behavior (22June2020). FRB of Chicago Working Paper No. 2020-12 Available online: https://ssrn.com/abstract=3583625 (accessedon4March2021).

Alonso**,** W. (1964). Location and Land Use: Toward a General Theory of Land Rent. Cambridge: Harvard University Press.

Anenberg**,** E., and Scharlemann, T. C. (2021). The effect of mortgage forbearance on house prices during COVID-19. FEDS Notes. Washington: Board of Governors of the Federal Reserve System. https://doi.org/10.17016/2380-7172.2872.

Apergis, N. (2021). The role of housing market in the effectiveness of monetary policy over the Covid-19 era. *Economics Letters*, 200, 109749. https://doi.org/10.1016/j.econlet.2021.

Arbel, Y., Ben-Shahar, D., Gabriel, S., and Tobol, Y. (2010). The local cost of terror: Effects of the second Palestinian Intifada on Jerusalem house prices. *Regional Science and Urban Economics* 40 (6), 415 426.

Arcaya, M. C., Nidam, Y., Binet, A., Gibson, R., & Gavin, V. (2020). Rising home values and Covid-19 case rates in Massachusetts. *Social Science & Medicine*, 265,113290.

Argyroudis, G. S., and Siokis, F. M. (2019). Spillover effects of great recession on Hong-Kong's Real Estate Market: An analysis based on causality plane and Tsallis curves of complexity– entropy. Physical A: *Statistical Mechanics and Its Applications*, 524, 576–586. https://doi.org/10.1016/j. physa.2019.04.052

Ayo-Lawal R.A., Omotoso, K.O. Ilevbare, O.E., Omimakinde, E. A. and Ukwuoma O. (2022). Social Assistance and Food Security During Covid-19 Pandemic Lock-down: Insights from Nigeria (Working Paper 3). In: SPIS Department (Eds). Readings in COVID-19 and Development Studies, pp 51-74. Ile-Ife: National Centre for Technology Management (NACETEM)

Baek, S., Mohanty, S.B. and Glambosky, M. (2020). COVID-19 and Stock Market Volatility: An industry level analysis. Finance Research Letters forthcoming.

Besley, T. and Mueller, H. (2012). Estimating the peace dividend: the impact of violence on house prices in Northern Ireland. *American Economic Review* 102 (2), 810–833.

Biswasa, A., Bhattacharjeea, U., Chakrabartia, A., Tewaria, D., Banu, H., and Dutta, S. (2020). Emergence of Novel Coronavirus and COVID-19: Whether to stay or die out? Critical *Reviews in Microbiology*, 46(2), 182-193.

Bosker, M., Garretsen, H., Marlet, G., and Van Woerkens, C. (2019). Nether Lands: Evidence on the price and perception of rare natural disasters. *Journal of the European Economic Association*, 17 (2), 413–453.

Cheshire, P., Hilber, C. A., and Schöni, O. (2021). Why central London has seen the biggest rises in house prices despite COVID. LSE COVID-19. http://eprints.lse.ac.uk/109974/1/covid19_

Cheung, K. S., Chung Y. Y. and Chuyi X. (2021). Housing Market in the Time of Pandemic: A Price Gradient Analysis from the COVID-19 Epicentre in China. *Journal of Risk and Financial Management* 14(3), 1 – 17.108.

Davies, N.G, Jarvis, C.I, Edmunds, W.J, Jewell, N.P, Diaz-Ordaz, K, Keogh, R.H (2021). Increased mortality in community-tested cases of SARS-CoV-2 lineage B.1.1.**7.** *Nature*, 593: 270-274.

Del Giudice, V., De Paola, P., & Del Giudice, F. P. (2020). COVID-19 infects real estate markets: Short and mid-run effects on housing prices in Campania Region (Italy). *Social Sciences*, 9(7), 1 – 18.

Deng, G., Gan, L. and Hernandez, M.A. (2015). Do natural disasters cause an excessive fear of heights? Evidence from the Wenchuan earthquake. *Journal of Urban Economics* 90 (1), 79–89.

Duca, J. V., Hoesli, M., & Montezuma, J. (2021). The resilience and realignment of house prices in the era of Covid-19. *Journal of European Real Estate Research*, 14(3), 421–431.

Duerksen M (2020). Innovations needed to prevent COVID-19 from catching fire in African cities. Africa Center for Strategic Studies. 9 April 2020. Available at: https://africacenter.org/spotlight/innovations-needed-prevent-covid-19-catching-fire-africa-cities/ (accessed 13 July 2022).

Federal Government of Nigeria (2020). Bouncing back: Nigeria economic sustainability plan. Report of the Economic Sustainability Committee. Available at: https://media.premiumtimesng.com/wp-content/files/2020/06/ESC-Plan-compressed-1.pdf (accessed 3 August 2022).

Francke, M. and Korevaar, M. (2021). Housing markets in a pandemic: Evidence from historical outbreaks. *Journal of Urban Economics*, 123, 103333.

Gormsen, N.J. and Koijen, R.S.J. (2020). Coronavirus: impact on stock prices and growth expectations. In: NBER Working Papers No. 27387.

Hallstrom, D. G., & Smith, K. V. (2005) Market responses to hurricanes. *Journal of Environmental Economics and Management*, 50(3), 541–561.

Hu, M., Lee, A. D., & Zou, D. (2021). COVID-19 and housing prices: Australian evidence with daily hedonic returns. *Finance Research Letters*, 43, 101960.

Ilechukwu, V.U. (2012). Non-Locational Determinants of Land, Housing and Rental Values in Onitsha, Nigeria. [Doctoral Dissertation, Department of Geography, University of Ibadan] Nigeria.

Just, M. and Echaust, K. (2020). Stock market returns, volatility, correlation and liquidity during the COVID-19 crisis: Evidence from the Markov switching approach. *Finance Research Letters*, 37, 1 – 8.

Kihato, C.W and Landau, L.B (2020). Coercion or the social contract? COVID 19 and spatial (in)justice in African cities. *City & Society* 32(1), 1 – 11. Open access. Available at:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7267582/pdf/CISO-32-na.pdf (accessed 30 July 2022).

Koren, M,.and Pet˝o, R. 2020. Business Disruptions from Social Distancing. Available online: https://arxiv.org/pdf/2003.13983.pdf (accessedon4March2021

Knight F. (2020). Global House Price Index, Research, Q2 2020. Available online:https://www.bayleys.co.nz/media/bdf9502b-cb96-4015-af53-6a5bcf548416 (accessedon4March2021).

Lima, D., Lopez, W., A., L., & Pradhan, A. (2020). COVID-19 and housing market effects: Evidence from U.S. shutdown orders. (September 23, 2020). Forthcoming at Real Estate Economics.

Liu, Y., and Tang, Y. (2021). Epidemic shocks and housing price responses: Evidence from China's urban residential communities. *Regional Science and Urban Economics*, 89, 103695,

Maclean, R (2020). "Africa Braces for Coronavirus, but Slowly". *The New York Times*.

Maruf, O. O., Olotu, S.J., Omimakinde, E.A., and Okpuru, O.A. (2022). Government Containment Policies on Covid-19 Pandemic in Nigeria: Impacts on Transmission & Diplomacy (Working Paper 6). In: SPIS Department (Eds). Readings in COVID-19 and Development Studies, pp 111-123. Ile-Ife: National Centre for Technology Management (NACETEM)

Mills, E.S. (1967). An aggregative model of resource allocation in a metropolitan area. *The American Economic Review* 57, 197–210.

Mills, E.S., (2002). Terrorism and U.S. Real Estate. *Journal of Urban Economics* 51 (2), 198 204.

Mueller, J., Loomis, J., and Gonzalez-Caban, A. (2009). Do repeated wildfires change homebuyers' demand for homes in high risk areas? A hedonic analysis of the short and long-term effects of repeated wildfires on house prices in Southern California. *The Journal of Real Estate Finance and Economic*s, 38(2), 155–172.

Muth, R.F. (1969). Cities and Housing: The Spatial Pattern of Urban Residential Land Use. Chicago: University of Chicago Press.

Ndinda, C., Moolman, B., Adebayo, P., Chimbwete, C., Ngungu, M., Maree, G., Parker, A., Lynch, I. and Shozi, M. (2021). Gender equality. South Africa Covid-19 Report (First edition, Chapter 5.4). Department of Planning, Monitoring and Evaluation, Government Technical Advisory Centre & National Research Foundation, Pretoria, South Africa.

Nigeria Centre for Disease Control, NCDC, (2020) Covid-19 Nigeria. https://covid19.ncdc.gov.ng/report/ (accessed 7 July 2022).

Olapegba, P.O., Ayandele O and Kolawole S.O. (2020). COVID-19 Knowledge and Perceptions in Nigeria: A Preliminary Assessment of Novel Coronavirus (COVID-19). COVID-19 SARS-CoV-2 Preprints from MedRxiv and BioRxiv.

Oyalowo, B. (2022, August 23rd - 24th). An Exploration of Resilience and Housing in Disaster Context in African Cities. (Conference Presentation). 3rd Annual Urbanization and Habitable Cities Radisson Hotel, Lagos, Nigeria.

Ramaphosa, C. (2020). Statement by President Cyril Ramaphosa on measures to combat COVID 19 epidemics. The Presidency. Retrieved from http://www.thepresidency.gov.za/press-statements/statement-president-cyril-ramaphosa-measures-combat-covid-19-epidemic

Ritchie, H., Mathieu, E., Rodés-Guirao, L., Appel, C., Giattino, C., Ortiz-Ospina, E., Hasell, J., Macdonald, B., Beltekian, D., Dattani, S., Roser, M. (2022). "Coronavirus Pandemic (COVID-19)". *Our World in Data*. Retrieved December 26, 2023.

Smith, K. V., Carbone, J., Pope, J., Hallstrom, D., and Darden, M. (2006). Adjusting to natural Disasters. *Journal of Risk and Uncertainty*, 33(1-2), 37-54

Stock, J.H and Watson, M.W. (2011). Introduction to Econometrics (4th ed.). London: Pearson Press.

Tanrıvermi¸ H. (2020). Possible impacts of COVID19 outbreak on real estate sector and possible changes to adopt: A situation analysis and general assessment on Turkish perspective. *Journal of Urban Management* 9:263–269

Ugonna, C.N (2013). Land use/Land cover mapping of the Lagos Metropolis of Nigeria using 2012 SLC-off Landsat ETM+ Satellite Images. *International Journal of Scientific & Engineering Research*, 4 (11), 1217 - 1223

UN Habitat. (2020). Covid-19 in African cities: Impacts, responses and policies recommendations. https://unhabitat.org/sites/default/files/2020/06/covid19 (accessed 27 July 2022)

Verma, R. and Husain, R. (2020). The resilience and strength of the new housing market during the pandemic. Retrieved from https://www150.statcan.gc.ca/ n1/pub/45-28-0001/2020001/article/00080-eng.htm

VonThünen, J. (1826). Isolated State. Translated by Carla M. Wartenberg. Oxford: Pergamon Press.

Wang, B. (2021). How does COVID-19 affect house prices? A cross-city analysis. *Journal of Risk and Financial Management*, 14(2), 47

Wanjau, K (2022). People's Responses to COVID – 19 Containment Measures in Selected Areas in Nairobi County, Kenya: Dynamism of Nairobians in Response to COVID – 19 (Chap.14, p274–305). IGI Global Publisher.www.igi-global.com/e-resources/library-recommendation/?id=125

Wooldridge, J. (2002). Econometric Analysis of Cross Section and Panel Data. MIT Press

Wong (2008) Wong, G. (2008). Has SARS infected the property market? Evidence from Hong Kong. *Journal of Urban Economics* 63(1), 74-95

Yang, M. and Junni Z. (2021). The impact of COVID19 on the housing market: Evidence from the Yangtze river delta region in China. *Applied Economics Letters*,1–4.

Zhang, Y., and Peacock, W. G. (2009). Planning for housing recovery: Lessons learned from Hurricane Andrew. *Journal of the American Planning Association*, 76(1), 5–24.

Zhu, H., Deng, Y., Zhu, R. and He, X., (2016). Fear of nuclear power? Evidence from Fukushima nuclear accident and land markets in China. *Regional Science and Urban Economics* 60 (1), 139–154.