The COVID-19 Pandemic: A Wake-up Call to Address the Burden of Diabetes and Hypertension in Kenya

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Abstract

Emerging data from Kenya and other parts of the world show that diabetes and hypertension are the leading risk factors for COVID-19 hospitalizations and death. Even though efforts are underway to develop a vaccine, a cure for COVID-19 could take years. Understanding the science and proper management of these chronic diseases could thus minimize the death rates suffered from COVID-19. This is important because developing countries like Kenya have limited resources and intensive care unit (ICU) beds for handling large numbers of severely impacted COVID-19 patients. The prevalence of diabetes and hypertension in Kenya has steadily increased over the last three decades standing at approximately 3.7% for diabetes and 5.5% for hypertension. The actual rates are much higher because data for most regions is not available and the real number of Kenyans living with diabetes and hypertension is unknown. Furthermore, a significant proportion of Kenyans with diabetes and hypertension are undiagnosed. For those diagnosed, the cost of care is a major barrier to effective management of diabetes and hypertension in low-income families who cannot afford health insurance. The challenge for diabetes and hypertension care is compounded by a lack of specialized training for physicians and primary healthcare workers. Mitigating the burden of diabetes and hypertension requires a two-pronged multi-sector engagement approach, specialized training in the management of diabetes and hypertension for healthcare workers, and increasing the health literacy of Kenyans at the grass root level. This is urgent because COVID-19 is likely to be here for years to come.

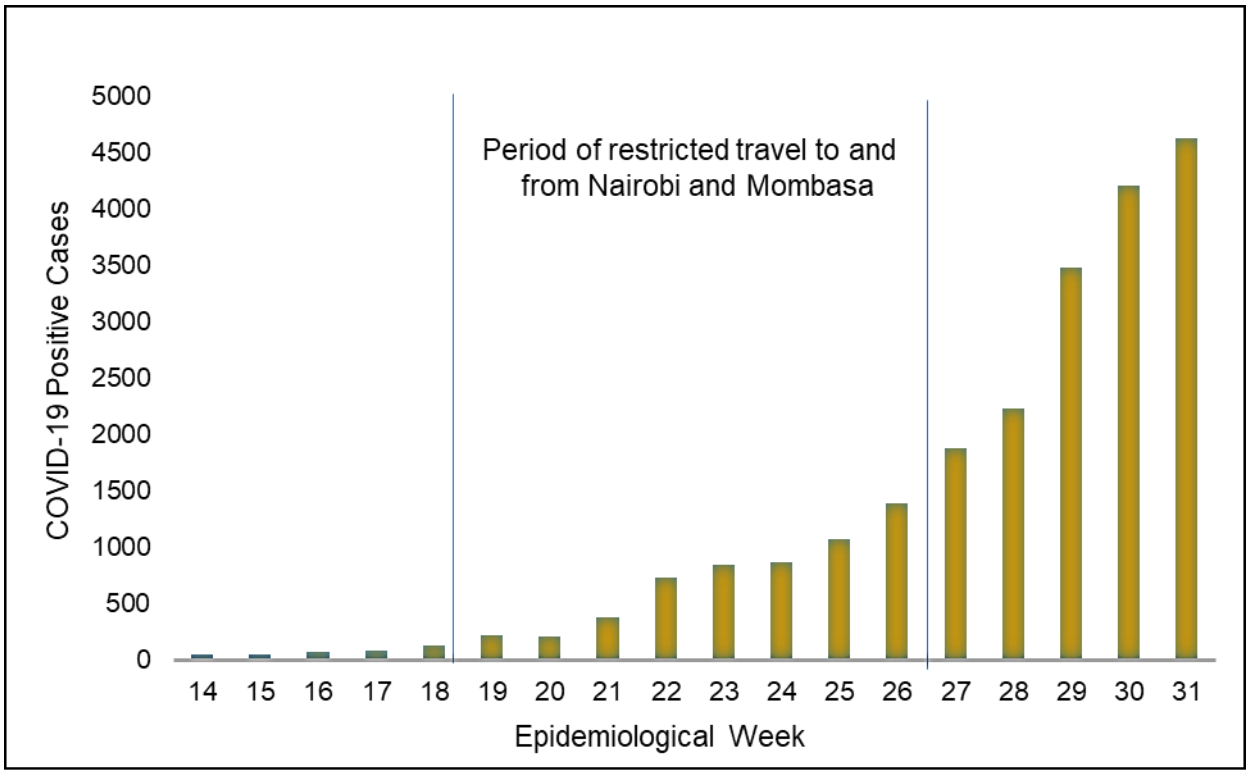
***Keywords*:** COVID-19, Diabetes, hypertension

INTRODUCTION

Severe acute respiratory syndrome coronavirus (SAR-CoV-2) causes coronavirus disease 2019 (COVID-19). First reported in Wuhan, China in December 2019, COVID-19 has become a major world-wide pandemic, infecting over 17.3 million and with over 674,000 deaths as of July 31st, 2020. During the same period, Kenya reported 20,636, with 341 deaths. It is likely that the numbers are much higher. Due to limited testing supplies, asymptomatic people are not routinely tested. Furthermore, social stigma is keeping Kenyans and other Africans with COVID-19 symptoms from being tested (Muhumuza, 2020). The Kenyan statistics through August 3rd 2020 (tracked by the Ministry of Health; https://www.health.go.ke) also reflect the impact of the early shutdown, imposed curfews, and travel restrictions from hotspots like Nairobi and Mombasa. Recent lifting of the travel restrictions is likely to result in increased community spread in small towns and rural

areas, which are often under resourced. The data (Figure 1) suggests that the period of curfew and restricted movements, allowed Kenyans to gain knowledge on the COVID-19 disease transmission and develop strategies for prevention, including: social distancing, use of masks, and washing of hands.

Figure 1: Weekly COVID-19 positive cases in Kenya



Source: Ministry of Health

Furthermore, it allowed time for production and distribution of personal protection equipment (PPEs) such as face masks. For this reason, the country did not experience a dramatic increase in the number of positive cases in the five weeks (weeks 11 to 15) after travel restrictions were imposed. The weekly fold-change in COVID-19 positive cases and death rates remained stable at approximately 1.3-fold and 1.2-fold respectively. A more concerning number, and better indicator of community spread, is the positivity rate that has steadily increased. When mass testing started at week 18, the positivity rate was approximately 2.0%, but increased to 11.9% by week 31, a 9-fold increase in 3 months (Table 1, Figure 2).

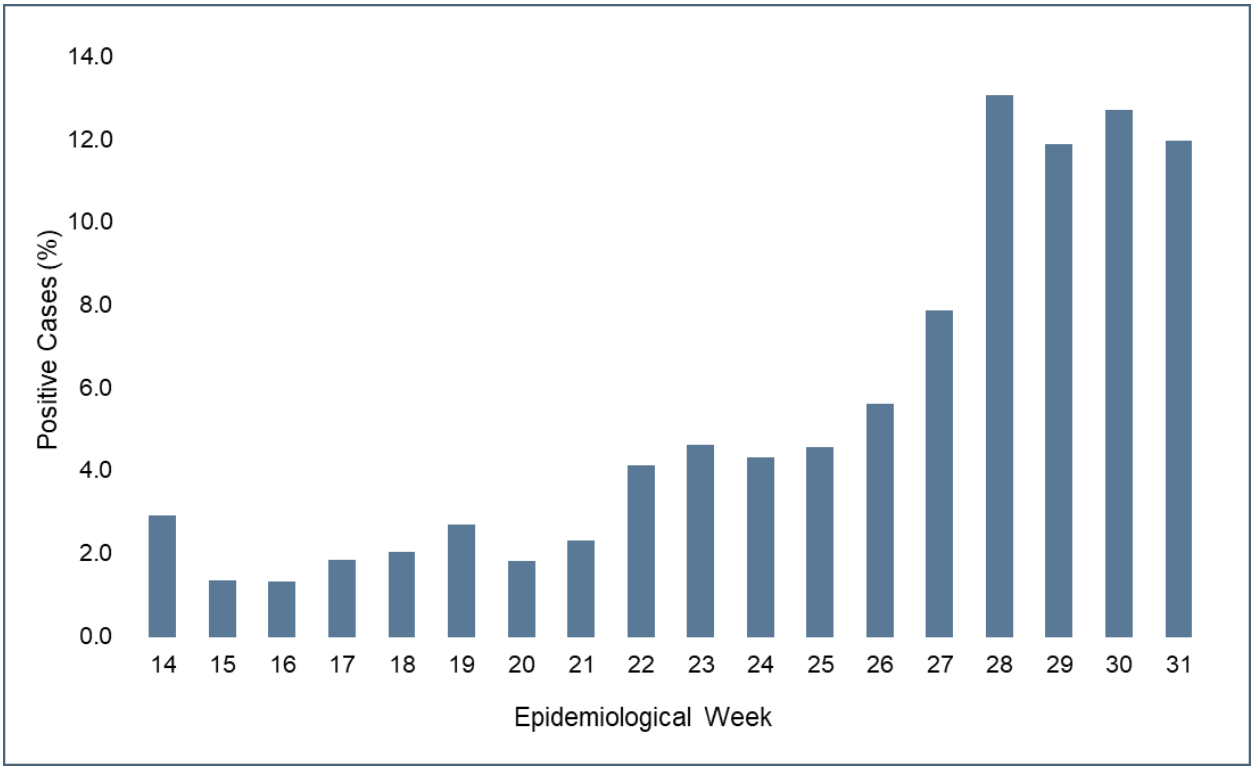
Table 1: Weekly positivity rates between weeks 14 and 31 of COVID-19 tracking. No testing was done in Kenya in weeks 1 through 13 of the COVID19 outbreak.

Week	Total Tests	Negative	Positive	Positivity (%)
14	1,705	1,656	49	2.9
15	3,846	3,796	50	1.3
16	5,749	5,676	73	1.3
17	4,522	4,441	81	1.8

18	6,398	6,271	127	2.0
19	8,146	7,930	216	2.7
20	11,999	11,787	212	1.8
21	16,618	16,243	375	2.3
22	18,083	17,348	735	4.1
23	18,382	17,541	841	4.6
24	20,265	19,400	865	4.3
25	23,665	22,595	1,070	4.5
26	25,051	23,658	1,393	5.6
27	23,977	22,100	1,877	7.8
28	17,101	14,874	2,227	13.0
29	29,413	25,936	3,477	11.8
30	33,251	29,047	4,204	12.6
31	38,764	34,142	4,622	11.9

Source: Ministry of Health

Figure 2: Weekly positivity rates starting from week 14 of tracking, calculated as a percentage of positive cases relative to total number of tests done.



Source: Ministry of Health

More worrisome is the fact that majority of those tested (84.4-96.2%) were asymptomatic (Table 2). With limited testing supplies, the asymptomatic COVID-19 infected are impossible to identify and track, thus they are unknowingly spreading the disease in their communities.

Table 2: Percentage of symptomatic and asymptomatic positive cases starting week 18 of the COVID-19 pandemic.

Week	Positive	Asymptomatic Cases	Asymptomatic (%)	Symptomatic Cases	Symptomatic (%)
18	162	139	85.8	23	14.2
19	180	152	84.4	28	15.6
20	249	218	87.6	31	12.4
21	382	346	90.6	36	9.4
22	746	664	89.0	82	11.0
23	894	845	94.5	49	5.5
24	880	811	92.2	69	7.8
25	1,071	1,011	94.4	60	5.6
26	1,414	1,251	88.5	163	11.5
27	1,884	1,638	86.9	246	13.1
28	2,541	2,316	91.1	225	8.9
29	3,377	3,235	95.8	142	4.2
30	4,413	4,160	94.3	253	5.7
31	4,016	3,862	96.2	154	3.8

Source: Ministry of Health

Currently, there is no cure for COVID-19 and vaccine development is months away from fruition. Access to vaccines will take even longer for developing countries like Kenya. Understanding the pathophysiology of SARS-CoV2 infection and susceptibility risk factors is key to mitigating the severity of COVID-19 and informing the development of drug development. In addition to the health implications, COVID-19 has dealt havoc to the world economy and its consequences will be felt for years to come. While severity of COVID-19 symptoms vary, by all accounts it is a life-threatening infection. Non-communicable disease (NCD) conditions such as diabetes, hypertension, and cancer have emerged as comorbidities for COVID-19 severity. At a daily briefing on July 22nd, Kenya's acting Ministry of Health Director General, Dr. Patrick Amoth, indicated that one in three COVID-19 patients who died (33%) had diabetes or hypertension; with hypertension leading at 17%, diabetes 15%, chronic lung diseases 10%, cancer 10%, and HIV 4%. According to the International Diabetes Federation (IDF) 2020 report, 552,400 Kenyans (2.2% of the population) are diabetic.

A recent study based on the 2015 Kenya STEPS survey of 4,485 participants aged 18-69 years documented a 24.5% prevalence of hypertension (Mohamed et al., 2018). Nearly 58% of diabetic patients have hypertension as a comorbidity (Oyando et al., 2019). Clearly, COVID-19 is a major burden to the most vulnerable.

Strategies for developing COVID-19 drugs

At the beginning of the COVID-19 pandemic, little was known about potential treatment approaches. The race to get a drug for treatment for COVID-19 could thus not be over emphasized and there was a rush to test existing drugs to mitigate the severity of this virus and improve patient

outcomes. There was palpable excitement when preliminary reports indicated that hydroxychloroquine, a drug widely used to treat malaria in the 80's and 90's, was effective in treating COVID-19. This prompted the Federal Drug Administration (FDA) to grant emergency approval for the use of hydroxychloroquine in patients with severe cases of COVID-19. Those hopes were dashed when clinical trials in the UK and the US showed that it was either ineffective and, in some cases, caused arrhythmia in the patients treated, leading to withdrawal of the emergency FDA approval for use of hydroxychloroquine in the US. The declaration of a herbal treatment for COVID-19 by Madagascar generated a new wave of excitement, especially in African communities, and even led to discussion regarding its use by the Madagascar delegation at the United Nations (UN). Many from African countries did not understand why the World Health Organization (WHO) was not promoting the Madagascar herbal medication and even accused the WHO of bias against African inventions. While it is possible the herbal medicine has active ingredients, the truth is that the ingredients had not been extracted and characterized, making it impossible to design clinical trials with quantifiable doses. Furthermore, a herbal medicine could not be scaled up to meet the world demand. Remdesivir, a drug previously developed to treat the Ebola virus, but found to be ineffective in clinical trials for Ebola, has been shown to reduce the length of hospitalization for severely ill COVID-19 patients (Antinori et al., 2020; Wang et al., 2020). However, remdesivir is intravenously administered in a hospital setting and often reserved for the most severely ill patients. An estimate by the drug manufacturer indicated that in the US, a full dose of remdesivir would cost $9,000 (KES 900,000) and in developing countries, it would cost $2,000 (KES 200,000). This literally keeps remdesivir out of reach for the average Kenyan patient who relies on public health facilities. Dexamethasone, a common corticosteroid, reduced the death rate of patients on oxygen therapy or mechanical ventilators (Rayman et al., 2020). To develop strategies for COVID-19 drug development, it is important to first understand mechanisms of SARS-CoV-2 infection.

The SARS-CoV virus has a structural protein (S) located on the virus envelop surface. The SARS-CoV-2 virus uses a membrane bound protein called angiotensin-converting enzyme II (ACE2) to gain entry into cells that line our body cavities (epithelial cells), then spreads to other organs through the bloodstream (P. Zhou et al., 2020; Wrapp et al., 2020). The S protein binds to ACE2, the host cells, causing fusion of membranes of the virus and host cells, and thus internalizing the virus, an essential step in iSARS-CoV2 infection. Binding of the S protein to the ACE2 is, therefore, the first step in infection. High expression of ACE2 could thus increase susceptibility to SARS-CoV-2 infection. ACE2 was previously shown to serve as a receptor for other severe acute respiratory syndrome coronaviruses (SARS-CoV) (Kuba et al., 2005; Li et al., 2003). In vitro studies showed that overexpression of ACE2 protein resulted in more efficient replication of SARS-CoV (Li et al., 2003). ACE2 is expressed in all human cells and is part of the renin-angiotensin-aldosterone system, a key pathway for hormonal regulation of blood volume and blood pressure. ACE2 cleaves off two amino acids from angiotensinogen I to form the angiotensin II. When blood pressure falls below normal, angiotensinogen II acts on smooth muscle cells lining blood vessels to cause constriction and thus increase blood pressure. Angiotensinogen II also stimulates the adrenal cortex to produce aldosterone, a hormone that enhances water and sodium reabsorption in the kidneys, thus increasing blood volume and ultimately raising the blood pressure. For this reason, cells that line blood vessels express receptors for ACE2 and ACE inhibitors are routinely used to treat hypertension. A British Columbia University study recently showed that patients who used ACE inhibitors had lower ACE2 expression in lungs (Milne et al., 2020).

Because virus interaction with ACE2 is a key step in COVID-19 infection, blocking SARS-CoV-2 interaction with ACE2 are viable therapeutic approaches. Earlier studies showed that anti-ACE2 antibodies blocked SARS-CoV replication in a dose-dependent manner (Li et al., 2003). Furthermore, in vitro studies showed that susceptibility to SARS-CoV infection positively correlated with ACE2 expression in tested cell lines (Hofmann et al., 2004; Jia et al., 2005). Ongoing studies include peptide-based therapies such as Angiotensin II receptor blockers (ARBs), small compound inhibitors. Peptide based therapies develop short proteins that bind to ACE2 and block the binding site for the S protein, thus prevent interacting with the host cells. Peptide based drugs are, therefore, expected to have minimal side effects when compared to chemical based drugs. Studies are also testing ACE2 based inhibitors. A mutated ACE2 that lacks neck and transmembrane domain produces a soluble form of ACE2 (sACE2) that blocked entry of SARS-CoV-2 into host cells (Procko, 2020). Truncation of the human ACE2 also produced a peptide (tACE2) with a higher binding affinity for the S protein when compared to the wild-type ACE2 receptor, which also produced a more stable complex once bound to ACE2 (Basit et al., 2020). A recent study produced a 23 amino acid ACE2-derived peptide shown to also block SARS-CoV-2 at nanomolar concentrations (Zhang et al., 2020). There are encouraging results from a Chinese study to determine the effect of renin-angiotensin system (RAS) inhibitors on COVID19 patients with hypertension. Patients receiving ACEI or ARB therapy were shown to have less severe disease and a trend toward lower levels of interleukin 6 (IL-6), in their blood (Meng et al., 2020), suggesting that a dampening of the inflammatory response. The same study showed that ACEI and ARB had the beneficial effect of increasing two types of immune cells, CD3 and CD8 T cell counts, both important in mitigating COVID-19. While these initial studies are promising, it will take time to determine the efficacy of drugs developed and bring them to production. Clinical outcomes for diabetic COVID-19 patients who used ACE-inhibitors (ACEI) or angiotensin II type-I receptor blocker (ARB) were comparable to those of control diabetics who did not use ACE1 or ARB (Chen et al., 2020).

Until a drug is available, our best hope lies on developing a vaccine. Because of the urgency, a multipronged approach has been adopted to develop a vaccine for COVID-19, leveraging partnerships between governments and industry. Several vaccine candidates have shown promise in the US, raising hope for a vaccine by early 2021. However, such a vaccine is not likely to be widely available to countries like Kenya, which did not directly contribute to the vaccine development and do not have the resources for purchasing millions of doses for their citizen.

Without drugs and vaccines, mitigating the outcomes for COVID-19 is going to rely on preventive strategies and paying attention to patients with chronic conditions that put them at higher risk. In Kenya, this calls for renewed sustained efforts at controlling diabetes and hypertension, two chronic non-communicable diseases associated with worse outcomes for COVID-19 patients.

Diabetes in Kenya

Diabetes is a chronic non-communicable disease (NCD) condition that is largely preventable. Patients with diabetes mellitus lose the ability to regulate blood sugar (glucose). Normal fasting blood glucose levels (normoglycemia) are 140 mg/dL (7.8 mmol/L). Hypoglycemia refers to glucose levels below normal and hyperglycemia is a term for glucose levels above normal. Blood glucose levels between 140 and 199 mg/dL (7.8 mmol/L and 11.0 mmol/L) indicate prediabetes, and levels above 200 mg/dL (11.0 nmol/L) are considered diabetic. A more reliable test for blood

glucose, which does not require fasting, is the glycated hemoglobin (A1c), a measure of the average blood sugar attached to hemoglobin for the past two to three months. An A1c below 5.7 is considered normal, between 5.7 and 6.4 percent indicates prediabetes, and an A1c level of 6.5 percent or higher indicates diabetes. Blood glucose is controlled by a hormone called insulin, synthesized by cells (beta cells) found in the pancreas. Complete loss of pancreatic beta cells can be triggered by autoimmune disease resulting in insulin deficiency and subsequent type 1 diabetes, also known as juvenile diabetes because of its onset at an early age. Type 1 diabetes is commonly treated with insulin injections. In type 2 diabetes, the most common type of diabetes, the pancreas still produces insulin but the patient's cells lose the ability to respond to the insulin, a condition known as insulin sensitivity. Obesity is the leading cause of type 2 diabetes. A body mass index (BMI) above 30 is considered obese. However, racial and ethnic variations have been documented in normal BMI range. Belly fat, which affects the waist to hip circumference ratio is a better predictor of the risk for developing type 2 diabetes. Pregnant women are also at risk for developing gestational diabetes. Other cases of diabetes are neither type 1 nor type 2, and are generally referred to as atypical diabetes. Regardless of cause, diabetes is associated with a variety of complications. These include kidney disease, cardiovascular disease (hypertension and heart disease), blindness, nerve damage which leads to impaired wound healing and amputations, and urinary tract infections. Inflammation is also an underlying factor in the development of diabetes and diabetes-associated complications.

Diabetes is the 18th cause of death in Kenya, accounting for 0.9% of all deaths in 2018. A substantial proportion (60%) of people with diabetes are undiagnosed diabetes and at risk of developing complications (Malanda et al., 2020; Mohamed et al., 2018). Furthermore, most people living with diabetes are diagnosed too late, when intervention do not prevent complications (World Health Organization, 2014). More concerning is the fact that an increasing proportion of Kenyans diagnosed with diabetes are young (under 25 years of age). Diabetes lowers the quality of life for patients and is a major financial burden to patients and their families. A recent study in two Kenyan counties estimates the annual direct cost (medicine and doctor's fees) of diabetes at KES 53,907 per patient who seek care from public facilities. The patients incur additional indirect costs (e.g., transport, food, accommodation) averaging KES 23,174 annually (Oyando et al., 2019). The cost was even higher for diabetics with hypertension as a comorbidity. Furthermore, the impact on the economy is significant in terms of missed work days. Although diabetes-specific policies existed in Kenya well before 2011, when the United Nations (UN) declared a NCD health strategic plan, a 2019 Global Health Action report found major gaps between how diabetes is addressed within the NDC policy agenda and tackling diabetes in reality (Shiroya et al., 2019). The report found weak monitoring systems and little involvement of the non-health sector, and calls for population-wide multi-sector diabetes prevention and control approaches that include the highest political level.

Associations between COVID-19 outcomes and diabetes

Several studies have demonstrated that people with diabetes are at higher risk for severe COVID-19 illness and death. Previous studies had demonstrated that diabetics have higher infection risks for influenza and pneumonia (Muller et al., 2005; Shah et al., 2003), the 2009 H1N1 influenza (Yang et al., 2006), and the Middle East respiratory syndrome-related coronavirus (MERS-CoV) (Alqahtani et al., 2018). A recent study combining data from a Genome-wide association study (GWAS) and proteome-wide Mendelian randomization (MR) analysis demonstrated that diabetes related traits associated with increased ACE2 expression (Rao et al., 2020), suggesting that

diabetes is a risk factor for more severe COVID-19 patients. A nationwide multi-center observational study of 1,317 participants (64.9% men) in France showed that a majority (88.5%) had type 2 diabetes (Cariou et al., 2020). Of the patients with diabetes as a comorbidity, a significant number were found to have microvascular and macrovascular diabetic complications (46.8% and 40.8% respectively). Furthermore, the French study showed that body mass index (BMI), a measure of obesity, was positively associated with assisted mechanical ventilation (tracheal intubation) and/or death within 7 days. Earlier reports from China showed that 5% - 20% of patients with COVID-19 were diabetic (Yang et al., 2020). Other studies in the city of Wuhan, China, the first epicenter for this virus, showed the proportion of COVID-19 patients with comorbid diabetes at 22% (F. Zhou et al., 2020) and 16.2% (Guan et al., 2019). Furthermore, diabetes prevalence rose to 31% among deceased people in Wuhan, China when compared to 14% of those who survived (F. Zhou et al., 2020). Earlier data from Wuhan had shown over 3-fold difference in mortality rate among diabetic COVID-19 patients when compared to non-diabetic patients (7.3% vs 2.3%) (Wu et al., 2019). Studies in Italy showed that 17% of patients in intensive care units (ICUs) were diabetic (Grasselli et al., 2020) and 28.3% of hospitalized COVID-19 patients in the USA were diabetic (Garg et al., 2020). Meta-analysis data also shows that diabetes more than doubled the risk for admission to ICUs and more than tripled the risk of death (Roncon et al., 2020). A retrospective study of 904 patients with COVID-19 in Wuhan, China showed that among diabetic patients, age, elevated C-reactive protein (CRP), and insulin usage associated with poor prognosis (Chen et al., 2020). A study of 59 of COVID-19 patients demonstrated that hyperglycemia (glucose> 7.77 nmol/L) at time of admission had higher baseline levels of two markers on inflammation, IL-6 and D-dimer, than patients with normoglemia, and had higher risk of severe disease (Sardu et al., 2020). Interestingly, long-term glycemic control (assessed by A1c levels) did not associate with COVID-19 severity (Cariou et al., 2020). Although data from Kenyan hospitals is limited at this point, majority of patients who died from COVID-19 in Kenya had diabetes (15%), hypertension (17%), or both.

Hypertension in Kenya

Hypertension, commonly known as high blood pressure (BP), is the 19th leading cause of death in Kenya, accounting for 0.71% of deaths in 2018. Blood pressure is recorded as two numbers (e.g., 120/76 mm Hg) where the top number (systolic) represents the BP when the heart beats and the lower number (diastolic) represents the BP when the heart relaxes between beats. The normal systolic BP is equal to or less than 120 (≤120) and the normal diastolic BP is equal to or less than 80 (≤80). The kidneys play a central role in the control of blood pressure. This is achieved via regulation of blood salt levels, which in turn impact water reabsorption and blood volume. The mechanism triggered in the kidney involves a cascade of hormones called the renin-angiotensin-aldosterone system (RAAS). In this cascade ACE2 converts angiotensin I to angiotensin II, which is ultimately responsible for blood vessel constrictions, synthesis of aldosterone which then leads to increased sodium chloride and water reabsorption by the kidneys.

Hypertension is considered a silent killer disease because one can be hypertensive for years without symptoms, while damage to blood vessels occurs. Prolonged hypertension is a major cause of chronic kidney disease, ultimately leading to kidney failure and dialysis. Hypertension is also a major risk factor for cardiovascular diseases and ultimately causes heart failure. Several recent studies indicate that the prevalence of hypertension is on the rise in Kenya. A cross-sectional study

using 43,898 individuals from the 2014 Kenya Demographic and Health Survey reported a 5% hypertension prevalence (Mkuu et al., 2019). An earlier study based on the 2015 Kenya STEPS survey of 4,485 participants aged 18-69 years documented a 24.5% prevalence of hypertension (Mohamed et al., 2018). Interestingly, only 15.5% of hypertensive participants were aware of their high blood pressure status. More worrisome was the finding that only 26.9% of those aware of their hypertensive condition were on treatment to control the blood pressure, and only 51.7% of those on treatment effectively managed their blood pressure. A Cross-sectional screening of 5,138 Kenyans on World Kidney Day from 2011 to 2019 documented a 17.5% prevalence of hypertension, with most of the hypertensive participants being under 50 years of age (Kabinga et al., 2019).

Like diabetes, managing hypertension is a major financial drain to families and the public health system. A 2019 study of the costs associated with hypertension reported a mean annual direct cost to patients (for medicines, services fees, transport etc.) of $304.8 (~KES 31,700) (Oyando et al., 2019). Other indirect costs such as emergency hospitalizations and missed work days make the economic impact even higher.

Association of COVID-19 outcomes and hypertension

Several studies have shown an association between hypertension and COVID-19 outcomes. COVID-19 patients have high levels of angiotensin II, a key regulator of blood pressure, when compared to non-hypertensive controls (Liu et al., 2020). Angiotensin II was previously shown to increase expression of inflammatory cytokines (Xianwei et al., 2012), and recent data has demonstrated that very high levels of inflammatory cytokines exacerbate outcomes in COVID-19 patients. A retrospective study of 1,161 patients at two hospitals in Wuhan, China showed that hypertension was an independent risk factor for in-hospital death of patients with diabetes (Shi et al., 2020). A second cross-sectional observational study in Milan, Italy showed that the presence of pulmonary hypertension was also associated with a higher rate of in-hospital death or ICU admission (41.7%) when compared to those without pulmonary hypertension (Pagnesi et al., 2020). A recent study in China showed that treating COVID-19 patients who had hypertension with RAS inhibitors improved outcomes in part via increasing immune cells (CD3 and CD8) and lowering the levels of IL-6 (Meng et al., 2020). While extensive studies have not been conducted in Kenya, reports from the Ministry of Health have shown that a significant proportion of hospitalized COVID-19 patients were hypertensive (17%). Worse still, the death rates for hypertensive COVID-19 patients were higher than those for non-hypertensive.

Mitigating COVID-19 outcomes

The COVID-19 pandemic is a major threat to life as we know it and a burden to public health systems throughout the world. There is no current cure for COVID-19 and vaccine development is going to take a while. This leaves prevention: social distancing, use of personal protection equipment (PPEs) such as face masks, and personal hygiene (frequent washing of hands) as the best strategy. Additional attention should be paid to patients with non-communicable chronic disease conditions such as diabetes and hypertension since they are associated with more severe COVID-19 disease outcomes. To mitigate COVID-19 outcomes, diabetic patients need to better manage blood glucose levels as they could impact the immune response. Healthcare providers

should be especially attentive to diabetic patients with COVID-19 who use insulin. Biomarkers associated with diabetes related characteristics (e.g. use of insulin and CRP levels) could also be used to identify patients at risk. A majority of patients with diabetes and or hypertension seek care from public facilities (Karinja et al., 2019). Improving healthcare services could thus promote better management of disease and improve health outcomes. Long-term control of diabetes and hypertension calls for adequate training of healthcare professionals. Of the 9,121 regular registered medical doctors in Kenya, only 12 are endocrinologist specialized in diabetes care (Kenya Medical Board, 2020). This means that diabetic patients seek care from General Practitioners who lack specialized training in diabetes management. A recent survey of 1,501 general practitioners (doctors) conducted by Malanda et al. (2020) found that 74% of them lacked training in diabetes. More worrisome was the finding that patient education resources were not available at the work setting for 60.8% of the doctors, and diabetes nurse educators or podiatrists were not available at 60.8% of their work facilities. Interestingly, 53% of the doctors surveyed reported screening at least 10% of people with diabetes each month. With regard to hypertension, it is been shown that healthcare provider-directed hypertension education, and provision of basic resources improve hypertension care in Kenya (Ogola et al., 2019). An equally important task is increasing health literacy at the grass root level. The government of Kenya has established the community health strategy that aims to empower communities and households to practice positive health behaviors and play a role on managing health initiatives at that levels. Efforts should be stepped up to raise awareness with regard to diabetes and hypertension; their prevention, encouraging testing and early diagnosis, and adherence to interventions thereafter. This should adopt an all-hands-on-deck approach that engages the health services private sector which plays a big role in healthcare service provision, other non-government sectors, and other community stakeholders such as faith-based communities (e.g., Churches, Mosques).

CONCLUSION

The COVID-19 pandemic has laid bare the inadequacies in managing chronic non-communicable disease conditions such as diabetes and hypertension. Addressing this need calls for training in diabetes management for doctors and healthcare workers coupled with patient health literacy for patients. Emerging data also points to high infection rates among doctors and frontline healthcare workers including clinical officers and nurses. It is imperative that this essential healthcare workforce is protected; ensuring that they get adequate PPE supplies and training on the proper use of PPEs.

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