

Impact of COVID-19 Measures on Kenya's Health System

Tabitha Kiriti Ng'ang'a

Working Paper - COVID-19_012

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By

Tabitha Kiriti Ng'ang'a

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List of abbreviations and acronyms

AfDB	African Development Bank
AIDS	Acquired Immuno Deficiency Syndrome
APHRC	African Population and Health Research Centre
ARV	Antiretroviral
BoP	Balance of Payment
BOMs	Boards of Management
CHE	Current Health Expenditure
CMM	Community Maternal Midwifery
COMESA	Common Market for Eastern and Southern Africa
DTP	Diphtheria, Tetanus and Pertussis
EAC	East African Community
FBOs	Faith-Based Organizations
FGDs	Focus Group Discussions
FGM	Female Genital Mutilation
FMHC	Free Maternal Health Care
GBV	Gender-Based Violence
GDP	Gross Domestic Product
GFF	Global Financing Facility
HIV	Human Immunodeficiency Virus
ICU	Intensive Care Unit
IEC	Information, Education and Communication
IMF	International Monetary Fund
KDHS	Kenya Demographic and Health Survey
KECHN	Kenya Enrolled Community Health Nurse
KEMRI	Kenya Medical Research Institute
KHIS	Kenya Health Information System
KNACC	Kenya National Aids Control Council
KNBS	Kenya National Bureau of Statistics
KNH	Kenyatta National Hospital
KRCHN	Kenya Registered Community Health Nurse
KUTRRH	Kenyatta University Teaching, Referral and Research Hospital
MDAs	Ministries, Departments and Agencies
MES	Managed Equipment Services

MOH	Ministry of Health
MTPs	Medium Term Plans
MTRH	Moi Teaching and Referral Hospital
NCDs	Non-Communicable Diseases
NCPD	National Council for Population and Development
NGOs	Non-Governmental Organizations
NHIF	National Health Insurance Fund
OECD	Organization on Economic Cooperation and Development
OOP	Out of Pocket
OPD	Outpatient Department
PCR	Polymerase Chain Reaction
PMA	Performance Monitoring Action
PPEs	Personal Protective Equipment
RI	Routine Immunization
RMNH	Reproductive Maternal Neonatal Health
SDGs	Sustainable Development Goals
TB	Tuberculosis
THE	Total Health Expenditure
UHC	Universal Health Coverage
UK	United Kingdom
UN	United Nations
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Emergency Fund
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNU-WIDER	United Nations University - World Institute for Development Economics Research
US	United States
WEO	World Economic Outlook
WHO	World Health Organization

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Prof. Tabitha Kiriti Ng'ang'a

Executive summary

The objective of this study is to analyse the impact of COVID-19 measures on the health sector.

We have investigated the level of preparedness of Kenya's health system for COVID-19 pandemic using selected indicators of preparedness, analyzed the level of selected health indicators before COVID-19 pandemic and the impact of COVID-19 measures on these indicators. This study uses secondary data complemented with primary data to meet these objectives. Primary data were collected from an electronic questionnaire which returned a sample of 61 respondents from Machakos, Murang'a, Nyeri, Vihiga, Narok, Nakuru, Kiambu, Nyandarua and Embu. Information was also collected from Focus Group Discussions (FGDs) drawn from Kawangware, Kibra and Mathare informal settlements in Nairobi, Kenya. Key informants who were mainly health sector policy makers provided critical information regarding the impact of COVID-19 measures.

Data sources

The study uses secondary data sourced from documented literature using electronic databases, grey literature, reference harvesting and discourse analysis. The secondary data were sourced from the Ministry of Health, African Union Heads, International Monetary Fund, Kenya Demographic Health Survey, Kenya National Bureau of Statistics, National Council for Population and Development, Republic of Kenya, United Nations Population Fund (UNFPA), United Nations International Children's Emergency Fund (UNICEF), United Nations, United Nations University - World Institute for Development Economics Research (UNU-WIDER), World Health Organization (WHO), World Bank, Government of Kenya policy documents, The National Treasury and Planning, civil societies, Non-Governmental Organizations (NGOs) and Faith-Based Organizations (FBOs). Additional literature and data were sought from other relevant institutions, which included other Government Ministries, Departments and Agencies (MDAs). The study also analyzed social and mainstream media reports on the COVID-19. Secondary data were complemented with primary data.

Methodology and Process

To gather information on the impact of COVID-19 on health, the author attended webinars to gather data on patients both male and female, medical practitioners in both public and private health facilities, and policy makers. An electronic questionnaire was administered to medical practitioners in both public and private health facilities and policy makers. Primary data were also gathered through FGDs with women of child bearing age and older ones, people living with chronic diseases such as cancer, diabetes, high blood pressure, Human Immunodeficiency Virus, Acquired Immunodeficiency Syndrome (HIV/AIDS), among others. Oral testimonies were also recorded from the participants. Information was also gathered from key informants on health systems. FGDs were held under strict Ministry of Health COVID-19 protocols in open spaces and the author made sure that participants were sanitized and provided with masks. Online discussions were held with other researchers doing work related to this topic and information exchanged, learning from one another.

Guided by circumstances facing the country at the time this study was conducted (curfew, COVID-19 pandemic), the author found it convenient to use purposive sampling. Purposive sampling generally helps a study to answer research questions by focusing on particular characteristics of a population of interest. The study oversampled Nairobi since it accounted for 43.3% of COVID-19 cases in Kenya. The first COVID-19 measures taken by the Government closed off the Nairobi Metropolitan and people could not leave its boundaries and outsiders could not enter the Metropolitan. The effects of the COVID-19 measures were therefore expected to impact more the people living in the City and its surroundings. It was also easier to conduct and use an electronic questionnaire and conduct Focus Group Discussions during the day and be home early in the city without breaking curfew hours. A total of 122 electronic questionnaires were sent by email and 61 participants responded, giving a response rate of 50%. The respondents to the electronic questionnaire were chosen from a list of emails from the author's emailing list, since physical face to face interviews were hard to conduct at that time as many people were working from home. The participants who responded to the electronic questionnaire came from Nairobi, Machakos, Murang'a, Nyeri, Vihiga, Narok, Nakuru, Kiambu, Nyandarua and Embu.

There were 31 participants for FGDs, divided into groups of 10 to make it easy for discussions and the participants for the FGDs were drawn from Kawangware, Mathare and Kibra. These are low income, high poverty rate informal settlements and most of the people who live in these areas are the primary users of public health facilities. The residents mostly earn their livelihoods by working in the wealthier neighbourhoods as domestic workers, guards, or gardeners; or industrial area or the central business district or operate small business in their neighbourhoods. The settlements are also heavily populated, with therefore minimal social distancing, and have no well-organized utility facilities such as metered water and electricity and therefore some of the government measures on COVID-19 could have had a major impact on the

population. Village and church elders from the three informal settlements were used to identify the FGD participants.

The study also used 18 key informants mainly policy makers to gather information on the health sector.

The primary data were thereafter transcribed, grouped into themes, analyzed then presented in narratives to complement the secondary data, which is presented in tables and graphs.

Findings

1. The level of funding of the health sector in Kenya does not meet the recommended 15% of government budget as recommended by the African Union (AU) Heads of States in the Abuja Declaration of 2001.
2. The private, Faith-Based Organizations (FBOs) and Non-Governmental Organizations (NGOs) contribute 53.0% of the number of health facilities in Kenya compared to 46.9% of public health facilities. This implies that the health sector in Kenya is more private than public.
3. The health facilities are unevenly distributed, with most counties not having a tertiary hospital. Nairobi has the highest number of health facilities (724 or 7.5%) and has the highest number of tertiary institutions (8). This is significant considering that Nairobi had the highest number of COVID-19 cases.
4. Kenyan health facilities do not meet the internationally recommended work force per 10,000 population, with a workforce of 15.6 instead of the 68 recommended per 10,000 population, implying that COVID-19 pandemic found Kenya in a state of unpreparedness in terms of workforce (medical doctors, laboratory technologists, and dentists to nurses and midwives) to handle the situation. Most of the critical workforce is found in Nairobi and other major urban areas.
5. Most hospitals did not have special emergency units with all the necessary facilities to handle emergencies and operating on a 24-hour basis.
6. Only 18.4% of hospitals had all the items required in the outpatient consultation rooms for suspected COVID-19 patients.
7. Only 3% of all health facilities had all the items required to prevent infections, hence increasing the possibility of infection of frontline workers and patients seeking services from these facilities.
8. Kenya had only 26.2% of the required bed capacity for critical care (2,048) and these are sparsely spread out in the counties with Nairobi, accounting for 51% of ICU beds in the country and only 256 ventilators available in Kenyan hospitals as at October 2020, with majority of these (65.2%) in Nairobi.

9. The Kenya health system was only at 17.2% in terms of submitting regular information on COVID-19, and most of this information was coming from secondary and tertiary hospitals, public primary hospitals and private/NGO/FBO primary hospital level.
10. Kenya's overall readiness index on all indicators of readiness was at 38.4%.
11. There was a change in health seeking behaviour with 39.3%, saying that they traveled less, did not seek medical attention, and missed their medication due to fear of contracting the virus.
12. Nationally, the modern contraceptive prevalence use dropped slightly from 42.7% in 2019 to 42.5% in 2020. The rate of unmet need for contraceptives increased slightly from 18.5% to 18.6%. Primary data showed that 45.9% of the respondents did not have access to contraceptives during the first 6 months of the pandemic.
13. There was a notable increase in the number of adolescent/teenage pregnancies during the first 6 months of the COVID-19 pandemic, and an increase in the number of child marriages in the whole country.
14. There was a decline of 6.54% in the number of revisits for antenatal care services and a decline of 12.3% in the number of pregnant women completing 4 antenatal clinic visits.
15. There were more people who gave birth at home (14.8%) than those who gave birth in a health facility (9.8%).
16. There was also an increase of 10.5% in the number of maternal deaths; and an increase of 95.7% in the number of adolescent maternal deaths with the maternal mortality ratio increasing from 96.6 to 105.8 per 100,000 live births.
17. There was a decline in the number of children vaccinated with diphtheria, pertussis, and tetanus (DPT3) in the months of April and May 2020. Between January and March 2020, the number of children vaccinated with DPT3 was 104,171. However, this number fell by 2% to 102,379 between April and June 2020. However, there was an increase in this number in the month of June, which even surpassed by 1.6% the number of children vaccinated during the January to June 2019 of 106,712 due to concerted efforts and sensitization by the Ministry of Health on the benefits of vaccination. However, there were still mothers who feared venturing out to take their children for vaccination due to fear of exposing them to infection based on information from primary data gathered from FGDs, key informants and from the electronic questionnaire.
18. The study found that 45.9% of the people living with Non-Communicable Diseases (NCDs) such as hypertension, diabetes, cancer and arthritis missed their medications during the first 6 months of the pandemic. However, a few were able to access their medication since health facilities put in measures to give enough medication to their patients to cover a couple of months to prevent them from

frequently visiting the health facilities and protect them from getting infected with COVID-19.

19. Health care frontline workers in Kenya were impacted negatively by the pandemic as 2.6% of the COVID-19 infected persons were health workers while 2.3% of health workers' deaths were due to COVID-19 complications.
20. Only 18% of respondents had any form of health insurance, leaving 82% not covered at all. Out of those who had insurance, only 27.3% were from rural areas and 63.6% were from urban areas. In term of gender, 9.1% of those who had insurance were females and 90.9% were male.

Implications for policy makers

Health sector funding: The Government needs to increase the level of funding of the health sector to the recommended 15% of government budget as per the Abuja Declaration. The funds should be used to increase the infrastructure needed to handle pandemics such as COVID-19. Such infrastructure include ICU/HDU facilities, isolation rooms and well-equipped outpatient departments. Funding is also needed for training and employment of health personnel to increase the level of preparedness for any other pandemic in Kenya and to reach the norms recommended by the WHO.

Health seeking behavior: A major drive is required now and in the future to improve the health indicators that deteriorated due to the change of health seeking behaviour as a result of the measures taken to curb the pandemic.

Public health awareness: There is need to ride on the level of awareness of increased levels of hygiene among Kenyans by making sure that water for drinking and hand washing is available in every household, as this will lead to a reduced burden of disease for households and the health sector. Public health officers should continue with the momentum of educating people at their households and at the community level on cleanliness and hygiene.

Primary health care facilities: Home-based care for asymptomatic COVID-19 patients should be accompanied by an ambulance system equipped with oxygen to evacuate patients whose conditions deteriorate while at home. It is also important to increase the number of health facilities at every ward to reduce the pressure on referral hospitals. This would ensure that primary health care is accessed at these health facilities. The facilities should be well equipped with Intensive Care Unit (ICU) and High Dependency Unit (HDU) facilities complete with oxygen and ventilators. They should also have trained personnel to handle cases before referring them to the national referral hospitals. An example is the community midwifery model (CMM) whereby the lives of women who do not deliver in an institution are not endangered.

Health insurance: The government needs to increase funding of the National Health Insurance Fund to not only cover illnesses and complications caused by a pandemic, but also increase the number of people who have some form of health insurance as this will reduce the out-of-pocket expenses incurred mainly by the lower income households, which makes them fall even further into poverty. This entails implementing the Universal Health Coverage (UHC) and ensure that health facilities treating patients getting refunded by the National Health Insurance Fund.

Mental health: There is need to increase the number of psychologists and mental health specialists in Kenya to provide psychosocial support to the increasing number of people who experience mental health issues due to COVID-19. There is also urgent need to increase the number of mental health institutions in the country and to make mental health affordable.

1. Introduction

Since the first Kenyan COVID-19 case was reported on 12th March 2020, Kenya has tested 1,183,212 people by 31st January 2021. The cumulative confirmed cases, cumulative death cases and the cumulative recovery cases have been increasing but at a slower rate than in the first quarter of 2020. As of 24th February 2021, Kenya had 104,773 cumulative confirmed cases of COVID-19. The number of fatalities was at 1,837, while that of recoveries amounted to 83,391 as shown in Table 1.

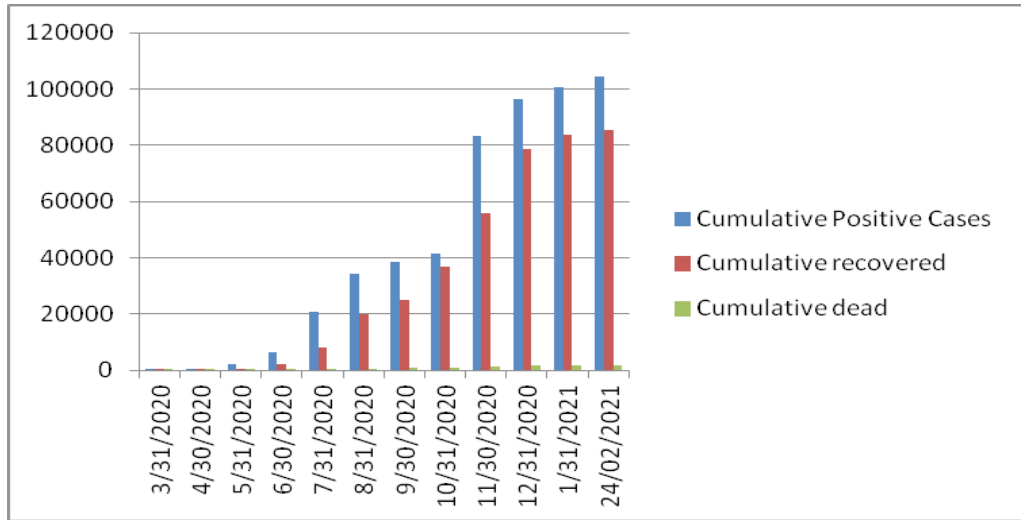
Table 1: COVID-19 cumulative confirmed, recovered and death cases in Kenya

Date	Months	Cumulative positive cases ²	Cumulative recovered	Cumulative dead
3/31/2020	March	59	1	1
4/30/2020	April	396	144	17
5/31/2020	May	1,962	478	64
6/30/2020	June	6,366	2,013	144
7/31/2020	July	20,636	8,165	341
8/31/2020	August	34,057	19,688	574
9/30/2020	September	38,378	24,740	707
10/31/2020	October	41,619	36,963	981
11/30/2020	November	83,316	55,610	1,452
12/31/2020	December	96,251	78,737	1,667
01/31/2021	January	100,773	83,855	1,755
24/02/2021	February	104,773	83,391	1,837

Data Source: <https://github.com/GuangchuangYu/nCov2019>

The cumulative number of positive cases, death and recoveries has been on an upward trend since March 2020 to date. As of March 2020, the fatality rate of COVID-19 was 1.69% and was at its highest in April 2020 with a fatality rate of 4.29%. As of 31st October, a total of 41,619 cases had been confirmed, with 981 deaths. As at 31st December 2020, 96,251 cases had been confirmed with 1,667 persons succumbing to the illness. Figure 1 shows the monthly reported cases of COVID-19 in Kenya, comprising cumulative positive, cumulative recovered and cumulative deaths up to 24th February 2021.

Figure 1: Cumulative positive, cumulative recovered and cumulative death cases in Kenya



Source: Daily COVID-19 updates by Ministry of Health Kenya (2020) as of 24th February 2021

The total number of recoveries and discharges for COVID-19 was 85,391 as of 24th February 2021 (Ministry of Health, 2021).

Figure 2: Distribution of COVID-19 cases by county as at 16th of February 2021

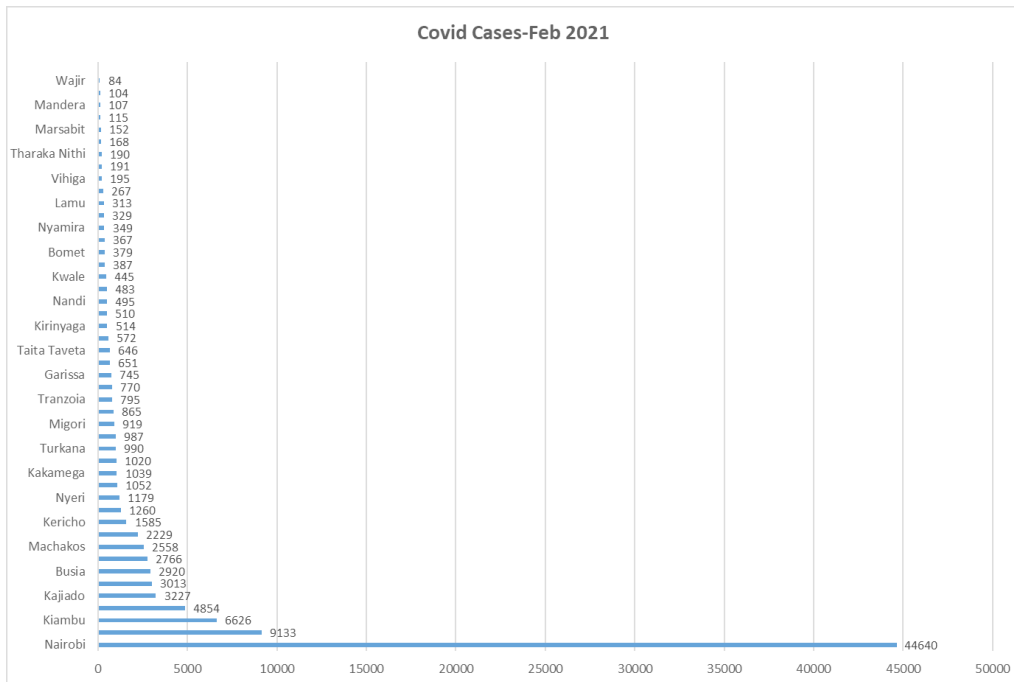
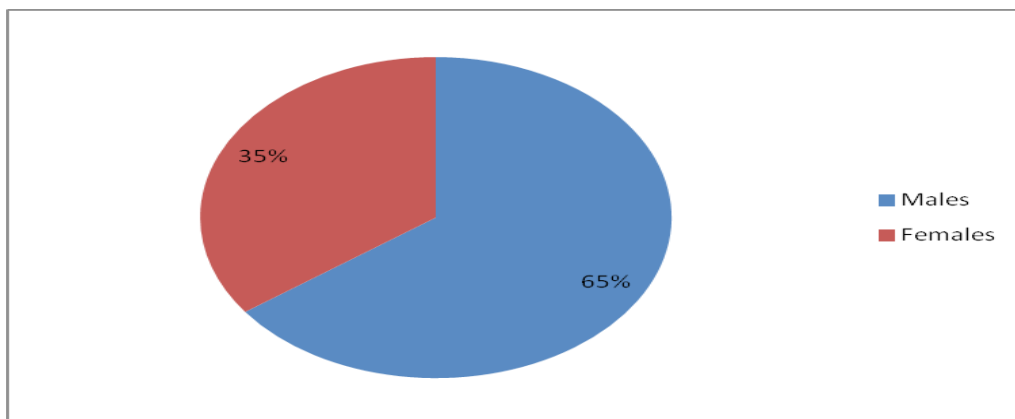


Figure 2 and Annex Table A1 show the distribution of COVID-19 cases by county on 16th of February 2021. Nairobi had the highest proportion of COVID-19 cases accounting for 43.3% of the total number of positive cases. It is followed by Mombasa and Kiambu, which accounted for 8.8% and 6.4% of all COVID-19 cases in Kenya while Wajir had the least.

The rate of infection has been higher for males than for females, with 34,237 (65%) males and 18,376 (35%) females infected as at 29th October 2020 as shown in Figure 3.

Figure 3: COVID-19 positivity rate by gender as at October 2020



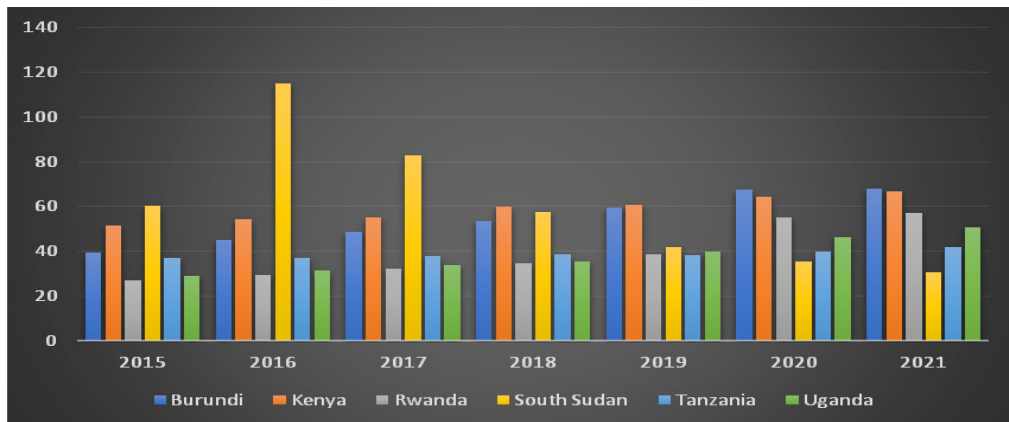
Kenya Government's response to COVID-19

Since the reporting of the first COVID-19 case in Kenya, many sectors have been adversely affected, especially by measures the Government of Kenya took to contain the spread of the virus. One of measures was restriction of movement to and from certain counties such as Nairobi and Nairobi Metropolitan, Mombasa, Kilifi and Kwale and putting some estates in Nairobi on lockdown. A 7 p.m to 5 a.m nationwide curfew was imposed for people except those offering essential services such as those offering medical services, and those transporting food and medical supplies. Places of work (both public and private) were closed, and workers instructed to work from home except for those offering essential services. Travel was also restricted for non-residents, and those who happened to arrive in Kenya immediately after this period were supposed to be quarantined for 14 days in identified isolation facilities. At the same time, all vehicles offering public services were supposed to adhere to Ministry of Health guidelines on hand washing and social distancing. All Kenyans were advised by the Ministry of Health to wear masks and practice hand washing. To decongest the health facilities, home-based care of COVID-19 positive and asymptomatic patients was later introduced. Valid COVID-19 certificates were supposed to be produced at border crossings, especially for track drivers ferrying goods throughout the East African region.

Performance of the economy

Africa's Gross Domestic Products (GDP) growth of 3.3% in 2019 fell to -2.1% in 2020 (African Development Bank - AfDB, 2021) as Africa experienced its worst recession in 50 years. This is due to the imposed partial lockdown of the economy triggered by the COVID-19 outbreak. The virus led to disruption in the various industries, especially the tourism and hospitality industries. Most East African Community (EAC) countries saw demand for increased social support for their respective populations due to vast job losses by many low income earners, who now relied heavily on their governments for support. With most of the countries facing huge external debts, they lacked adequate resources to mitigate COVID-19 effects on their economies. Figure 4 shows the EAC countries with their respective debts as a per cent of their annual GDPs.

Figure 4: EAC government debt as percentage of GDP



Source: International Monetary Fund (2020)

The EAC countries' GDP growth rates have been projected to decline in 2021. Table 2 shows the revised and projected growth in GDP for 2020 and 2021.

Table 2: EAC real GDP growth rate, 2019–2022³

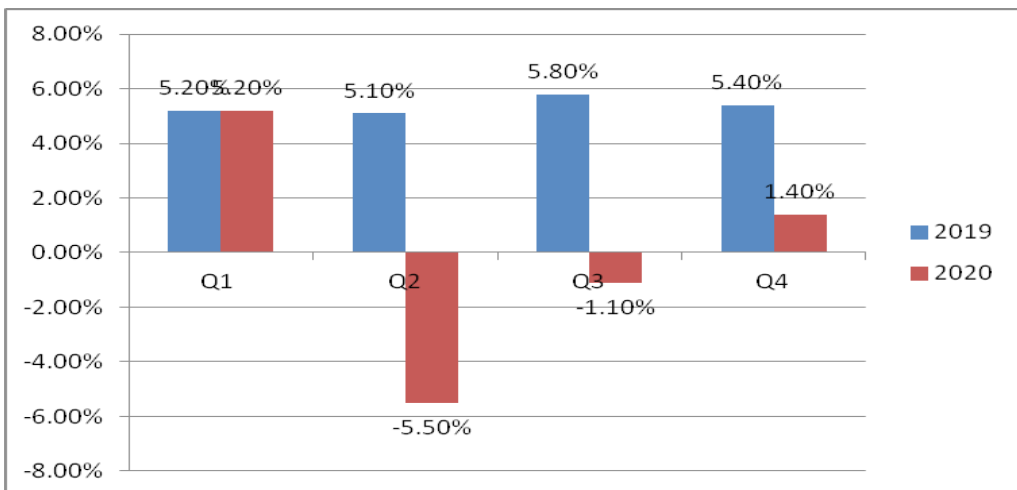
Country	2019	2020	2021 projected	2022 projected
Burundi	4.1	-3.3	3.5	2.1
Ethiopia	8.4	6.1	2.0	7.9
Kenya	5.4	1.4	5.0	5.9
Rwanda	9.4	-0.4	3.9	6.9
South Sudan	7.4	-3.6	0.1	2.5
Tanzania	6.8	2.1	4.1	5.8
Uganda	7.5	-0.5	4.8	5.4
East Africa	5.3	0.7	3.0	5.6
SSA	3.0	-2.6	3.0	3.9

Source: African Development Bank statistics

In Kenya, GDP growth rates dipped from 5.4% in 2019 to 1.4% in 2020. This decline has been attributed to decrease in tourism activity, export sales, and disruption in supply chains. Tanzania and Uganda have shown similar trends, with their GDP growths declining from 6.8% and 7.5% in 2019 to 2.1% and -0.5% in 2020, respectively. However, Tanzania had an expanded market for mineral exports, especially gold, but this was only in the third quarter of 2020 (United Nations Economic Commission for Africa–UNECA, Trade Mark East Africa–TMEA, and African Economic Research Consortium–AERC, 2021). The Ugandan economy also faced disruption of supply chains and a loss of global demand for its goods (Deloitte, 2020).

COVID-19 found Kenya when its economic growth was on a decline, having fallen from 5.8% in the fourth quarter of 2019. This declined to 5.2% in the first quarter of 2020. When COVID-19 was declared a pandemic in March 2020, Kenya's economic growth rate declined drastically to -5.5%. However, the economy shows an improvement in the third quarter of 2020 as shown in Figure 5.

Figure 5: Kenya quarterly GDP growth rate, 2019–2020



Source: <https://www.statista.com/statistics/1181083/quarterly-gdp-growth-rate-in-kenya/>

The decline in GDP growth in the second quarter could be attributed to the decline in economic activity because of measures taken by the government to curb the spread of COVID-19. The slow economic growth led to tightening of financial conditions in Kenya, with most of the financing directed to measures to curb the COVID-19 spread, coupled with a reduction of government revenue due to weakening economic activity, tax reliefs to vulnerable households, and an increase in COVID-19-related spending needs (World Bank, 2020a).

COVID-19 found Kenya when its economic growth was on a decline, having fallen from 5.8% in the fourth quarter of 2019. This declined to 5.2% in the first quarter of 2020. When COVID-19 was declared a pandemic in March 2020, Kenya's economic growth rate declined drastically to -5.5%. However, the economy shows

an improvement in the third and fourth quarters of 2020 as shown in Figure 5. The improvement in the economic growth rates in the third and fourth quarters of 2020 could be attributed to increase in business due to the partial reopening of the economy after easing of some of the COVID-19 measures; increased exports in July-August after decreasing in the second quarter of the year; and increased distribution of cash transfers to vulnerable groups through mobile money accounts.

Health Sector Funding

The health budget is broken down into recurrent and development budget. Recurrent budget is resources meant to cater for expenditures of recurrent and ongoing nature while development budget caters for expenditures of development or investment nature. The Abuja Declaration of 2001 states that African Union (AU) member states should allocate a minimum of 15% of their annual GDP to health care (African Union (AU) Heads of State, 2001).

The 2020/21 national government health budget was Ksh114 billion, compared to the pre-COVID-19 period when it was Ksh115.4 billion in the 2019/20 first supplementary budget, and 103.4 in the 2nd 2019/20 supplementary budget (Development Initiatives, 2020) as shown in Table 3.

Table 3: Budgetary allocations to the Ministry of Health, 2017/18 to 2020/21-Ksh billions

Year	2017/18	2018/19	2019/20 Supplementary Budget 1	2019/20 Supplementary Budget 2	2020/21
National Referral and Specialized Services	35.9	40.2	37.9	39.6	42.5
Health Policy Standards and Regulations	17.5	23.8	46.8	38.3	39.2
Preventive, Promotive and RMNCAH	7.7	9.9	12.3	6.3	13.9
Health Research and Development	9.2	7.2	9.8	10.1	9.9
General Administration Planning and Support Services	8.0	8.8	8.9	9.1	8.5
Total	78.4	90	115.4	103.4	114
Actual Expenditure	61.8	76.7	115.7	N/A	N/A

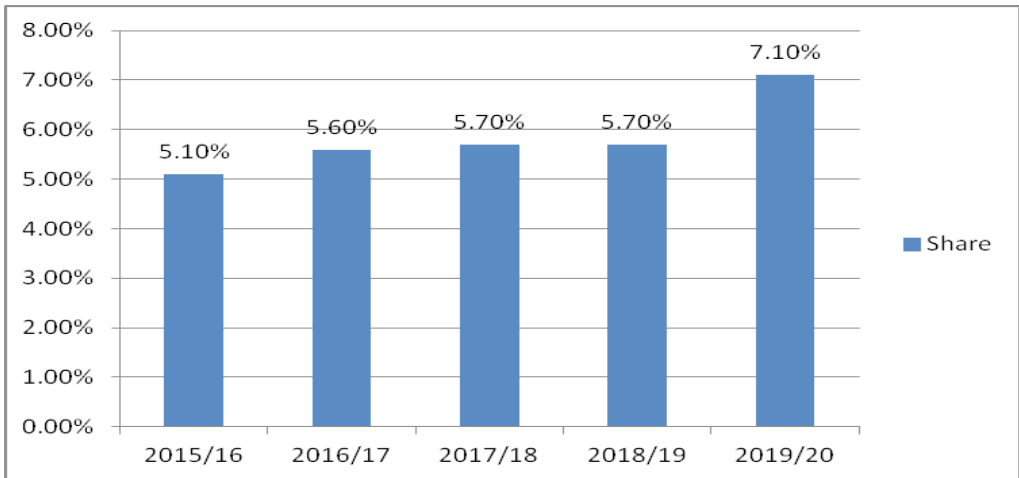
N/A Data not available

Source: KNBS (2020), Economic Survey

Table 3 shows that the actual expenditures in the health sector are below the allocated amounts for the years 2017/18 and 2018/2019. However, the actual expenditure for the year 2019/20 was slightly higher than the allocated amount.

The total government budget was Ksh1,790.4 billion for the 2020/21 financial year and the allocation of Ksh114 billion was only 6.24%, which was an increase from the 3.31% allocation from the total 2019/20 budget of Ksh 2.8 trillion (National Treasury and Planning, 2019/20 and 2020/21 final budget highlights). Figure 6 shows the share of government expenditure on health to total government expenditure from 2015/16 to 2019/20

Figure 6: Share of government expenditure on health to total government expenditure, 2015/16 to 2019/20



Source:KNBS, Economic Survey, Various Issues

As Figure 6 shows, the share of government expenditure on health has been below the recommended 15% from 2015 to 2019. The government budget 2020/21 read in June 2020 allocated Ksh 15.0 billion to Kenyatta National Hospital, which is the oldest referral hospital in Kenya; Ksh12.6 billion for the rollout of Universal Health Coverage (UHC), which had been on trial bases in Nyeri, Machakos, Kisumu and Isiolo; Ksh 10.0 billion for Moi Teaching and Referral Hospital, which is the second oldest referral hospital; Ksh 6.2 billion for Managed Equipment Services (MES); Ksh 5.3 billion for transforming health systems for UHC; Ksh 4.3 billion for Conditional Grants to level 5 hospitals; Ksh 4.1 billion for Free Maternal Health Care (FMHC); Ksh 4.0 billion for Health Sector Support for UHC; Ksh 1.9 billion for National Health Insurance Fund (NHIF) cover for the elderly and severely disabled; and Ksh 1.4 billion for vaccines and immunization.

According to Development Initiatives (2020), the implementation of national government health programmes in the 2020/21 financial year needed Ksh 209.4 billion, according to resources estimates made in 2019. However, these estimates were made before the outbreak of COVID-19, showing a funding gap of Ksh 95.3 billion and indicating that the actual funding gap is likely to be much higher if the health needs stemming from the COVID-19 pandemic are considered (Development Initiatives, 2020).

When COVID-19 was declared a pandemic, the Kenya government created a COVID-19 contingency plan whose cost of implementing was estimated at Ksh 8.7 billion (World Bank, 2020b). The World Bank funded 61% of this cost, while the International Monetary Fund in May 2020 approved the disbursement of Ksh 78.3 billion to Kenya under the Rapid Credit Facility to enable the country cover its urgent balance of payment (BoP) needs resulting from the pandemic (International Monetary Fund, 2020). In response to the COVID-19 pandemic, extra budget allocations were provided by governments to enhance surveillance, purchase medical supplies, construct isolation centres, recruit more health personnel, among others (Etyang, 2021). For instance, in the 2019/20 second supplementary budget estimates, the Disease Surveillance and Response sub-programme was added to the budget to finance the Kenya COVID-19 Emergency Response Project. This sub-programme will be allocated Ksh 2.7 billion in 2020/21 for COVID-19 testing and treatment (Development Initiatives, 2020). However, this is still not enough to meet the demands for the health sector.

2. Context

Health is a very important component of human capital development for any country as healthy workers are more productive and efficient. The COVID-19 pandemic touched the core sector of the economy; the health sector. The measures taken to curb the pandemic not only impacted the health sector but also people who seek services from the sector, and leading to unintended consequences on other aspects of health. This study focuses on the health providers, health seekers and selected health indicators.

Status of Kenya's health care system

The Kenya Health Policy 2012-2030 gives guidelines to ensure improvement in the status of health in Kenya, in line with the provision of the Constitution of Kenya 2010, the Kenya Vision 2030, and other global commitments. Kenya's Health Policy is supposed to be all-inclusive, balanced, and rational to ensure equity, efficiency, and social accountability in the delivery of health care services. The policy consists of six objectives, which include elimination of communicable diseases; halting and reversing the rising burden of non-communicable conditions; reducing the burden of violence and injuries; providing essential health care; minimizing exposure to health risk factors and strengthening collaboration with other sectors that have an impact on health (Ministry of Health, 2014).

Healthcare providers in Kenya include public and private health facilities, pharmacies and chemists, traditional healers, community health workers, providers of public health programmes, and general administration, among others.

According to the Ministry of Health (2019), healthcare functions consist of goods and services provided and activities performed by healthcare providers. General healthcare functions include curative care (inpatient and outpatient), provision of pharmaceuticals from independent pharmacies and chemists, prevention and public health programmes, healthcare administration, and capital formation.

The sources of health financing for the health sector in Kenya are the national government, households, and donors who also include non-governmental organizations and faith-based organizations.

The Constitution of Kenya 2010 has devolved the responsibility of delivering and financing essential health services to the counties, while the national Ministry of Health is mandated to provide policy support and technical guidance to priority

national programmes. The mandates of the national health sector include referral facilities, policy formulation, capacity building, and regulations and technical support, while service delivery is assigned to the county governments. County governments are responsible for county health services, including county health facilities and pharmacies, ambulance services, promotion of primary healthcare, licensing and control of undertakings that sell food to the public, veterinary services (excluding regulation of the profession), cemeteries, funeral parlors and crematoria, refuse removal, refuse dumps, and solid waste disposal. Although health is a devolved function to the counties, the national government controls a huge share of the total health expenditure (THE) accounting for 44% of the total health expenditure in the 2018/2019 financial year.

Kenya's population stood at 47.6 million based on the 2019 population census. About 70% of this population is resident in the rural areas (Kenya National Bureau of Statistics, 2020a). The Ministry of Health (2020) health facility list shows 12,731 health facilities in the country, out of which 5,970 (46.9%) were public and 5,347 (42%) private, 1,019 (8.1%) faith-based organizations and 382 (3%) were owned by Non-Government Organizations (Ministry of Health, 2020). The structure of the health care system starts at the community level where there are levels 1, 2 and 3 facilities consisting of dispensaries and health centres. Next are the primary level 4 facilities consisting of hospitals that handle cases referred to them from the lower level health facilities. The next levels are the level 5 secondary facilities and at the apex are the tertiary referral hospitals or what are known as level 6 (Ministry of Health, 2007a).

The Constitution of Kenya 2010 Article 43 (1) (a) provides every citizen the right to the highest attainable standards of health, which includes the right to health care services, including reproductive health. Healthcare services in Kenya are provided by public and private providers, with the latter comprising both not-for-profit and for-profit providers. The distribution of health facilities by ownership in 2015 is as shown in Table 4.

Table 4 shows that at the lowest level (dispensary), the Ministry of Health has the highest percentage of health facilities. However, most of level 3 health facilities are owned by private, faith-based and Non-Governmental Organizations (NGOs). The total number of health facilities in Kenya increased by 5.2% from 13,113 in 2018 to 13,790 in 2019 as shown in Table 4. The table also shows that Level 3 health facilities increased from 2,154 in 2018 to 2,313 in 2019, accounting for 16.8% of the total facilities. Level 3 facilities constitute medical centres (31.0%), health centres (56.0%) and nursing homes (13.0%). Most of the health centres at 82.2% were owned by the Government while the private sector owned 95.0% of the nursing homes.

Annex Table A2 shows the distribution of the number of health facilities in 2018 by county. In 2018, there are 52% public and 48% private health facilities. From Annex Table A2, it is clear that some counties such as Nairobi (80%), Nakuru, Kirinyaga, Kiambu (78%), Kajiado (67%), Nyeri (62%), Meru (68%) and Mombasa (79%) have the highest number of private health facilities with Nairobi having the most facilities followed by Mombasa and Kiambu.

Table 4: Health facilities by level, type and ownership, 2015-2019

Level	Type of Health Facility	Ownership	2015	2016	2017	2018	2019	% in 2019	
Level 2	Dispensary	MoH	3,768	4,019	4,350	4,459	4,652	82.3	
		Private	120	121	126	138	147	2.6	
		FBO	783	792	812	819	829	14.7	
		NGO	20	20	21	23	27	0.5	
		Sub-Total	4,691	4,952	5,309	5,439	5,655	100	
	Medical Clinic	MoH	11	11	11	13	14	0.3	
		Private	3,302	3,570	3,902	4,193	4,427	94.2	
		FBO	9	10	11	16	17	0.36	
		NGO	201	217	233	238	240	5.1	
		Sub-Total	3,523	3,808	4,157	4,460	4,698	100	
	Stand Alone	MoH	30	34	34	34	34	10.7	
		Private	130	137	143	149	169	53.1	
		FBO	21	22	22	22	22	6.9	
		NGO	81	85	86	90	93	29.3	
		Sub-Total	262	278	285	295	318	100	
		Total	8,476	9,038	9,751	10,194	10,671		
	Level 3	Medical Centre	MoH	0		0	0	0	0
			Private	335	387	469	582	685	95.5
FBO			3	3	3	7	8	1.1	
NGO			20	21	21	23	24	3.4	
Sub-Total			358	410	493	612	717	100	
Health Centre		MoH	1000	1014	1023	1028	1039	80.2	
		Private	10	10	11	12	13	1.0	
		FBO	192	198	201	202	204	15.8	
		NGO	26	30	37	37	39	3.0	
		Sub-Total	1,228	1,252	1,272	1,279	1,295	100	
Nursing Home		Private	183	194	214	249	286	95.0	
		FBO	5	5	5	5	5	1.7	
		NGO	8	8	8	9	10	3.3	
		Sub-Total	196	207	227	263	301	100	
		Total	1,782	1,869	1,992	2,154	2,313		

continued next page

Table 4 Continued

Level	Type of Health Facility	Ownership	2015	2016	2017	2018	2019	% in 2019
Level 4	Primary Care Hospitals	MoH	357	358	353	354	356	45.5
		Private	181	202	231	269	303	38.8
		FBO	99	100	101	106	109	13.9
		NGO	12	12	12	12	14	1.8
		Total	649	672	697	741	782	100
Level 5	Secondary Care Hospitals	MoH	9	9	13	13	13	72.2
		Private	2	2	2	2	2	11.1
		FBO	3	3	3	3	3	16.7
		NGO	0	0	9	0	0	0
		Total	14	14	18	18	18	100
Level 6	Tertiary Referral Hospitals	MoH	4	4	6	6	6	100
		Private	0	0	0	0	0	0
		FBO	0	0	0	0	0	0
		NGO	0	0	0	0	0	0
		Total	4	4	6	6	6	100
		Grand Total	10,925	11,597	12,464	13,113	13,790	

Key: MOH=Ministry of Health; FBO=Faith-Based Organization; NGO=Non-Governmental Organization

Source: Kenya National Bureau of Statistics (2020), Economic Survey

According to the 2020 Ministry of Health Master Facility List, there are 12,731 health facilities in the country, of which 46.9% are public, 8.1% are Faith-Based Organizations (FBOs), Non-Governmental Organizations (NGOs) 3% and 42% are privately-owned. This implies that the health sector in Kenya is more private than public, and that the public health system may not be able to provide health services to everybody who falls sick and more so during the COVID-19 pandemic.

According to the Republic of Kenya (2019)-the total number of health facilities in Kenya in 2018 was 9,654⁴. Dispensaries formed the highest proportion of this total (79.8%) followed by health centres (14.9%) and first level hospitals (5.1%). Tertiary hospitals, which are generally referral hospitals (level 4 and 5) expected to handle critical cases such as those caused by COVID-19, were only 23 (0.2%) as shown in Annex Table A2.

The health facilities were unevenly distributed, with most counties not having a tertiary hospital. Nairobi had the highest number of health facilities at 724 (7.5%) and having the highest number of tertiary institutions (8). This is significant considering that Nairobi had the highest number of COVID-19 cases.

Human resources in the public health system

The World Bank reports that in Rwanda, the long educational and health institutions closure due to COVID-19 will adversely affect the supply chain of qualified health workforce to deliver quality health services (World Bank, 2020a). By the onset of COVID-19, Kenya did not have adequate health facilities to meet the internationally recommended workforce per 10,000 population. In total, Kenyan health workforce was only at 15.6 out of a target of 68.0, implying that COVID-19 pandemic found Kenya in a state of unpreparedness in terms of workforce to handle the pandemic. The available workforce was unevenly distributed among the counties as shown in Annex Table A4.

The World Health Organization (WHO) recommends a doctor patient ratio of 1 doctor per 1000 population. A 2018 report by the Kenya Medical Registration Board shows that the number of registered and active doctors in Kenya were only 6,394 and the number of registered and active dentists was only 683. This translates to a ratio of 1 medical doctor to 7,507 patients and 1 dentist to 70,278, meaning that the available doctors would be stretched to the limit to handle the increased number of COVID-19. Geographically, there is a huge divide between human resources that are available in rural areas and urban areas as shown in Table 5.

Table 5: Distribution (%) of health personnel by facility type, ownership and location

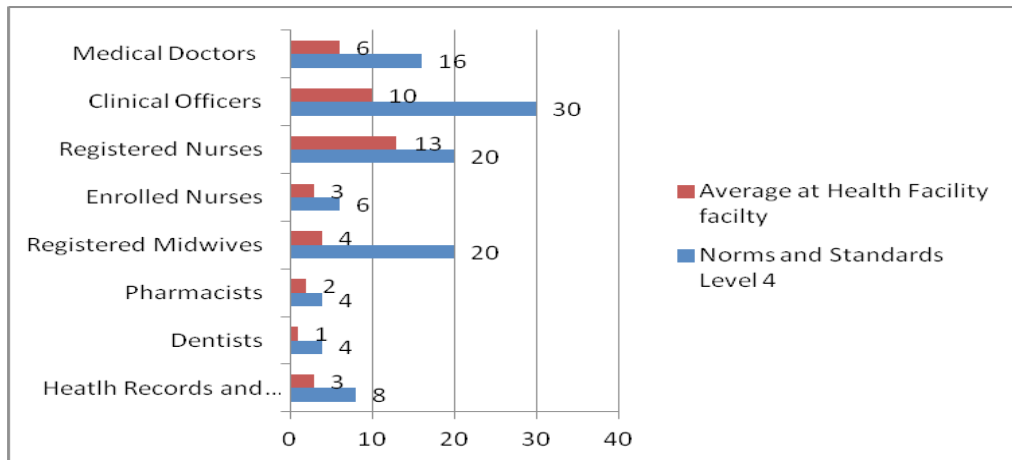
Health Personnel	Kenya	Nairobi	First level hospitals	Health centres	Dispensary and clinics	Private	Public	Rural	Urban
Physician/ Medical Doctor	2.6	7.7	4.9	0.7	1.1	4.5	1.2	0.6	4.4
Medical Officer	7.2	18.1	13.6	3.2	2.1	10.2	5.1	2.7	11.3
Clinical Officer (Specialist)	1.9	0.9	2.4	1.4	1.6	1.9	1.9	1.3	2.4
Clinical Officer	19.1	16.6	13.0	23.8	23.6	21.9	17.1	19.9	18.4
Nurse (Specialist)	0.9	0.4	1.1	0.3	0.9	0.8	0.9	0.6	1.1
BSc Nurse	4.0	2.5	4.3	4.0	3.6	2.7	4.9	4.1	3.9
KRCHN	52.0	47.2	50.4	54.3	52.4	47.8	55.0	55.9	48.5
KECHN	12.4	6.6	10.4	12.3	14.7	10.1	13.9	14.9	10.1
Total	100	100	100	100	100	100	100	100	100

KRCHN=Kenya Registered Community Health Nurse; KECHN=Kenya Community Health Nurse
Source: Republic of Kenya (2019), Kenya Health Service Delivery Indicator Survey 2018 Report

Table 5 shows that rural areas have the least number of physicians/medical doctors at only 0.6% compared with Nairobi County which has 7.7% of the total number of physicians/medical doctors. Medical officers are also concentrated in urban areas at 11.3% compared with 2.7% in rural areas. This would mean that critical cases from rural areas would have to be referred to Nairobi County. However, rural areas lead in the number of Kenya Registered Community Health Nurses (KRCHN) at 55.9% and clinical officers (19.9%).

About 70% of the Kenyan population lives in rural areas. They mostly rely on level 4 health facilities, community health volunteers and health facilities that are staffed by nurses who provide primary health care services such as immunization. Sub-county hospitals provide more services, and only a few medical doctors are available as shown in Figure 7. In primary level 4 hospitals, there were, on average, only 6 medical doctors against the recommended 16; 10 clinical officers against the recommended 30; 4 midwives against the recommended 20; and 1 dentist against the 4 recommended (Republic of Kenya, 2019).

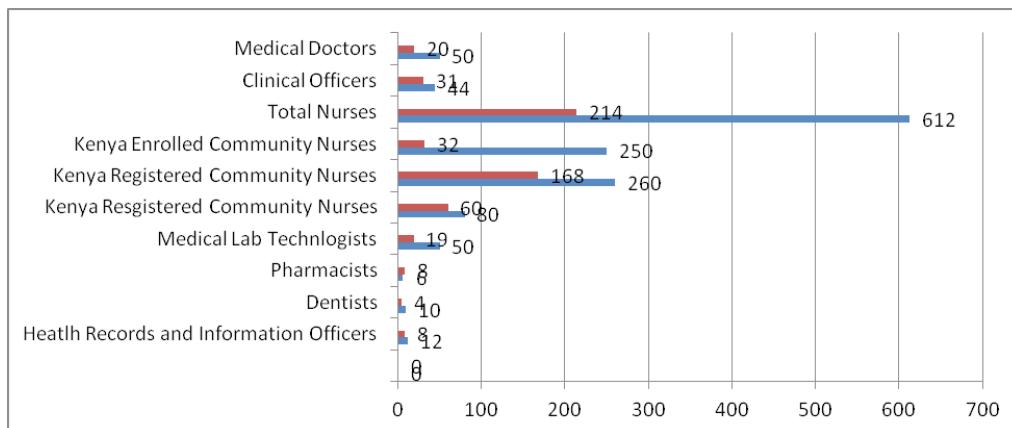
Figure 7: Health workforce norms and average health workers in primary level 4 hospitals in Kenya-2018



Source: Ministry of Health - Kenya harmonized health facility assessment 2018/2019

The average number of medical doctors in level 5 and tertiary hospitals was 20, which is below the recommended 50 and only 4 dentists against the WHO recommended 10 as shown in Figure 8.

Figure 8: Health workforce norms and average health workers in secondary level 5 and tertiary hospitals (Level 6) in Kenya, 2018



Source: Ministry of Health - Kenya harmonized health facility assessment 2018/2019

As shown in Figure 8, the total number of nurses was only 214 against the recommended 612. There was also a shortage of medical laboratory technologists whose number stood at 19 against the recommended 50. Medical laboratory technologists are crucial during times of any pandemic as they perform all laboratory tests and procedures that help doctors to diagnose, monitor, treat and prevent diseases. These tests range from blood banking, chemistry, hematology, immunology, and microbiology, and many others. All this shows that the level of preparedness in terms of workforce of the health sector to handle a pandemic was below the expected levels.

Literature review

Healthcare facilities play a critical role in national and local responses to emergencies such as COVID-19. The World Health Organization (2014) recommends that a health facility should ensure availability of alternative treatment sites for treatment of the pandemic cases; put in place infection prevention and control measures such as isolation rooms; ensure protocols for patient triage (including the designation of triage areas) and for patient traffic flow within and in the vicinity of the hospital; and put in place measures to ensure the safety of hospital staff and paying attention to the physical, mental, emotional and social needs of hospital staff and their families during an epidemic. In any pandemic, information is power and health facilities should have information on epidemiological data that should be communicated to the communities and measures taken to avoid the risk of infection. Health facilities should also have specialized human and physical resources such as well-equipped Intensive Care Units (ICUs) to handle the pandemic and logistic services available to transport the sick. A health facility should also continue with the general and specialized services that it normally provides, including care of patients with acute or chronic illnesses such as Non-Communicable Diseases (NCDs), laboratory services, community health outreach activities (immunization and antenatal care, post-natal care), distribution and tracking of pharmaceutical and other medical supplies, and training of health personnel.

A study by WHO (2018) shows that NCDs are the leading causes of death and disability globally, affecting more people each year than all other causes combined. The study shows that NCDs are responsible for over 70% of all deaths, with nearly 80% of these deaths occurring in low- and middle-income countries. In Kenya, a survey by the Ministry of Health in 2015 on Non-Communicable Diseases (cancer, cardiovascular diseases, diabetes, chronic respiratory diseases, and mental illness) found that they accounted for more than 50% of hospital admissions and 55% of hospital deaths in Kenya (Ministry of Health, 2015). A pandemic leads to disruption of NCD services in terms of screening, case identification, and referral systems. WHO (2020c) contends that those living with NCDs are at increased risk of becoming severely ill with the coronavirus. Increased demand for the limited specialized facilities such as intensive care units (ICUs) to treat and take care of COVID-19 patients could have led to disruption of treatment for NCDs.

The measures to curb COVID-19 could also have disrupted common preventive services, including immunization and reproductive, maternal and child health preventive services. Riley et al. (2020) contend that a decline of 10% in coverage of antenatal and postnatal health care would have disastrous implications for the lives of women and their newborns. The authors estimated that an additional 1.7 million women who give birth and 2.6 million newborns would experience major complications but would not receive the care they need. This would result in an additional 28,000 maternal deaths and 168,000 newborn deaths (Riley et.al., 2020). The United Nations Population Fund (UNFPA), which is a major supplier of contraceptives in developing countries, reports that COVID-19 disruptions would cause stock-outs of modern contraceptives in 46 countries that usually receive supplies from them (UNFPA, 2020).

The World Bank (2020b) reports that in Uganda, between April and June 2020, the coverage of antenatal care in-facility deliveries and some immunization services dropped by between 5% and 30% compared with the similar period in 2019. Maternal deaths increased by 19% between the last quarter of 2019 and the last quarter of 2020; the numbers of pregnant mothers seen for their first antenatal care visits declined by between 31% and 55% in Eswatini, and there are also increases in teenage pregnancies in the country (Mahmud and Riley, 2020; World Bank, 2020b).

Objectives of the study

The COVID-19 pandemic was unexpected and Kenya had not had the experience of handling a pandemic of such magnitude. A country's level of preparedness for an epidemic determines how fast the pandemic spreads, how sick the patients will be and the fatality rate. In 2018, Kenya's level of preparedness was at 60% compared to that of South Africa, whose level was 79% (Sambala et al., 2018).

Therefore, the objective of this study is to analyse the impact of COVID-19 measures on the health sector. Specifically, this study:

- a) Investigates the level of preparedness of Kenya's health system for COVID-19 pandemic using selected indicators of preparedness;
- b) Analyses the level of selected health indicators before COVID-19 pandemic; and
- c) Analyses the impact of COVID-19 measures on selected health indicators.

The study aims to answer the following questions:

- (i) How prepared was Kenya's health system for a pandemic?
- (ii) What was the level of selected health indicators before COVID-19 pandemic?
- (iii) What is the impact of government COVID-19 measures on these health indicators?

The results of this paper are expected to provide a platform to engage and influence policy makers charged with the response to health to coordinate the required protocols to prevent the spread of the COVID-19 pandemic. It is also expected that the results will provide evidence to minimize the unintended consequences of the measures used to curb COVID-19 in Kenya.

3. Data and methodology

Data sources

The study uses secondary data sourced from documented literature using electronic databases, grey literature, reference harvesting and discourse analysis. The secondary data were sourced from the Ministry of Health, African Union Heads, International Monetary Fund, Kenya Demographic Health Survey, Kenya National Bureau of Statistics, National Council for Population and Development, Republic of Kenya, United Nations Population Fund (UNFPA), United Nations International Children's Emergency Fund (UNICEF), United Nations, United Nations University - World Institute for Development Economics Research (UNU-WIDER), World Health Organization (WHO), World Bank, Government of Kenya policy documents, The National Treasury and Planning, civil societies, Non-Governmental Organizations (NGOs) and Faith-Based Organizations (FBOs). Additional literature and data were sought from other relevant institutions, which included other Government Ministries, Departments and Agencies (MDAs). The study also analyzed social and mainstream media reports on the COVID-19. Secondary data were complemented with primary data.

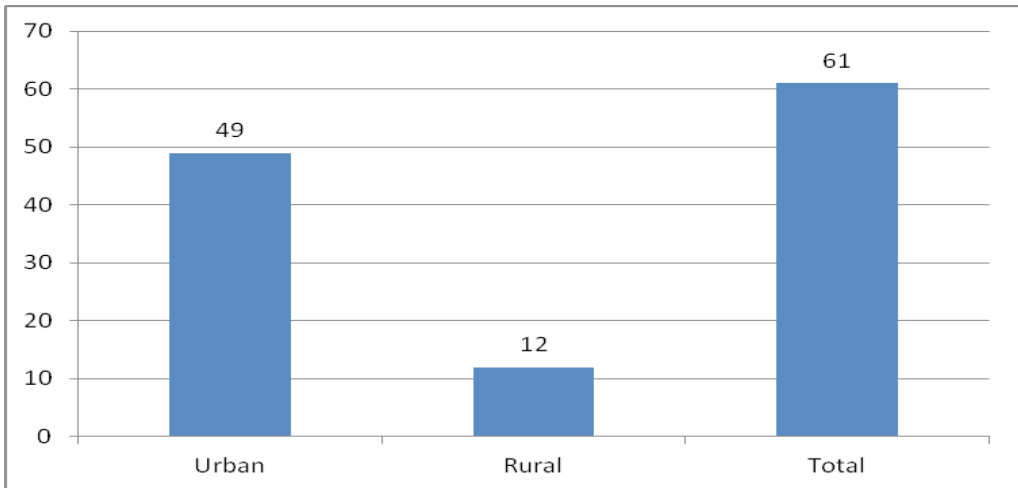
Methodology and process

To gather information on the impact of COVID-19 on health, the author attended webinars on health to gather data on patients, both male and female, medical practitioners in both public and private health facilities and policy makers. An electronic questionnaire was administered to medical practitioners in both public and private health facilities and policy makers. Primary data were also gathered through Focus Group Discussions (FGDs) with women of child bearing age and older ones; and people living with chronic diseases such as cancer, diabetes, high blood pressure, HIV/AIDS, among others. Oral testimonies were also recorded from the participants. Information was also gathered from key informants on health systems. FGDs⁵ were held under strict Ministry of Health COVID-19 standard operating protocols in open

spaces and the author made sure that participants were sanitized and provided with masks. Online discussions were held with other researchers doing work related to this topic and information exchanged, thus learning from one another.

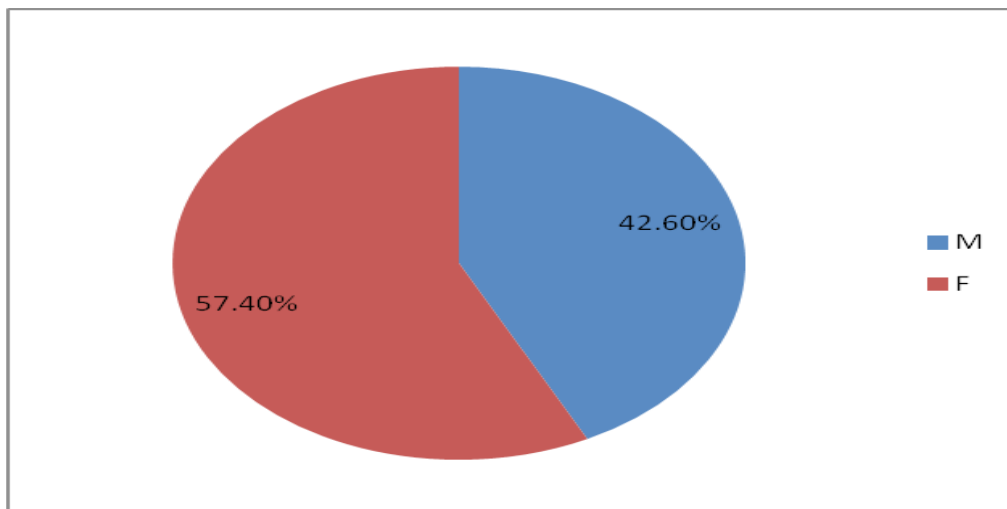
Guided by circumstances facing the country at the time this study was conducted (curfew, COVID-19 pandemic), the author found it convenient to use purpose sampling. Purposive sampling generally helps a study to answer research questions by focusing on particular characteristics of a population of interest. In the case of this study, everybody in Kenya, male, female, young or old and people of all tribes and nationalities had in one way or another been affected by the COVID-19 measures. The study oversampled Nairobi since it accounted for 43.3% of COVID-19 cases in Kenya. The first COVID-19 measures taken by the Government closed off the Nairobi Metropolitan and people could not leave its boundaries and outsiders could not enter the Metropolitan. The effects of the COVID-19 measures were therefore expected to impact more the people living in the city and its surroundings. It was also easier to conduct and use an electronic questionnaire and conduct Focus Group Discussions during the day and be home early in the city without breaking curfew hours. A total of 122 electronic questionnaires⁶ were sent by email⁷ and 61 participants responded, giving a response rate of 50%. Figure 9 shows the number of participants by region.

Figure 9: Number of participants by region



As Figure 9 shows, (49)80.3% of the participants came from urban areas while (12)19.7% were from rural areas. The total sample size for the electronic questionnaire⁸ was 61 participants, with 42.6% males and 57.4% females as shown in Figure 10.

Figure 10: Number of respondents by gender



The respondents to the electronic questionnaire were chosen from a list of emails from the author’s emailing list, since physical face to face interviews were hard to conduct at that time as many people were working from home.

The age of the participants ranged from 17 years to those over 76 years as shown in Table 6.

Table 6: Total number of respondents by age group

Age Group		Frequency	Percent
Valid	17-25	7	11.5
	26-40	9	14.7
	41-55	20	32.8
	56-65	12	19.7
	66-75	7	11.5
	76-100	6	9.8
	Total	61	100.0

Majority (32.8%) of the respondents were in the 41-55 years age group followed by those between 56 and 65 years (19.7%). The participants who responded to the electronic questionnaire came from Nairobi (73.8%), Machakos, Murang’a, Nyeri, Vihiga, Narok, Nakuru, Kiambu, Nyandarua and Embu as shown in Table 7.

Table 7: Distribution of respondents by county

County	Frequency	Percent
Nairobi	45	73.8
Machakos	1	1.6
Murang'a	4	6.6
Nyeri	3	4.9
Vihiga	1	1.6
Narok	2	3.3
Nakuru	1	1.6
Kiambu	2	3.3
Nyandarua	1	1.6
Embu	1	1.6
Total	61	100

There were 31 participants for FGDs divided into groups of 10 to make it easy for discussions. The participants for the FGDs were drawn from Kawangware, Mathare and Kibra. These are low income, high poverty rates informal settlements and most of the people who live in these areas are the primary users of public health facilities. The residents mostly earn their livelihoods by working in the richer neighbourhoods as domestic workers, guards, gardeners; in industrial area or the central business district; or operate small business in their neighbourhoods. The settlements are also heavily populated, with minimal social distancing and do not have well-organized utility facilities such as metered water and electricity and therefore some of the government measures on COVID-19 could have had a major impact on the population. Village and church elders from the three informal settlements were used to identify the FGD participants.

The participants, young and older women and men, were asked whether their health seeking behaviour had changed since COVID-19 was declared a pandemic and especially after the Government of Kenya instituted measures to curb the spread of the virus, using indicators such as access and use of contraceptives, antenatal and postnatal visits, place of delivery and access to immunization services. They were also asked whether any one of them was living with a chronic condition such as hypertension, diabetes, cancer, Human Immunodeficiency Virus (HIV), and arthritis among others that required them to be on medication on a daily basis and how this had been impacted by COVID-19. They were then asked whether they were able to access medication such as antiretrovirals (ARVs), chemotherapy, radiotherapy, and dialysis or hypertension drugs. They were also asked whether they knew of anyone in their neighbourhood or elsewhere whose health had been negatively impacted by the COVID-19 measures.

The study used 18 key informants⁹ who were asked questions on whether they had observed changes in the health seeking behaviour of patients. They were also asked whether patients with non-communicable diseases were given the same attention as COVID-19 positive patients since 16th March 2020. Their opinion was also sought on the number of resources available for use in the health sector, including public health sector funding; whether the counties had enough resources to handle COVID-19 and whether the Kenya health system was well prepared to handle COVID-19. Their opinion was sought on how the Government of Kenya had handled COVID-19 in terms of measures taken to contain the spread of the virus, and availability of resources such as testing kits, personal protective equipment (PPEs), and quarantine/isolation facilities, among others. They were also asked what the impact of COVID-19 on frontline workers such as medical doctors, nurses, dentists had been.

Information was also sought from respondents and participants on change in their health seeking behaviour because of the COVID-19 measures instituted by the government. Information was also sought on access to a few selected health indicators such as access to contraceptives, adolescents/teenage pregnancies, child marriages, access to antenatal services, place of birth and access to immunization services and especially DPT3 vaccination.

Participants were also asked whether they were living with non-communicable chronic diseases and in particular hypertension, diabetes, arthritis and cancer and whether they were able to access drugs and medical treatment for these diseases during the COVID-19 lockdown.

Information was also gathered on availability of medical insurance by the respondents and the impact of COVID-19 on their mental health. Finally, participants were asked whether they were aware of people whose health had been impacted upon due to the measures taken by the government to curb the spread of COVID-19. Table 8 shows the category of key informants.

Table 8: Category of key informants

Category	Frequency	Percent
Cardiologist	2	11.1
Gynecologist	1	5.6
Physiotherapist	1	5.6
General Practitioner	4	22.2
Lecturer	1	5.6
Lab Technologist	1	5.6
Neonatal Nurse	1	5.6
Pediatrician	3	16.7
Rheumatologist	2	11.1
Surgeon	1	5.6
Urologist	1	5.6
Total	18	100

The primary data were thereafter transcribed, grouped into themes, analyzed and then presented in narratives to complement the secondary data, which is presented in tables and graphs.

Limitations of methodology

COVID-19 was declared a pandemic in March 2020 and, therefore, very little had been documented on its impact. Institutions that carry out data collection, such as the Kenya National Bureau of Statistics, usually release their reports on a yearly basis. Kenya had not had the experience of a pandemic and therefore the Ministry of Health did not have data that could be used to show how the measures had impacted on the health system. The Ministry of Health was releasing information on the pandemic daily, but not on other health indicators. However, some institutions such as the Kenya Private Sector Alliance (KEPSA) had done rapid surveys in March and April 2020 to gauge the impact of COVID-19 measures. The Kenya National Bureau of Statistics (2020) also did a study on the socio-economic impact of COVID-19 on households in May 2020. Some of the findings of these studies are compared with the results of this study. To overcome this challenge, the author collected primary data from Kenyans from 10 counties, who gave their views on how the COVID-19 pandemic measures had impacted on them. Key informants also gave valuable information on how these measures had impacted on the health sector. Considering the small sample size, these results should be interpreted with caution and the impact also taken as a correlation or consequence and not direct causation.

4. Results and findings

Level of preparedness of Kenya’s health system to COVID-19 pandemic

Indicators of a health facility’s level of preparedness for COVID-19 were recommended by the World Health Organization in 2019, where a health facility at whatever level is expected to have an area or unit dedicated solely for emergency services. This unit is expected to be fully equipped with appropriate equipment and capacity to handle, manage and provide diagnoses (World Health Organization, 2020a). These facilities should have a 20-hour operating system. Using the Ministry of Health (2020) Kenya harmonized health facility assessment 2018/2019, this study found that out of a total of 411 hospital facilities, only 25% had a special emergency unit and 20% had a dedicated emergency unit that operates for 24 hour as shown in Table 9.

Table 9: Number of hospitals with general emergency services

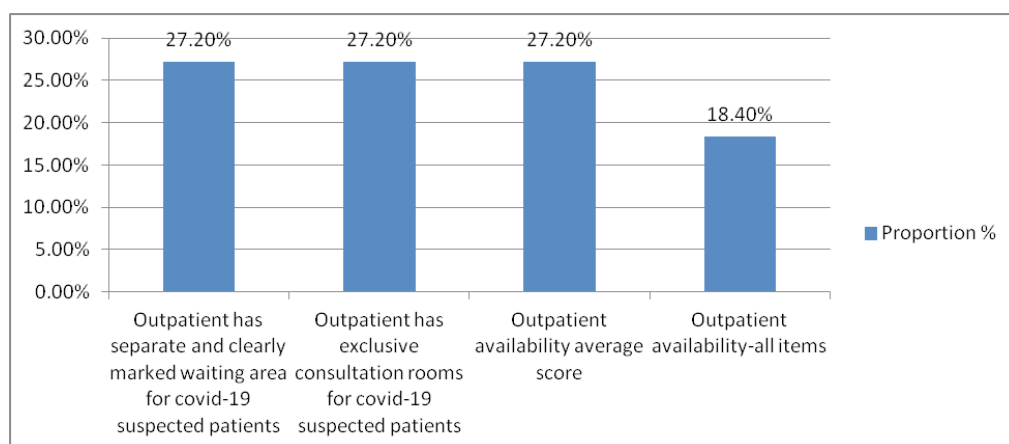
Type of Emergency Service	Number	Proportion (9%)
Availability of 24 hr emergency services	292	71
Availability of 24 hr laboratory services	275	67
Availability of 24 hr radiological services	180	44
Medical and nursing staff assigned to remain in ER for 24 hours	147	36
Core non-rotating staff assigned to emergency room	115	28
Facility has special emergency unit	103	25
Facility reports using a formal triage system with a standardized instrument	86	21
Dedicated emergency unit operating 24 hours	82	20
24 hr surgical unit that includes surgeon and anesthetist on site 24 hours	33	8
Total	411	100

Ministry of Health (2020) - Kenya harmonized health facility assessment 2018/2019

Table 9 shows that even though 71% of hospitals in Kenya had a 24-hour facility, only 67% had 24-hour laboratory services that would provide the evidence that a patient was COVID-19 positive.

To deal with a pandemic of the level of COVID-19, a health facility needs to have separate and clearly marked waiting area for COVID-19 suspected patients in the outpatient department (OPD). It also needs to have exclusive consultation rooms for COVID-19 suspected patients. It is also essential that equipment for emergency patient examination and for emergency treatment especially for patients with breathing problems as exhibited by COVID-19 positive patients are available in emergency service area and functioning. These are suction apparatus (manual); suction apparatus (electronic); suction catheters; ricothyroidotomy set; oropharyngeal airway - adult; oropharyngeal airway- pediatric; and supraglottic device. Figure 11 shows that out of the 114 hospitals, only 27.2% had these facilities and only 18.4% had all the items required in the consultation rooms for suspected COVID-19 patients. This clearly shows a low level of preparedness of Kenya's health system for COVID-19 pandemic.

Figure 11: Availability of OPD services for COVID-19, July-August 2020



Source: Ministry of Health (2020b) - Kenya Health Information System (KHIS) 2020

To prevent infection of health workers and patients, a health facility is required to have disposable latex gloves (sterile); auto-disable syringes; safety box (for sharps); soap (bar or liquid) for hand hygiene; environmental disinfectant (e.g., chlorine, alcohol); waste receptacle for potentially infectious non-sharp waste with functional foot pedal to open it; surgical/respiratory masks; aprons; waste receptacle bin with lid and plastic bin liner clearly marked, for example by label or color, for biological waste; gowns; non-sterile protective gowns; sterile gowns; disposable paper towels for drying hands; poster reminding staff about hand hygiene or showing good hand hygiene techniques; gumboots or clogs; hair cover; N95 face masks; and eye protection goggles, face shields.

Mean availability of these items = (Disposable latex gloves (sterile)+Auto-disable syringes+ Appropriate storage bin for sharps waste + Hand hygiene items + Surface disinfectant + Appropriate storage bin for infectious waste + surgical/respiratory masks + Aprons + Appropriate storage bin for biological waste + Protective gowns + Disposable

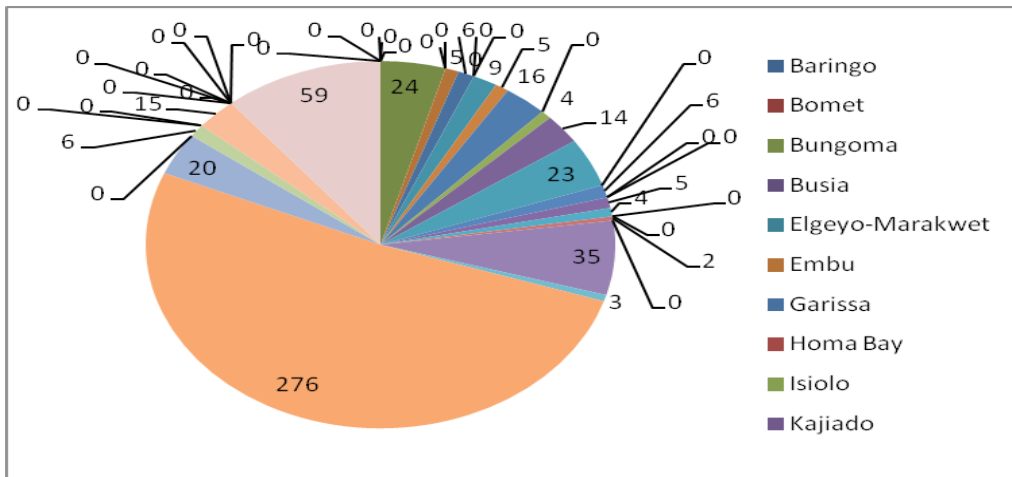
paper towels for drying hands + Poster reminding staff about hand hygiene or showing good hand hygiene techniques + Gumboots or clogs + Hair cover+ N95 face masks +Eye protection (goggles, face shields)/16.

This study found that out of 2,236 health facilities in Kenya, none has all these items. The mean availability of these items stood at only 3%, hence increasing the possibility of infection of frontline workers and patients seeking services from these facilities.

Barasa, Ouma and Okiro (2020) had predicted that Kenya would need an additional 1,511 ICU beds and 1,609 ventilators with a 6 months’ COVID-19 transmission curve) to absorb caseloads due to COVID-19. However, a national survey conducted by the Kenya Healthcare Federation in 2020 found that the total number of ICU beds in Kenya was only 537, and these sparsely spread out in the counties as shown in Annex Table A7 and Figure 12.

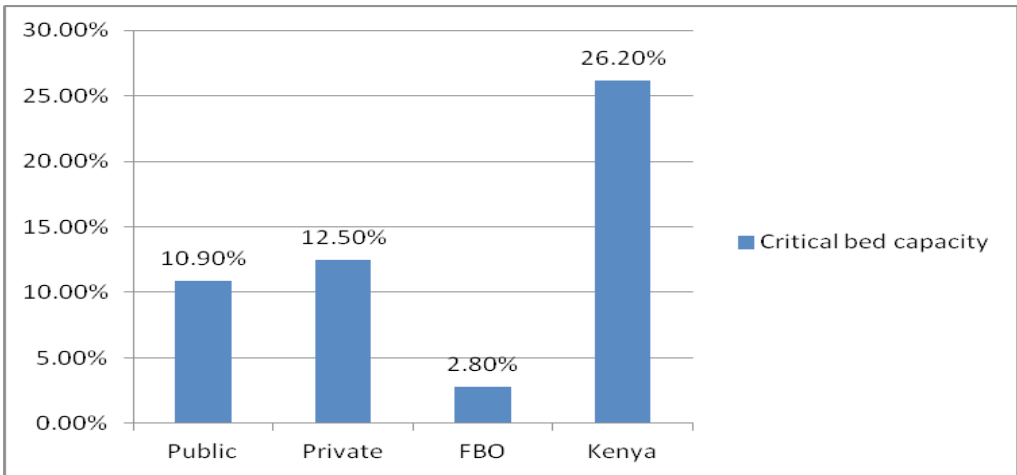
The number of hospital beds that the critically ill can use when admitted was 37,216. Nairobi had the highest contribution to this number with 2,341 in public hospitals and 2,486 (private plus FBOs). Out of the 47 Counties, Nairobi has the highest number of ICU beds at 276, accounting for 51% of ICU beds in the country. However, Nairobi had only 99 ICU beds in public hospitals while the rest (177) belonged to the private sector and faith-based organizations; Mombasa follows with 35 ICU beds but only accounting for 6.5%. It is important to note that counties not shown in Annex Table A8 did not have any ICU beds at the time and have got to rely on neighbouring counties or airlift the critical cases to Nairobi.

Figure 12: Number of ICU beds available by county



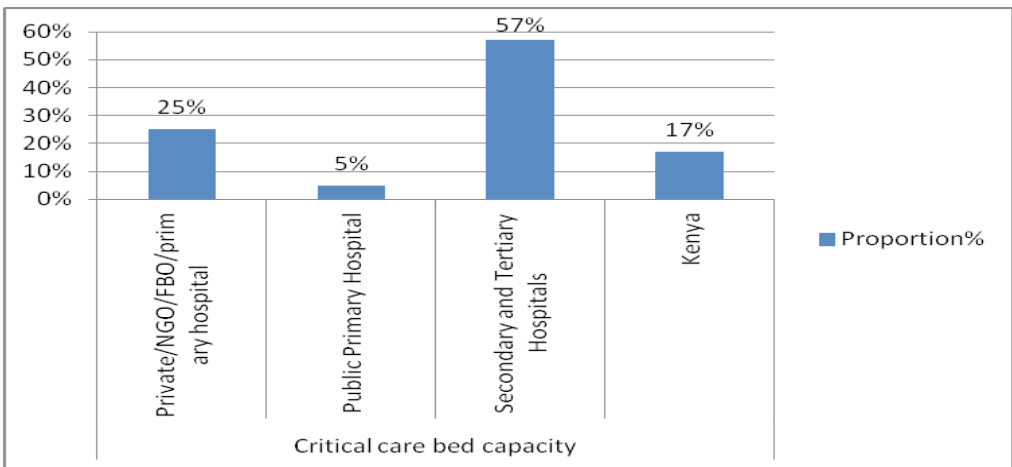
Most COVID-19 patients admitted in hospital require ventilators or are supposed to be put on supplementary oxygen. Unfortunately, there were only 256 ventilators available in Kenyan hospitals as at October 2020, with majority of these (65.2%) in Nairobi. Availability of beds for COVID-19 patients who needed critical care also shows that, in total, Kenya had only 26.2% of the required bed capacity for critical care (2,048¹⁰) as shown in Figure 13.

Figure 13: Critical bed capacity by ownership, July-August 2020



Public primary hospitals or what is known as level 4 and 5 hospitals had only 5% bed capacity for critical care. The bulk of the bed capacity (57%) is in the secondary (mainly private) and the three tertiary hospitals (Kenyatta National Hospital, Kenyatta University Teaching, Referral and Research Hospital and Moi Teaching and Referral Hospital as shown in Figure 14.

Figure 14: Critical care bed capacity by level of hospital, July-August 2020

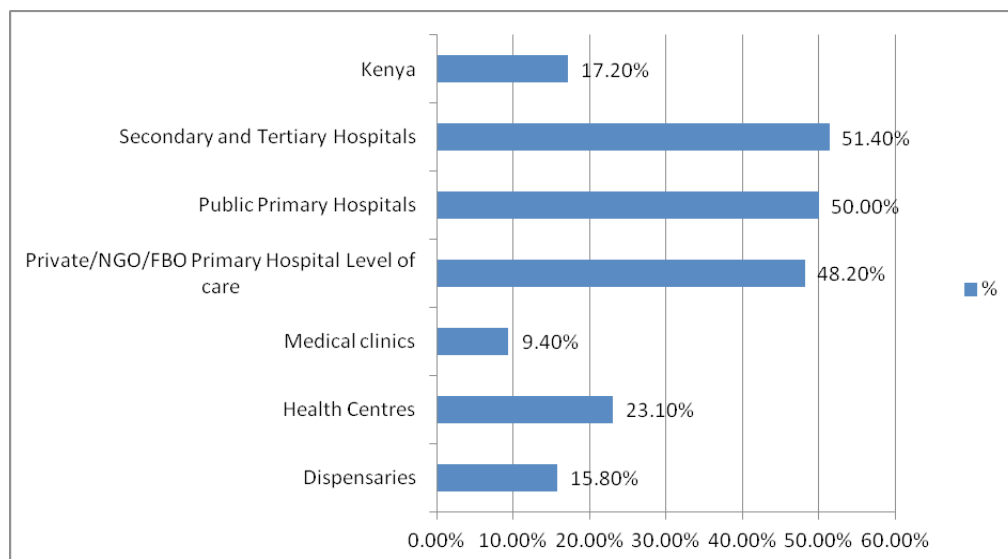


Source: Ministry of Health (2020b) - Kenya Health Information System (KHIS) 2020

During the pandemic, there was (and even now) need for regular sharing of information. Health facilities should be well-equipped to submit regular information on COVID-19 to inform the public on risk factors, what is needed to avoid infection, the spread of the virus, share information with other health facilities to learn from

each other, and especially since there was very little information available on how to handle the virus. The communication system should be inter-hospital and intra-hospital to not only share information but to also share data on the virus. This is as per the US Centre for Disease Control 2019 recommendation. As late as August 2020, the Kenya health system was only at 17.2% in terms of submitting regular information on COVID-19, and most of this information was coming from secondary and tertiary hospitals, public primary hospitals and private/NGO/FBO primary hospital level of care as shown in Figure 15.

Figure 15: Facility submits regular information on COVID-19, July-August 2020

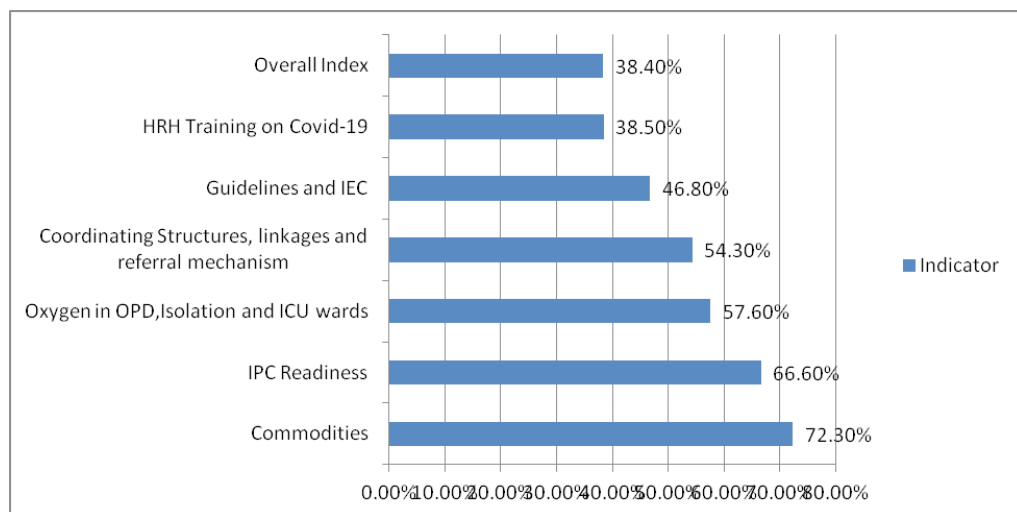


Source: Kenya Health Information System (KHIS) 2020

A health system is expected to always be ready to handle a pandemic. The Kenya Service Readiness and Availability Assessment Mapping (SARAM) (Ministry of Health, 2013) defines readiness as the ability of a health facility to provide comprehensive services. The Kenya Essential Package for Health (KEPH) defines services that should be provided to different age cohorts, disaggregated by level of care. There are four key indicators of service readiness for health facilities: standard precautions for infection control, availability of essential medicines, basic equipment and amenities. Apart from having an outpatient that can cater for COVID-19 suspected patients and reporting, a health system needs well-trained human resource on how to handle the pandemic, well prepared guidelines on Information, Education and Communication

(IEC); coordinating structures, linkages and referral system; oxygen in OPD, isolation and ICU wards; infection, prevention and control readiness; and enough commodities to test for diseases. The overall score is the average of the scores from each of these indicators. Figure 16 shows the level of preparedness using the scores from various indicators of readiness.

Figure 16: Level of preparedness for COVID-19, July-August 2020

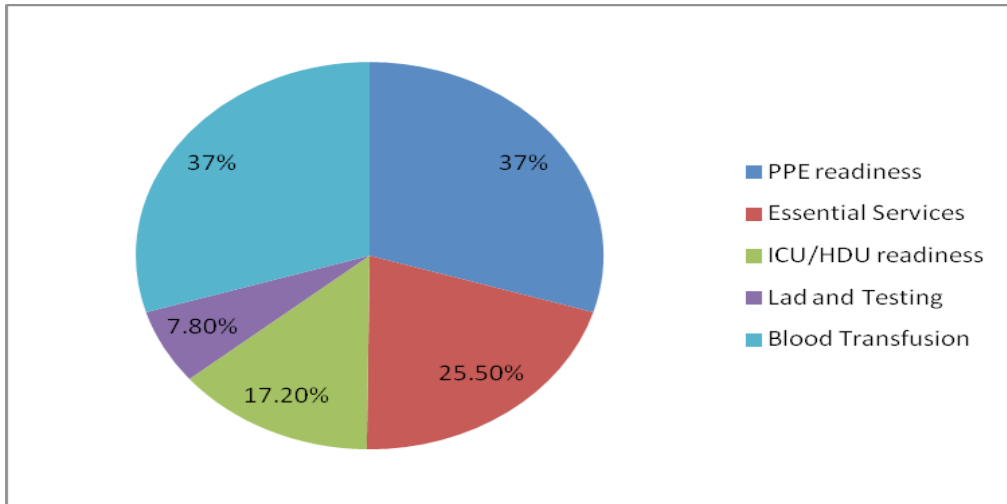


Source: Ministry of Health (2020b), Kenya Health Information System (KHIS) 2020

In terms of infection, prevention and control (IPC) of the pandemic, Kenya scored 66.6%, meaning that some health facilities did not have all the items required to prevent infection of both the health workers and the patients. In terms of commodities required to handle the pandemic, Kenya scored 72.3%. However, the score for human resource training was only at 38.5%. Kenya’s overall readiness index on all these indicators of readiness was at 38.4%.

Other indicators of readiness are availability of personal protective equipment (PPEs), essential services for treatment and care of patients, blood transfusion, laboratory and testing facilities, ICU and HDU beds. Figure 17 shows that Kenya’s health personnel did not have enough PPEs as these were only at 37% of the required, essential services were at 25.5%, ICU/HDU readiness was only at 17.2% of the required and only 7.8% of laboratory and testing facilities were in a position to perform all tests required to diagnosis and treat.

Figure 17: Performance of indicators of preparedness for COVID-19, July–August 2020



Source: Kenya Health Information System (KHIS) 2020

Disruption in supply chains of essential commodities such as testing kits, PPEs and other medical equipment could have led to low testing capacities, diagnosis and treatment. For example, Kenya used to source the automatic testing kits reagents from the United States. On 6th of September 2020, it was reported that the United States government had placed an embargo on exportation of any reagents for Roche and Abbott machines. This stoppage forced Kenya to scale down testing for COVID-19, resulting to running two systems, a manual system and an automatic Polymerase Chain Reaction (PCR) system.

In January 2021, a team of researchers from the Kenya Medical Research Institute (KEMRI) discovered new COVID-19 variants circulating in Kenya. They identified 16 coronavirus variants from a sample collected from 205 people from Nairobi, Kajiado, Kilifi, Taita Taveta, Tana River, Mombasa, Kwale and Lamu counties between June and October 2020. Some of the variants have not been identified anywhere else in the world and are different from the coronavirus detected in the UK and South Africa recently, which is more transmissible and can render diagnostic tools ineffective and rendering drugs and vaccines less effective (*The East African, 2021*). KEMRI also notes that the new coronavirus detected in the UK and South Africa is already circulating in Kenya. This new coronavirus variant could pose a challenge to Kenya considering the capacity challenges so far in dealing with the initial variant in terms of availability of testing kits, personnel, and infrastructure.

The inadequacy of equipment and other medical supplies made Kenyans start local innovations to curb the spread of COVID-19. For example, students from Kenyatta University invented ventilators to aid in the fight against COVID-19 (Kenyatta University, April 2020). Textile factories that had been closed for decades started manufacturing PPEs, including masks. Rivatex in Eldoret and a textile factory in Kitui started manufacturing PPEs and masks en-masse to supply these to other counties (*Nation News, 31st March 2020*).

Impact of COVID-19 measures on selected health indicators

Health seeking behaviour

The COVID-19 pandemic and the measures that the government instituted to curb the spread of the virus led to a change in health seeking behaviour. Barriers such as lockdowns, curfews and risk for infection can prevent people from accessing health facilities and may result to self-medicating using drugs accessed from local chemists or shops. It can also lead to loss of follow-ups, missed medication and even death as happened in Ethiopia where a study conducted by Tamirat et al. (2020) found that out of a sample of 644 patients, a loss to follow up, missed medication, and death occurred in 70%, 12%, and 1.3% of the patients, respectively, due to change in health seeking behaviour as a result of COVID-19 measures.

This study found that 39.3% of those who responded to the online questionnaire had changed their health seeking behaviour. Only 8.2% said that their health seeking behaviour had not changed as shown in Table 10.

Table 10: Change in health seeking behaviour

		Frequency	Percent	Valid Percent	Cumulative Percent
	No	5	8.2	8.2	8.2
	Yes	24	39.3	39.3	47.5
	N/A	32	52.5	52.5	100.0
	Total	61	100.0	100.0	

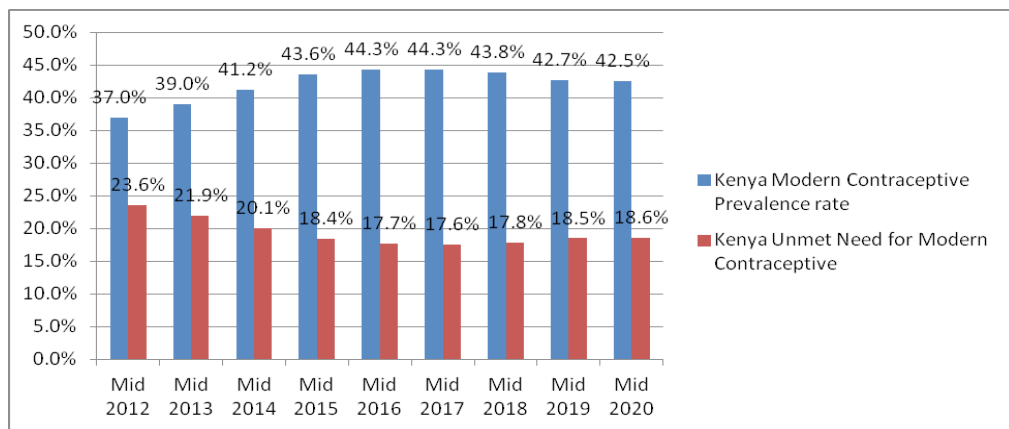
In our study, out of those whose health seeking behaviour had changed, 70.8% were from urban areas and 29.2% were from rural areas. This may be attributed to the fact that these measures were enforced more in urban areas than in rural areas. Karijo et al. (2020) reported that in Kenya, nearly all (99%) of persons interviewed avoided unnecessary travel during the partial lockdown for fear of contracting COVID-19. The Performance Monitoring Action (PMA) June 2020 report shows that 66% of women encountered difficulties in accessing a health facility during the first phase of COVID-19. Among those who needed to visit a health facility but did not, 92% said that they feared contracting COVID-19.

Access to contraceptives during the lockdown

Men who were on contraceptives and women and girls on family planning or those who would want to start may decide not to seek these services during the partial lockdown. Access to contraceptives gives men and women the choice to decide when to have a child.

The COVID-19 pandemic brought about disruptions in supply chains all over the world, including supplies for reproductive health and in the process denying women and adolescent girls from accessing contraceptives. The Global Financing Facility (2020) had predicted that 1,698,800 fewer women would access family planning services due to a 37% disruption of services while United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) (2020) reported that there was a 30.5% decline in contraception uptake between March and June 2020 compared to the same period in 2019. However, in March 2020, United Nations Population Fund (UNFPA) donated assorted family planning contraceptives to Kenya to arrest the expected shortage. Therefore, the modern contraceptive prevalence rate dropped by a very small margin from 42.7% in 2019 to 42.5% in 2020 as shown in Figure 18. The rate of unmet need for contraceptives increased slightly from 18.5% to 18.6%.

Figure 18: Kenya modern contraceptive use



Source:<http://www.familyplanning2020.org/sites/default/files/Kenya%202020%20CI%20Handout.pdf>

However, the change in health seeking behaviour due to fear of COVID-19, the lockdowns, and curfews led some contraceptive users to miss their supplies as shown by information from FGDs and from the respondents of this study’s electronic questionnaire. This study found that (28) (45.9%) of the respondents did not have access to contraceptives during the first 6 months of the pandemic and only (18) 24.6% were able to access contraceptives during this period. Table 11 shows a decline of 4.23% in the number of new clients seeking family planning services. Karijo et al. (2020) in their study on change in health seeking behaviour in all 47 counties in Kenya found that only 4% of the females reported being unable to access emergency pills and other contraceptives, 5% were not able to access sanitary towels while 8% were not able to access condoms. Their study also found that only less than 5% were not able to access antiretrovirals (ARV) while 8% were not able to access drugs to relieve anxiety or depression.

The FGDs conducted for this study found that about 60% of women had their contraceptive prescriptions run out during the first 6 months of the pandemic and they had not managed to access some more. Two women confirmed that they fell pregnant during the same period because they were not on contraceptives. About 50% of those women whose contraceptives run out said:

“We are lucky that our spouses were in the rural areas. They traveled before the lockdown of the Nairobi Metropolitan”

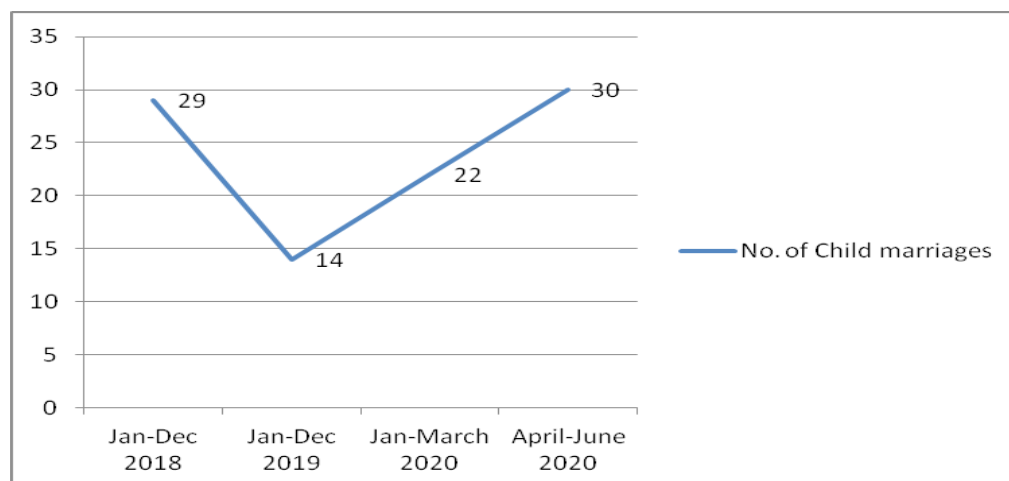
The women fear getting unwanted/unplanned pregnancies if there was another lockdown and they were not able to access contraceptives.

Adolescents/teenage pregnancies and marriages during COVID-19

Unavailability of contraceptives attributed to COVID-19 measures could have had an impact on adolescents and teenagers who were idle at home since schools were all closed. The Ministry of Health's Kenya Information Systems (2020) data shows that in all the 47 counties, between January and June 2020, 8,264 adolescent girls of ages 10-14 years became pregnant. At the same time, 153,848 girls of 15-19 years of age became pregnant during that period, which was a 40% increase in the country's monthly average. The data also shows that 3,966 girls under the age of 19 were pregnant in Machakos County alone. At the same time, in Turkana County, 558 adolescent pregnancies were reported between March and June, which was almost a threefold increase from the same period in 2019 as reported by the Kenya Health Information System. During the period 2019 to 2020, Nairobi County was leading with 11,795 teenage pregnancies in the period January-May 2020 compared to the same period in 2019 where there were 11,410 cases reported. Kakamega County comes second with 6,686 cases compared to 8,109 cases in 2019.

Early childbearing especially for teenagers is a serious health issue due to the risks of premature birth, low birth weight, and adolescent maternal deaths. The Kenya Health Information System (2020) data⁹ shows that adolescent (10-19 years) maternal deaths between March and June 2019 were only 23, but rose to 45 between March and June 2020, an increase of 95.7%.

Adolescents and teenagers who become pregnant sometimes get married off by their parents. During the lockdown due to COVID-19, there was an increase in the number of child marriages as reported by the National Crime Research Centre (2020) as shown in Figure 19.

Figure 19: Number of child marriages, 2018-June 2020

As shown in Figure 19, the number of yearly child marriages had been on a decline from 29 in 2018 to only 14 in 2019. However, within a period of 6 months (January to June 2020), the number of child marriages increased by 114.5% from 14 to 30.

Access to antenatal services during the pandemic

The partial lockdown and avoiding unnecessary travel could also have impacted on access to antenatal services. Pregnant women who would have wanted to access antenatal clinics may have decided not to endanger their lives by using public transport for fear of contracting the coronavirus. Table 11 shows the proportion of women (15-49 years) who received antenatal care at least four times during pregnancy by any provider.

Table 11: Kenya antenatal care, family planning and maternal deaths March-June 2019 and March June 2020

Variable	March-June 2019	March-June 2020	% Change
	Total	Total	
Re-visit ante natal clinic clients	1,118,046	1,044,912	-6.54
Pregnant women completing 4 ante natal clinic visits	298,211	261,444	-12.3
Family planning new clients	811,464	777,119	-4.23
Fresh stillbirths (FSB)	3,634	3,883	6.9
Macerated stillbirths (MSB)	3,805	3,959	4.1
Total maternal deaths	373	412	10.5
Adolescent (10-19 years) maternal deaths	23	45	95.7
Maternal mortality ratio	96.6	105.8	9.5

Source: Kenya Health Information System (KHIS) 2020

Table 11 shows a decline of 6.54% in the number of revisits for antenatal care services and a decline of 12.3% in the number of pregnant women completing 4 antenatal clinic visits. About 60% of FGD participants had not attended antenatal clinics during the first 6 months of the pandemic while 10% had not attended at all even before the COVID-19 pandemic. The remaining 30% had attended antenatal clinic at least once during the first wave of COVID-19 pandemic. Responses from the electronic questionnaire show that 16.4% of the respondents were not able to access antenatal services and only 8.2% answered in the affirmative. All those who were able to access antenatal services were from urban areas and 70% of those who could not access were from the rural areas. Ability to access antenatal services also depended by age as shown in Figure 20.

Figure 20: Ability to access antenatal services by age group

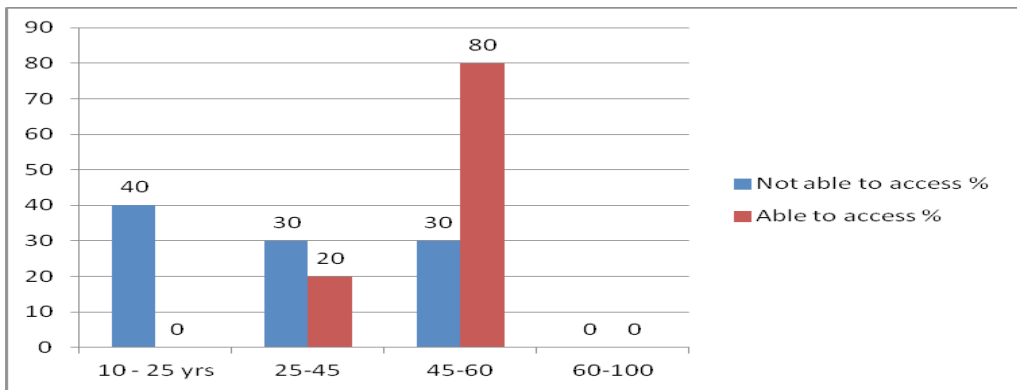


Figure 20 shows that 40% of those in the younger age group (10-25) years were not able to access antenatal services while 80% of those between 45 and 60 years were able to access antenatal services.

Access to health facility assisted delivery during COVID-19 pandemic

The inability to access antenatal services could have resulted in an increase in home deliveries that were not attended to by a skilled health practitioner resulting in unsafe motherhood. The Global Financing Facility (2020) had predicted that disruption in health service delivery due to COVID-19 would leave 230,400 women without access to facility-based deliveries. This study found that 14.8% of those respondents who gave birth during first 6 months of the pandemic gave birth at home and 9.8% gave birth in a health facility. About 60% of the FGD participants gave birth at home and with no skilled health personnel to attend to them. A key informant from a public health facility said that they used to open the hospital but very few women would turn up. However, *“we used to hear of women delivering at home risking not only their lives but those of the unborn babies”*.

About 20% took advantage of an initiative dubbed wheels for life, a private-public partnership between the Ministry of Health, University of Nairobi and a taxi service provider called Bolt that provided pregnant women with an emergency number to not only consult a doctor but also a free taxi transfer to a health facility at night during COVID-19 curfew hours.

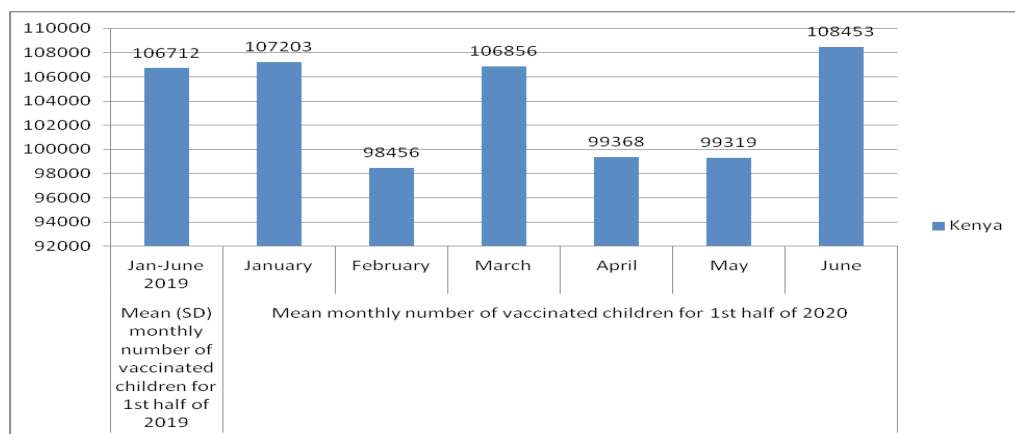
Table 11 shows an increase in the number of fresh stillbirths by 6.9% and macerated stillbirths increasing by 4.1%. There was also an increase of 10.5% in the number of maternal deaths, with a huge increase of 95.7% in the number of adolescent maternal deaths. The maternal mortality ratio also increased from 96.6 to 105.8 per 100,000 live births.

Access to immunization services during COVID-19

After delivery, babies are supposed to be immunized against certain diseases so that they can develop immunity as they grow up. The percentage of children receiving the diphtheria, tetanus and pertussis vaccine (DTP) is often used as an indicator of how well countries are providing routine immunization services. In 2019, the number of unvaccinated children with DTP1 in Kenya was 43,000. Kenya's immunization coverage increased from 92% in 2018 to 97% in 2019, which was above the global average. However, with the observed change in health seeking behaviour, such that mothers were not attending post-natal clinics during pandemic due to the lockdown, travel restrictions, loss of income due to lockdowns, hence inability to pay for services and concern about being exposed to COVID-19, there is a possibility these gains could be eroded in the first few months of COVID-19.

Data gathered from the Ministry of Health Information System websites shows a decline in the average number of monthly number of children who received DTP3 immunization compared with the same time in 2019. Figure 21 shows the mean monthly number of DTP3 vaccinated children between January and June 2020 against monthly mean for the first half of 2019. Between January and March 2020, the number of children vaccinated with DTP3 was 312515. However, this number fell by 2% to 307140 between April and June 2020. April and May 2020 were the worst months, showing a huge decline in the average number of children who received DTP3 vaccination. In April, 99,368 children were vaccinated but in May, the number decreased to 99,319. There was heightened fear of contracting COVID-19 by venturing out and mothers feared endangering their children if they took them out to health clinics to get immunized. However, through the Ministry of Health, information, education and communication that immunization services are vital and a lot of campaigns, this fear was reduced and the average number of DTP3 vaccinated children picked up in the month of June 2020 and even surpassed by 1.6% the number of children vaccinated during the January to June 2019 of 106,712. This shows that during a pandemic, availability of information, sensitization and proper communication can counter the fear of infection and change in health seeking behaviour.

Figure 21: Change in the mean number of monthly DPT3 Jan-March 2020 and April-June 2020



Source: Ministry of Health (2020b), Kenya Health Information System (KHIS) 2020

Primary data shows that 50% of the FGD participants had not had their children immunized by the time of the interview, since some of them gave birth during the lockdown and they feared exposing their babies to COVID-19 if they ventured out to the health facilities to have their children immunized. Gains could also be eroded due to disruption of immunization services under the pandemic, where resources including personnel were diverted to outbreak response. The Global Financing Facility (2020) had predicted that because of disruptions in all essential services, including immunization among others, child mortality in Kenya could increase by 22% and maternal mortality by 26% over the next year.

Information gathered during oral testimonies with women of child-bearing age from various informal settlements such as Kawangware, Mathare and Kibra in Nairobi as shown in Box 1 confirms this.

Box 1: Impact of COVID-19 on antenatal, post-natal, deliveries and immunizations

Cherotich (not her real name) from Kawangware, who was pregnant before the onset of COVID-19 says that: “I was 4 months pregnant and I used to attend antenatal clinic. However, when the curfew was imposed and there was restricted movement, I stopped attending clinic. I was also afraid that I might contract the virus, which would also harm my unborn baby. I always used to pray to God that my baby was growing well and I would not experience any difficulties when giving birth when the time came. I never received the anti-tetanus jab that I am supposed to receive when pregnant. I gave birth to a healthy baby girl in August and by that time the virus was still there and so I gave birth at home assisted by

continued next page

Box 1 Continued

my mother-in-law who had not managed to travel back to Kericho after visiting us in early March. My baby's birth was therefore not registered and she also did not receive the immunization that she could have received immediately after birth". Cherotich fears that she may fall pregnant again since she has not yet started using any contraceptives since giving birth, though she believes that as long as she is breastfeeding, she can't get pregnant. "When the restrictions were lifted at the end of September, I visited the clinic and my baby is now receiving the immunizations".

Naliaka* from Kibra had given birth before the onset of the coronavirus. However, she stopped taking her baby for post-natal clinic in case she also contracted the virus. She is also not on contraceptives and she fears that she might get pregnant any time even before her baby is one year.

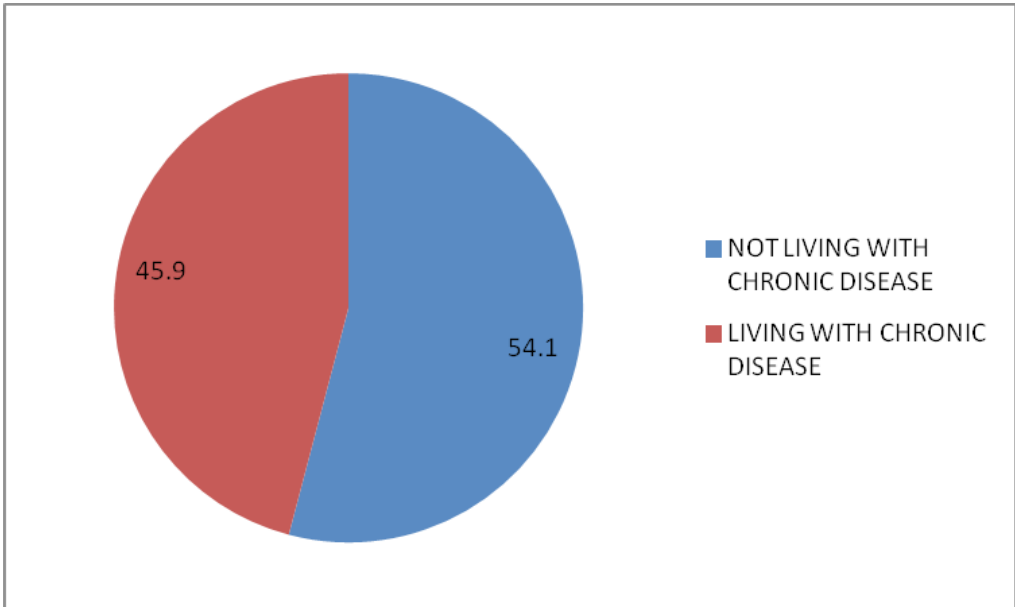
The story is the same for Mrs Iminzah (not her real name) from Mathare though for her, she lost her baby after delivery during the month of June at night. She gave birth at home and her baby had some complications and the woman who was assisting her to deliver did not know what to do. Her family does not have a car and there was no means of taking her to Kenyatta National Hospital at night. Her husband tried pleading with a taxi driver but he was not ready to risk his life or arrest by the police because of breaking the curfew rules.

June* says she was lucky to give birth in a hospital. While watching TV, she saw an advertisement that pregnant women could call a particular number and a taxi would come for them and take them to the hospital. She took advantage of this and she gave birth to a premature baby. The baby was put in an incubator and she stayed in hospital for a month before she was discharged with her baby who had by then gained some weight.

Access to drugs for people living with non-communicable chronic diseases

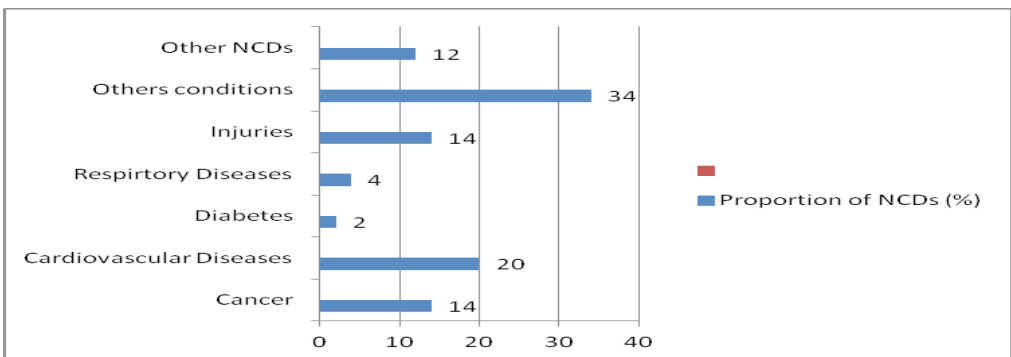
The WHO (2016) had reported that NCDs would cause 73% of global deaths and 60% of the burden of disease by 2020. The organization reports that 25% of deaths among adult women in the world are caused by Non-Communicable Diseases (NCDs) such as heart disease, cancer and diabetes. The Ministry of Health (2015) reports that in Kenya, NCDs such as cancers, diabetes and others such as obesity, hypertension, cardiovascular diseases, among others, account for 27% of the total deaths, over 50% of total hospital admissions and 40% of hospital mortality in Kenya. According to the WHO, NCD progress monitors, in 2017, the proportion of deaths attributable to NCDs stood at 33%. However, this fell to 27% in 2020. This study found that among the participants who responded to the electronic questionnaire, 45.9% were living with a chronic disease as shown in Figure 22.

Figure 22: Prevalence of non-communicable chronic diseases



Smit et al. (2020) found that 51% of all Kenyan adults currently suffer from more than one NCD, and that hypertension and high cholesterol are the main NCD drivers with an adult prevalence of 20.5%. The KEMRI website shows that cardiovascular diseases account for 20% of all NCDs as shown in Figure 23.

Figure 23: Prevalence of NCDs (2020)

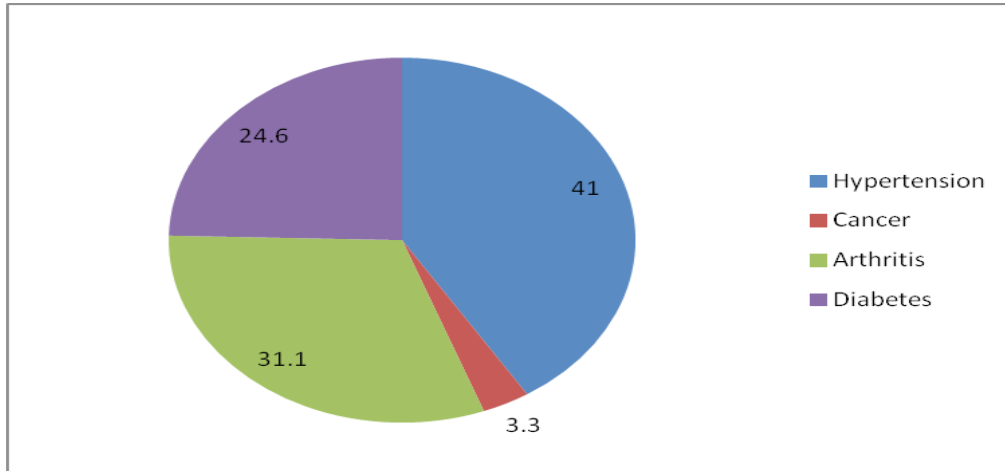


Source: <https://www.kemri.org/non-communicable-diseases-ncd-program/>

Cancer accounts for 14% of all NCDs, diabetes' prevalence stands at 2%, respiratory diseases account for 4% while injuries contribute 14% of NCDs. Other conditions such as arthritis, depression, mental disorders and all other forms of NCDs account for 12% of NCDs in Kenya as shown in Figure 23. Wamai, Kengne and Levitt (2018) found that the prevalence rate of hypertension in Kenya stood at 24.5% while that of diabetes was 2.4%.

The sample from our study found that hypertension accounted for 41.0% of NCDs among the respondents followed by arthritis (31.1%), diabetes at 24.6% while cancer accounted for 3.3% as shown in Figure 24.

Figure 24: Prevalence of selected non-communicable diseases



Kluge, Wickramasinghe and Rippin (2020) contend that NCDs are a major risk factor for patients with COVID-19, since their immunity is already compromised. Also, the restrictive measures imposed by the government, such as lockdowns, reduce the level of physical activity, availability of healthy food and access to healthcare services, which are all critical for patients with NCDs. Most people living with NCDs have to be on medication throughout their lives to improve the quality of their lives. This study found that 23% of the participants did not have access to medication during the first 6 months of COVID-19. The rest were able to access their medication since health facilities put in measures to give enough medication to their patients to cover a couple of months to prevent them from frequently visiting the health facilities and protect them from getting infected with COVID-19. This was captured by a key informant from a health facility:

“we made sure that we gave drugs to NCD patients that could last them a couple of months”.

However, for those who may have required chemotherapy, radiation and other forms of therapy that would have required them to visit facilities in the Nairobi Metropolitan, this was not possible after the curfew was declared.

Before the COVID-19 pandemic, it was normal for many Kenyans to seek medical attention in countries such as India and South Africa. The closure of international borders and the cessation of flights to these countries meant that this was no longer an option. The people suffering from these NCDs had to bear with their situation as captured in Box 2, based on information gathered from a group of Kenyans who had pre-existing conditions.

Box 2: Impact of COVID-19 on patients with cancer, diabetes and hypertension

Waigwa (not his real name) lives in Kawangware. He had been on medication for diabetes for 5 years but his condition had deteriorated. The doctors had recommended dialysis since his kidneys were not functioning well due to the effects of diabetes. He had been going for dialysis at Kenyatta National Hospital every week. However, when the curfew was declared, he could no longer travel to Kenyatta National Hospital to collect his medicine and undergo dialysis. “My eyes are now yellow and I can’t see properly. I always used to feel sick and at one time, I had to be rushed to a nearby private clinic for emergency treatment. Fortunately, it was during the day. After this, I was always afraid that I may have contracted the virus”. The doctor from the private clinic usually helps him once in a while with medication. Waigwa says that he has left his fate to God. After the curfew in September, he has now resumed his dialysis although the doctors tell him that he may now need a kidney transplant.

Alice’s (not her real name) story is told by a participant in the FGD. Alice comes from Nyeri and suffers from multiple myeloma, which is a form of cancer. She had been referred to Kenyatta National Hospital for chemotherapy but as she was putting her finances together, the first COVID-19 positive case was announced and thereafter, a curfew was declared and the Nairobi Metropolitan was not open to outsiders. Alice could not therefore receive chemotherapy and she died in July 2020.

A number of participants in focus group discussions said that they all were suffering from high blood pressure and used to get their medication from various public health facilities before the onset of the COVID-19 pandemic. However, the curfew, restricted travel and fear of contracting the virus made them stop going for the medication. They only resumed in early October 2020 after the lifting of the curfew.

COVID-19 and health workers

Etyang (2021) argues that the on-going pandemic and mitigating measures will have an impact on mental health due to limited access to health care services, prolonged social isolation and stresses related to the impact of COVID-19. Some of the measures that the Kenya government imposed included forced quarantine of all those who tested positive for COVID-19. It also included uncustomary care and burial of relatives who died of COVID-19. This could trigger mental illness and increase the number of mentally ill patients in the country as exhibited in anxiety, depression, alcohol and substance abuse and attempted suicides. Also, the long number of hours working in hospital by nurses and doctors away from their families, and fear of contracting the

disease could have negatively impacted on their mental health and especially since most of them, together with the doctors, complained of lack of personal protection equipment, lack of testing kits including reagents, delays in receiving results, and lack of health insurance. In Kenya, 2.6% of the COVID-19 infected persons are health workers while 2.3% of the deaths due to COVID-19 complications were from the frontline health workers (Ministry of Health, 2020a). In September 2020, the Ministry of Health reported that more than 900 Kenyan health workers had contracted COVID-19 since March 2020 and 16 had succumbed to the disease. A Rapid Assessment Survey on the Consequences of COVID-19 in Kenya by United Nations (UN) Women in 2020 found that 60% of women in Kenya faced mental issues compared to 56% of men during the first 6 months of COVID-19. There was therefore need for psychosocial support not only for the health workers but also for the Kenyan population to mitigate the mental health effects of COVID-19. Unfortunately, there is a shortage of psychologists in Kenya. For example, the psychologist to population ratio is 1:4,600,000. In addition, less than 1% of the public sector health care facilities offer any form of mental health care (KNBS, 2020).

COVID-19 and health insurance coverage

In 2017, the National Hospital Insurance Fund (NHIF) coverage in the country stood at 15.8% of all Kenyans, leaving out 84.2% of Kenyans without any form of insurance (Karanja and Barasa, 2017). In 2018, only 11% of the Kenyan population was covered by the National Health Insurance Fund as reported by the Ministry of Health (2019), and this varies by region. This leaves 89% of the rest of Kenyans without this government subsidized health insurance, mainly relying on out-of-pocket (OOP) to cater for their health.

This study found that out of a sample of 61 respondents to the electronic questionnaire, only 18% had any form of health insurance, leaving 82% not covered at all. Out of those who had insurance, only 27.3% were from rural areas and 63.6% were from urban areas. In terms of gender, 9.1% of those who had insurance were females and 90.9% were male. This study also found that 50.8% of the respondents were aware of people whose health had deteriorated because they could not afford drugs from chemists and pharmacies. During the early months of COVID-19, testing of COVID-19 used to be free, especially in those areas that were considered centres of the infection. Voluntary testing would cost US\$ 100. This figure is way above what most Kenyans earn per day, with 32% of Kenyans living below US\$ 1.90 a day, meaning that many of them would avoid going to the hospital unless they are in advance stages of the disease. Those who were quarantined in both private and public facilities were expected to pay for services, and there were lots of complaints of patients who had been discharged but could not leave the facilities as they were not able to pay. Considering that most of the people who have contracted COVID-19 are men, their treatment will be met using household financing.

5. Discussion of the results and findings

COVID-19 found Kenya's level of preparedness below the standards recommended by the World Bank in terms of funding, physical facilities such as isolation rooms in outpatient departments, well-equipped ICU/HDUs, general ward beds, personal protective equipment, essential services for treatment and care of patients, blood transfusion, laboratory and testing facilities, ICU and HDU beds, qualified personnel and quality of service. There is also an imbalance between urban and rural areas. However, Kenya was not alone in terms of preparedness for COVID-19. The World Health Organization (2013) contends that most health systems in Africa are generally underfunded and understaffed, and that access to specialized care is highly unequal. An initial assessment in March 2020 by the World Health Organization regional Office for Africa (2020) on the level of Africa's preparedness for COVID-19 gave a score of 66% in terms of national preparedness. However, this varied from one country to another. For example, a study by the Norwegian Refugee Council (NRC) found that in Central Africa, there were only 3 ventilators to save the lives of people who contracted COVID-19 in Central Africa with a population of 5 million people. However, even those that have these ventilators, they may not have the necessary personnel to operate them. Obaseki et al. (2015) found that most African countries lack the technical medical expertise, such as pulmonologists and respiratory therapists, needed to operate ventilators. The Organization for Economic Co-operation and Development – OECD (2019) and WHO (2018) found that in Africa, the average number of physicians per 1000 people is only 0.2 compared to 3.6 in the European Union.

This study found that 39.3% of the respondents changed their health seeking behaviour because of the COVID-19 pandemic, which impacted on access to contraceptives, antenatal and post-natal services, immunization services, delivery in health facilities and access to prescription drugs. The findings concur with those of Karijo et al. (2020) who found that 4% of the females in all the 47 counties in Kenya reported being unable to access emergency pills and other contraceptives, 5% were not able to access sanitary towels, while 8% were not able to access condoms. Their study also found that only less than 5% were not able to access antiretrovirals (ARVs) while 8% were not able to access drugs to relieve anxiety or depression.

This study also found an increase in adolescents' pregnancies in all the 47 counties between January and June 2020, with 8,264 adolescent girls of ages 10-14 years becoming pregnant. There was also an increase in child marriages such that within a period of 6 months (January to June 2020, the number of child marriages increased by 114.5% from 14 to 30. The findings conform with those of UNICEF (2020) report showing that Malawi experienced an 11% increase in teenage pregnancies, and an additional 13,000 cases of child marriage from January to August 2020 compared to the same period in 2019.

This study also reports a decline of 6.54% in the number of revisits for antenatal care services and a decline of 12.3% in the number of pregnant women completing 4 antenatal clinic visits. The findings concur with those of Anita and Sabaratnam (2020) who argued that during the Ebola epidemic in the Democratic Republic of Congo (DRC), Sierra Leone, and Liberia, contraception and routine maternal health care declined significantly.

This study found that 14.8% of those respondents who gave birth during the first 6 months of the pandemic gave birth at home and 9.8% gave birth in a health facility. These findings correlate with those of the Global Financing Facility (2020) that had predicted that disruption in health service delivery due to COVID-19 would leave 230,400 women without access to facility-based deliveries.

The Global Financing Facility (2020) had predicted that because of disruptions in all essential services, including immunization, child mortality in Kenya could increase by 22% and maternal mortality by 26% over the next year. Primary data for this study shows that 50% of the FGD participants had not had their children immunized by the time of the interview, since some of them gave birth during the lockdown and they feared exposing their babies to COVID-19 if they ventured out to the health facilities to have their children immunized. Secondary data shows that between January and March 2020, the number of children vaccinated with DPT3 was 104,171 but this fell by 2% to 102,379 between April and June 2020. WHO (2020d) had estimated that 80 million children in 68 countries were at risk of developing vaccine-preventable disease because of disruption in immunization services.

Smit et al. (2020) found that 51% of all Kenyan adults currently suffer from more than one NCD. This study found that 54.1% of the respondents were living with NCDs. People suffering from NCDs have a higher risk factor of suffering severe disease caused by COVID-19 and they, therefore, need to have access to their medication. However, this study found that 23% of the respondents did not have access to medication during the first 6 months of COVID-19.

The COVID-19 measures that the Kenya Government took impacted negatively on Kenyan health workers. The Ministry of Health (2020) reported that 2.6% of the COVID-19 infected persons were health workers while 2.3% of the deaths due to COVID-19 complications were from the frontline health workers. Etyang, et.al; (2021) Huang et al. (2020), Kang et al. (2020) and Catton (2020) argued that the pandemic and the mitigating measures would have an impact on mental health due to limited access to health care services, prolonged social isolation and stresses related to the impact of COVID-19.

This study found that 18% of the respondents had any form of health insurance, leaving 82% not covered at all and this differed by region with only 27.3% of those who had insurance coming from rural areas and 63.6% from urban areas. Having health insurance also differed by gender, with only 9.1% of those who had insurance being females and 90.9% being males. This means that majority of Kenyans depended on-out-of pocket to cater for their health needs, and it is even worse during the COVID-19 period where many lost their jobs. The COVID-19 measures disrupted livelihoods and out of pocket health expenditures could be pushing them deeper into poverty. Tafirenyika (2016) reports that very few African countries have national medical insurance schemes and those that exist serve only a few. In Ghana, only one-third of the population receives medical insurance under the country's National Health Insurance Scheme while Nigeria's national scheme covers less than 3% of its population (Tafirenyika, 2016).

6. Summary and conclusion

Summary

The objective of this study was to analyse the impact of COVID-19 measures on the health sector. We have investigated the level of preparedness of Kenya's health system for COVID-19 pandemic using selected indicators of preparedness, analyzed the level of selected health indicators before COVID-19 pandemic and the impact of COVID-19 measures on these indicators. This study uses secondary data complemented with primary data to meet these objectives. Primary data were collected from an electronic questionnaire which returned a sample of 61 respondents from Machakos, Murang'a, Nyeri, Vihiga, Narok, Nakuru, Kiambu, Nyandarua and Embu. Information was also collected from FGDs drawn from Kawangware, Kibra and Mathare informal settlements. Key informants who were mainly health sector policy makers provided critical information regarding the impact of COVID-19 measures.

Conclusion

The COVID-19 pandemic has laid bare the lack of preparedness of the health sector to handle a pandemic, and this has led to high infection and fatality rates due to lack of personnel, ventilators, personal protective equipment for the health personnel, lack of testing equipment, among others. COVID-19 has given the government a chance to fix the health care system and exposed the need to fully implement the Universal Health Care.

The measures taken by the government led to change of health seeking behaviour and the unintended results such as low rates of access to reproductive maternal, antenatal and postnatal health, missed medication and management of non-communicable diseases such as diabetes, hypertension, cancer, and arthritis, among others. This means, therefore, that such measures should always be accompanied by other measures that would not negatively impact on access to health services.

7. Policy implications and recommendations

Lessons learnt

- The level of funding of the health sector in Kenya does not meet the recommended 15% of government budget.
- The private health facilities (privately, FBOs and NGOs) contribute to 53% of the number of health facilities compared to 46.9% of public health facilities, implying that the health sector in Kenya is more private than public, and therefore the public health system may not be able to provide free or subsidized health services to everybody who falls sick and more so during the COVID-19 pandemic.
- The health facilities are unevenly distributed, with most counties not having a tertiary hospital. Nairobi has the highest number of health facilities and the highest number of tertiary health institutions. This is significant considering that Nairobi had the highest number of COVID-19 cases.
- Kenyan health facilities do not meet the internationally recommended work force per 10,000 population with a workforce of 15.6 out of a target of 68.0, implying that the COVID-19 pandemic found Kenya in a state of unpreparedness in terms of workforce (medical doctors, laboratory technologists, and dentists to nurses and midwives) to handle the pandemic. Most of the most critical workforce is found in Nairobi and other major urban areas.
- Most hospitals did not have special emergency units with all the facilities to handle emergencies and operating on a 24-hour basis.
- Only 18.4% of hospitals had all the items required in the outpatient consultation rooms for suspected COVID-19 patients.
- Only 3% of all health facilities had all the items required to prevent infection, hence increasing the possibility of infection of frontline workers and patients seeking services from these facilities.
- Kenya had only 26.2% of the required bed capacity for critical care (2,048), and these sparsely spread out in the counties, with Nairobi accounting for 51% of ICU beds in the country and only 256 ventilators available in Kenyan hospitals as at October 2020, with majority of these (65.2%) in Nairobi.

- The Kenya health system was only at 17.2% in terms of submitting regular information on COVID-19 and most of this information was coming from secondary and tertiary hospitals, public primary hospitals and private/NGO/FBO primary hospital level.
- Kenya's overall readiness index on all indicators of readiness was at 38.4%.
- There was a change in health seeking behaviour, with 39.3% saying that they traveled less, did not seek medical attention, and missed their medication due to fear of contracting the virus.
- Nationally, the modern contraceptive prevalence rate dropped by a very small margin from 42.7% in 2019 to 42.5% in 2020. The rate of unmet need for contraceptives increased slightly from 18.5% to 18.6%. Primary data showed that 45.9% of the respondents did not have access to contraceptives during the first 6 months of the pandemic.
- There was a notable increase in the number of adolescent/teenage pregnancies during the first 6 months of the COVID-19 pandemic and an increase in the number of child marriages in the whole country.
- There was a decline of 6.54% in the number of revisits for antenatal care services and a decline of 12.3% in the number of pregnant women completing 4 antenatal clinic visits.
- There were more people who gave birth at home (14.8%) than those who gave birth in a health facility (9.8%).
- There was also an increase of 10.5% in the number of maternal deaths; an increase of 95.7% in the number of adolescent maternal deaths with the maternal mortality ratio increasing from 96.6 to 105.8 per 100,000 live births.
- There was a decline in the number of children vaccinated with DPT3 in the months of April and May 2020, but there was an increase in this number in the month of June, which even surpassed by 1.6% the number of children vaccinated during the January to June 2019 of 106,712 due to concerted efforts and sensitization by the Ministry of Health on the benefits of vaccination. However, there were still mothers who feared venturing out to take their children for vaccination due to fear of exposing them to infection based on information from primary data gathered from FGDs, key informants and from the electronic questionnaire.
- The study found that most people living with NCDs, such as hypertension, diabetes, cancer and arthritis missed their medications during the first 6 months of the pandemic. However, a few were able to access their medication, since health facilities put in measures to give enough medication to their patients to cover a couple of months to prevent them from frequently visiting the health facilities and protect them from getting infected with COVID-19.

- Health care frontline workers in Kenya were impacted negatively by the pandemic as 2.6% of the COVID-19 infected persons were health workers while 2.3% of health workers' deaths were due to COVID-19 complications.
- Only 18% of respondents had any form of health insurance, leaving 82% not covered at all. Out of those who had insurance, only 27.3% were from rural areas and 63.6% were from urban areas. In term of gender, 9.1% of those who had insurance were females and 90.9% were male.

Implication for policy makers

Health sector funding: The government needs to increase the level of funding of the health sector to the recommended 15% of government budget according to the Abuja Declaration. The funds should be used to increase the infrastructure needed to deal with pandemics such as ICU/HDU facilities, training and employment of health personnel to increase the level of preparedness for any other pandemic in Kenya and to reach the norms recommended by the WHO.

Level of preparedness: It is important that all health facilities have all that is needed to handle emergencies, including pandemics starting with 24 hour ambulances, outpatient emergency units that are well-equipped with not only personnel such as anesthetists and surgeons but also 24 hour laboratories and radiological services. All health facilities should have all the required items to prevent infections for both frontline workers and patients seeking services.

Health seeking behaviour: There is need for a major drive now and in the future to improve the health indicators that deteriorated due to the change of health seeking behaviour as a result of the measures taken to curb the pandemic. These include availability of contraceptives and all antenatal services, reduction of adolescent/teenage pregnancies and child marriages, increasing health facility-assisted delivery services, and management and treatment of NCDs.

Public health awareness: There is need to ride on the level of awareness of increased levels of hygiene among Kenyans by making sure that water for drinking and hand washing is available in every household, as this will lead to a reduced burden of disease for households and the health sector. Public health officers should continue with the momentum of educating people at their households and at the community level on cleanliness and hygiene.

County primary health care facilities: Home-based care for asymptomatic COVID-19 patients should be accompanied by an ambulance system equipped with oxygen to evacuate patients whose conditions deteriorate while at home. It is also important to increase the number of health facilities at every ward to reduce the pressure on

referral hospitals. This will ensure that primary health care is accessed at these health facilities. The facilities should be well equipped with ICU and HDU facilities, complete with oxygen and ventilators. They should also have trained personnel to handle cases before referring them to the national referral hospitals. An example is the community midwifery model (CMM), whereby the lives of women who do not deliver in an institution are not endangered.

Health insurance: The government needs to increase funding of the National Health Insurance Fund to not only cover illnesses and complications caused by a pandemic but also increase the number of people who have some form of health insurance as this will reduce the out-of-pocket expenses incurred mainly by the lower income households that makes them fall even further into poverty. This entails implementing the Universal Health Coverage and the health facilities treating patients getting refunded by the National Health Insurance Fund.

Mental health: There is need to increase the number of psychologists and mental health specialists in Kenya to provide psychosocial support to the increasing number of people, including frontline workers who experience mental health issues due to COVID-19. There is also an urgent need to increase the number of mental health institutions in the country and to make mental health affordable.

Notes

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2. Cumulative positive cases comprise both the cumulative recovered and cumulative dead.
3. The 2021 and 2022 figures are based on the December 2020 growth rates before the COVID-19 third phase.
4. There is a discrepancy between the figures given by Kenya National Bureau of Statistics (2020), Economic Survey and the Republic of Kenya (2019)-Kenya Health Service Delivery Indicator Survey 2018 Report due to availability and revision of data by the Kenya National Bureau of Statistics
5. FGDs were held outside church compounds facilitated by the author and her research assistant. All participants were sanitized on arrival and provided with a mask, which was supposed to be worn throughout the discussion period.
6. The same sample was used to collect information on education whose results are presented in another paper.
7. The author used email addresses of persons known to her and therefore no ethical considerations were broken. This happens quite often when doing surveys using survey monkey.
8. Annex Table A5.
9. Annex Table A6
10. Barasa, Ouma and Okiro (2020) had recommended 1,511 more ICU beds in addition to the 537 available.
11. Annex Table A9.

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Annex

Table A1: COVID-19 cases distribution per county as at 16th February 2021

County	COVID-19 Cases
Total	103,188
Nairobi	44,640
Mombasa	9,133
Kiambu	6,626
Nakuru	4,854
Kajiado	3,227
Uasin Gishu	3,013
Busia	2,920
Kilifi	2,766
Machakos	2,558
Kisumu	2,229
Kericho	1,585
Meru	1,260
Nyeri	1,179
Laikipia	1,052
Kakamega	1,039
Kisii	1,020
Turkana	990
Bungoma	987
Migori	919
Murang'a	865
Trans Nzoia	795
Kitui	770
Garissa	745
Embu	651
Taita Taveta	646
Siaya	572
Kirinyaga	514
Makueni	510

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Table A1 Continued

County	COVID-19 Cases
Nandi	495
Narok	483
Kwale	445
Nyandarua	387
Bomet	379
Homa Bay	367
Nyamira	349
Baringo	329
Lamu	313
Isiolo	267
Vihiga	195
Samburu	191
Tharaka Nithi	190
West Pokot	168
Marsabit	152
Elgeyo Marakwet	115
Mandera	107
Tana River	104
Wajir	84

Source: <https://www.statista.com/statistics/1136519/cumulative-coronavirus-cases-in-kenya-by-county/>

Table A2: Health facility by ownership, 2018 by county

County	Ownership			Proportion (%)	
	Public	Private	Total	Public	Private
Mombasa	53	201	254	21	79
Kwale	101	40	141	72	28
Kilifi	110	145	255	43	57
Tana River	45	18	63	71	29
Lamu	35	15	50	70	30
Taita Taveta	63	37	100	63	37
Garissa	81	74	155	52	48
Wajir	94	2	96	98	2
Mandera	62	40	102	61	39
Marsabit	65	29	94	69	31
Isiolo	36	16	52	69	31
Meru	146	313	459	32	68
Tharaka Nithi	72	62	134	54	46

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Table A2 Continued

County	Ownership			Proportion (%)	
	Public	Private	Total	Public	Private
Kitui	232	96	328	71	29
Machakos	164	154	318	52	48
Makueni	210	94	304	69	31
Nyandarua	72	78	150	48	52
Nyeri	118	189	307	38	62
Kirinyaga	63	142	205	31	69
Murang'a	129	114	243	53	47
Kiambu	109	378	487	22	78
Turkana	108	61	169	64	36
West Pokot	90	33	123	73	27
Samburu	46	26	72	64	36
Trans Nzoia	73	83	156	47	53
Uasin Gishu	120	73	193	62	38
Elgeyo Marakwet	108	15	123	88	12
Nandi	118	69	187	63	37
Baringo	176	33	209	84	16
Laikipia	73	42	115	63	37
Nakuru	164	263	427	38	62
Narok	106	53	159	67	33
Kajiado	92	188	280	33	67
Kericho	134	60	194	69	31
Bomet	110	24	134	82	18
Kakamega	160	111	271	59	41
Vihiga	49	42	91	54	46
Bungoma	131	79	210	62	38
Busia	76	43	119	64	36
Siaya	137	59	196	70	30
Kisumu	127	93	220	58	42
Homa Bay	170	101	271	63	37
Migori	131	86	217	60	40
Kisii	117	56	173	68	32
Nyamira	87	51	138	63	37
Nairobi	147	577	724	20	80
Total	5,003	4,651	9,654	52	48

Source: Republic of Kenya (2019), Kenya Health Service Delivery Indicator Survey 2018 Report

Table A3: Distribution of facilities by type

County	Dispensary/ Clinic	Health Centre	First Level Hospital	Tertiary Hospital	Total	Proportion (%)
Mombasa	214	24	14	2	254	2.6
Kwale	123	14	4	0	141	1.5
Kilifi	223	22	10	0	255	2.6
Tana River	53	8	2	0	63	0.7
Lamu	41	6	3	0	50	0.5
Taita Taveta	72	18	10	0	100	1.0
Garissa	110	31	13	1	155	1.6
Wajir	62	24	10	0	96	1.0
Mandera	61	33	8	0	102	1.1
Marsabit	70	20	3	1	94	1.0
Isiolo	41	8	3	0	52	0.5
Meru	396	39	23	1	459	4.8
Tharaka Nithi	111	17	6	0	134	1.4
Embu	162	16	7	1	186	1.9
Kitui	256	58	14	0	328	3.4
Machakos	270	36	11	1	318	3.3
Makueni	257	38	9	0	304	3.2
Nyandarua	122	24	4	0	150	1.6
Nyeri	266	31	9	1	307	3.2
Kirinyaga	168	30	7	0	205	2.1
Murang'a	214	18	11	0	243	2.5
Kiambu	399	58	29	1	487	5.0
Turkana	142	19	8	0	169	1.8
West Pokot	111	7	5	0	123	1.3
Samburu	64	5	3	0	72	0.7
Trans Nzoia	132	16	8	0	156	1.6
Uasin Gishu	151	30	11	1	193	2.0
Elgeyo Marakwet	93	22	8	0	123	1.3
Nandi	167	15	5	0	187	1.9
Baringo	180	25	4	0	209	2.2
Laikipia	93	14	8	0	115	1.2
Nakuru	343	58	25	1	427	4.4
Narok	117	35	7	0	159	1.7
Kajiado	235	33	12	0	280	2.9
Kericho	159	20	15	0	194	2.0
Bomet	110	18	5	1	134	1.4

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Table A3 Continued

County	Dispensary/ Clinic	Health Centre	First Level Hospital	Tertiary Hospital	Total	Proportion (%)
Kakamega	191	66	13	1	271	2.8
Vihiga	60	25	6	0	91	0.9
Bungoma	169	29	12	0	210	2.2
Busia	92	20	7	0	119	1.2
Siaya	136	49	11	0	196	2.0
Kisumu	151	47	21	1	220	2.3
Homa Bay	197	59	15	0	271	2.8
Migori	169	36	12	0	217	2.3
Kisii	113	37	22	1	173	1.8
Nyamira	85	45	8	0	138	1.4
Nairobi	549	134	33	8	724	7.5
Grand Total	7,700	1,437	494	24	9,654	100
Proportion (%)	79.8	14.9	5.1	0.2	100	100

Source: Republic of Kenya (2019), Kenya Health Service Delivery Indicator Survey 2018 Report

Table A4: Health workforce density per 10,000 population (Target=23), Kenya 2018

County	Core workforce density per 10,000 population	Health workforce density score (Target=23)
Baringo	10.6	46
Bomet	8.9	39
Bungoma	8.5	37
Busia	11.9	52
Elgeyo Marakwet	9.9	43
Embu	21.2	92
Garissa	10.0	43
Homa Bay	14.2	62
Isiolo	22.0	96
Kajiado	24.6	107
Kakamega	9.9	43
Kericho	16.2	70
Kiambu	22.8	99
Kilifi	10.0	43
Kirinyaga	22.3	97
Kisii	13.6	59
Kisumu	22.6	98

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Table A4 Continued

County	Core workforce density per 10,000 population	Health workforce density score (Target=23)
Kitui	14.9	65
Kwale	8.0	35
Laikipia	16.5	72
Lamu	24.6	107
Machakos	18.2	79
Makueni	13.2	57
Mandera	5.2	22
Marsabit	13.5	59
Meru	18.6	81
Migori	11.3	49
Mombasa	19.2	83
Murang'a	9.3	41
Nairobi	26.3	115
Nakuru	19.3	84
Nandi	8.8	38
Narok	6.1	27
Nyamira	14.1	61
Nyandarua	11.6	51
Nyeri	31.0	135
Samburu	11.3	49
Siaya	13.7	60
Taita Taveta	19.1	83
Tana River	7.2	32
Tharaka Nithi	33.8	147
Trans Nzoia	7.5	32
Turkana	7.4	32
Uasin Gishu	28.2	123
Vihiga	12.2	53
Wajir	6.1	27
West Pokot	9.3	40
Grand Total	15.6	68

Source: Ministry of Health (2019), Kenya Harmonized Health Facility Assessment 2018/2019

Table A5: Health face to face questionnaire

1. COUNTY_____
2. REGION Urban (1) Rural (0)
3. NAME_____
4. GENDER (Female (1) Male (0))
5. AGE IN YEARS_____
6. PROFESSION_____
7. DESIGNATION_____
8. WORKPLACE_____
9. Do you have a Chronic Disease?
 - (a) Yes-1
 - (b) No-0
10. If yes, what sort of Chronic disease?
 - (a) Hypertension –Yes (1) No (0)
 - (b) Cancer –Yes (1) No (0)
 - (c) Diabetes –Yes (1) No (0)
 - (d) Arthritis –Yes (1) No (0)
 - (e) HIV/AIDS –Yes (1) No (0)
11. Did you have access to medication during the COVID-19 lockdown (March-July 2020)
 - (a) Yes-1
 - (b) No-0
12. Did you have a change in your health seeking behaviour as a result of the government measures to curb COVID-19?
 - (a) Yes -1
 - (b) No – 0
13. Were you able to access contraceptives during the COVID-19 lockdown?
 - (a) Yes-1
 - (b) No-0
14. Were you able to access antenatal services during the COVID-19 lockdown?
 - (a) Yes – 1
 - (b) No – 0
15. Did you deliver at home or in a health facility?
 - (a) Health facility -1
 - (b) Home - 0
16. Were you able to access post-natal services during the COVID-19 lockdown?
 - (a) Yes – 1
 - (b) No – 0
17. Were you able to access immunization services during the COVID-19 lockdown?
 - (a) Yes – 1
 - b) No – 0
18. Are you aware of anybody whose health was impacted negatively by COVID-19 measures?
 - (a) Yes – 1
 - (b) No - 0
19. Do you have any form of medical insurance?
 - (a) Yes – 1
 - (b) No - 0

Table A6: List of FGD participants

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Table A8: Questionnaire for health key informants

1. There have been allegations that Kenyans have changed their health seeking behaviour since the announcement of COVID-19 as a pandemic in Kenya. Why do you think this is so? Please explain how this has manifested itself and the long run impact on health indicators such as immunization rates, contraceptive use, unwanted pregnancies, midwives assisted births, etc.
2. Have patients with non-communicable diseases been given the same attention as COVID-19 positive patients since 16th March 2020?
3. What is your opinion on the amount of resources available for use in the public health sector in terms of medical doctors, nurses, lab technicians, ICU/HDU beds, ventilators, etc to handle COVID-19?
4. Funding of the health sector is supposed to be according to the Abuja Declaration (15% of Government budget). Has Kenya been following this and if not? Why?
5. Health is a devolved function in Kenya. Have resources followed the functions?
6. Are counties well equipped to handle COVID-19 cases? If not, why?
7. How prepared was the Kenyan health system to handle COVID-19?
8. Is Kenya fully implementing the Universal Health Coverage? If not, Why?
9. What is your opinion on how the Government of Kenya has handled COVID-19 in terms of:
 - (i) Measures taken to contain the spread of the virus
 - (ii) Availability of resources—testing kits, PPEs, equipment, quarantine/isolation facilities, etc
10. What has been the impact of COVID-19 on frontline workers such as medical doctors, nurses etc?
11. What is your knowledge of health insurance of Kenyans?

Table A9: Hospital bed, ICU beds, and ventilators in Kenya (2020)

County	General hospital beds				ICU beds				Ventilators			
	Public	Private	FBOs	Total	Public	Private	FBOs	Total	Public	Private	FBOs	Total
Baringo	284	9	64	357	0	0	0	0	0	0	0	0
Bomet	229	6	200	435	0	0	0	0	0	0	0	0
Bungoma	287	389	130	806	0	24	0	24	0	8	0	8
Busia	460	14	96	570	0	0	0	0	0	0	0	0
Elgeyo Marakwet	233	82	126	441	0	0	0	0	0	0	0	0
Embu	587	23	158	768	5	0	0	5	0	0	0	0
Garissa	291	4	98	393	6	0	0	6	0	0	0	0
Homa Bay	490	30	160	680	0	0	0	0	0	0	0	0
Isiolo	297	14	45	356	0	0	0	0	0	0	0	0
Kajiado	268	112	25	405	0	0	0	0	0	0	0	0
Kakamega	1,124	103	20	1,247	9	0	0	9	0	0	0	0
Kericho	665	220	160	1,045	5	0	0	5	0	0	0	0
Kiambu	1,144	188	876	2,208	11	0	0	11	0	4	0	4
Kilifi	284	270	137	691	0	0	0	0	0	0	0	0
Kirinyaga	402	54	147	603	4	0	0	4	0	0	0	0
Kisii	726	791	411	1,928	9	5	0	14	5	0	0	5
Kisumu	1,018	343	428	1,789	11	12	0	23	11	0	0	11
Kitui	522	33	202	757	0	0	0	0	0	0	0	0
Kwale	102	54	101	257	6	0	0	6	0	0	0	0
Laikipia	276	92	48	416	0	0	0	0	0	0	0	0
Lamu	22	20	68	110	0	0	0	0	0	0	0	0

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Table A9 Continued

County	General hospital beds				ICU beds				Ventilators				
	Public	Private	FBOs	Total	Public	Private	FBOs	Total	%	Public	Private	FBOs	Total
Machakos	801	191	125	1,117	5			5	0.9				0
Makueni	470	20	46	536	4			4	0.7				0
Mandera	246	40	48	334	0			0	0				0
Marsabit	218	21	175	414	0			0	0				0
Meru	596	98	912	1,606			2	2	0.4		2		2
Migori	216	261	161	638	0			0	0				0
Mombasa	664	433	69	1,166	12	23		35	6.5		17		17
Murang'a	542	186	183	911	0	0	3	3	0.6				0
Nairobi	2,341	2013	473	4,827	99	137	40	276	51.4		143	24	167
Nakuru	1,276	276	181	1,733	6	14		20	3.7		8		8
Nandi	202	77	35	314	0			0	0				0
Narok	133	81	200	414	6			6	1.1				0
Nyamira	264	18	87	369	0			0	0				0
Nyandarua	118	33	186	337	0			0	0				0
Nyeri	754	33	430	1217	6	4	5	15	2.8		3		3
Samburu	136	42	178	356	0			0	0				
Siaya	460	54	94	608	0			0	0				0
Taita Taveta	236	35	88	359	0			0	0				0
Tana River	98	27	63	188	0			0	0				0
Tharaka Nithi	108	55	483	646	0			0	0				0
Trans Nzoia	271	48	33	352	0			0	0				0

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Table A9 Continued

County	General hospital beds			ICU beds				Ventilators				
	Public	Private	FBOs	Total	Public	Private	FBOs	Total	Public	Private	FBOs	Total
Turkana	191	50	117	358	20	36	3	0		28	3	0
Uasin Gishu	871	480	57	1408	0			59				31
Vihiga	162	10	88	260	0			0				0
Wajir	88	40	54	182	0			0				0
West Pokot	142	35	127	304	0			0				0
Total	21315	7508	8393	37216				537				256
												100

* Source: Ministry of Health (2019), Kenya Harmonized Health Facility Survey 2019

** Source: Kenya Healthcare Federation Survey 2020

Table A10: Adolescents (age 10-19) presenting with pregnancy at health facilities

	2019					2020						
	Jan	Feb	Mar	Apr	May	Total	Jan	Feb	Mar	Apr	May	Total
Nairobi	2,412	1,813	2,630	2,262	2,293	11,410	3,651	3,090	2,088	1,494	1472	11,795
Kakamega	1,904	1,379	1,670	1,531	1,625	8,109	1,560	1,186	1,232	1,275	1433	6,686
Homa Bay	1,300	924	1,170	1,226	1,313	5,933	1,219	1,232	1,159	1,178	1173	5,961
Kajiado	1,045	1,066	992	1,059	1,166	5,328	1,214	1,157	1,091	1,248	1131	5,841
Nakuru	1,274	1,321	1,245	1,179	1,773	6,792	1,339	1,050	1,211	1,094	1142	5,836
Narok	1,266	1,213	1,409	1,160	1,432	6,480	1,296	1,231	1,084	847	1127	5,585
Bungoma	1,667	1,449	1,639	1,293	1,291	7,339	1,230	1,014	1,073	1026	1234	5,577
Meru	1,403	1,354	1,396	1,201	1,466	6,820	1,149	996	1,012	994	1084	5,235
Trans Nzoia	1,071	532	1,140	1,189	1,088	5,020	1,056	910	974	939	1050	4,929
Kiambu	1,190	1,226	1,241	1,157	1,239	6,053	1,027	991	1027	836	953	4,834
Migori	1,047	823	978	1,037	1,075	4,960	942	893	819	852	905	4,411
Kisii	1,040	720	894	980	1,073	4,707	954	736	1005	673	933	4,301
Kwale	1,119	1,040	1,102	1012	928	5,201	955	885	900	695	617	4,052
Machakos	951	929	930	874	1,026	4,710	805	783	817	789	772	3,966
Turkana	758	844	799	737	717	3,855	695	784	854	713	818	3,864
West Pokot	854	295	612	676	641	3,078	941	587	689	810	811	3,838
Kericho	818	1274	780	923	915	4,710	856	848	697	693	735	3,829
Bomet	1,002	733	956	863	910	4,464	765	722	693	712	730	3,622
Siaya	1,114	893	984	973	1,165	5,129	796	681	662	756	701	3,596
Kilifi	1,119	964	914	969	755	4,721	859	738	672	608	534	3,411
Nandi	758	653	654	711	732	3,508	667	676	650	669	639	3,301

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Table A10 Continued

	2019					2020						
	Jan	Feb	Mar	Apr	May	Total	Jan	Feb	Mar	Apr	May	Total
Kisumu	805	437	646	685	680	3,253	760	589	598	582	660	3,189
Kitui	800	654	849	772	820	3,895	700	581	542	492	731	3,046
Vihiga	701	563	512	570	646	2,992	679	433	664	572	560	2,908
Nyamira	666	617	653	772	682	3390	695	538	478	520	510	2,741
Busia	828	613	570	630	536	3177	599	485	534	513	454	2,585
Makueni	696	548	623	624	693	3184	510	454	518	533	514	2,529
Murang'a	631	564	586	585	530	2896	548	542	437	396	496	2,419
Baringo	507	315	507	427	501	2257	482	464	474	395	467	2,282
Tana River	639	426	575	481	450	2571	583	518	502	358	297	2,258
Uasin Gishu	805	803	982	925	915	4430	464	407	427	436	397	2,131
Laikipia	484	398	504	455	490	2331	439	454	392	381	430	2,096
Samburu	320	227	573	1059	465	1959	456	423	386	384	377	2,026
Elgeyo Marakwet	348	223	309	335	364	1579	348	295	356	342	345	1,686
Tharaka Nithi	345	325	313	307	371	1661	320	307	300	282	298	1,507
Garissa	375	380	445	395	397	1992	288	328	344	286	229	1,475
Mandera	503	378	509	303	325	2018	224	320	239	227	407	1,417
Marsabit	368	331	500	322	304	1825	240	326	223	252	319	1,360
Nyeri	283	277	230	223	261	1274	278	287	262	245	248	1,320
Wajir	283	186	259	266	249	1243	205	260	263	266	247	1,241
Nyandarua	366	285	304	317	341	1613	244	188	274	210	260	1,176

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Table A10 Continued

	2019						2020					
	Jan	Feb	Mar	Apr	May	Total	Jan	Feb	Mar	Apr	May	Total
Kirinyaga	344	223	312	289	308	1476	257	194	190	294	170	1,105
Taita Taveta	292	106	329	251	348	1326	297	238	165	176	167	1,043
Mombasa	534	481	261	356	328	1960	204	179	204	199	209	995
Isiolo	310	250	250	256	298	1364	209	193	188	210	180	980
Embu	236	149	184	143	196	908	197	211	156	193	175	932
Lamu	146	95	143	67	136	587	140	120	133	67	56	516
Total	37,727	31,299	36,063	34,827	36,257	175,488	34,342	30,524	29,658	27,712	9,197	151,433

Source: Data extract from Kenya Health Information System (KHIS) as at 19th June 2020



Mission

To strengthen local capacity for conducting independent, rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

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