

## Pushing Back the Growing Burden of Chronic Kidney Disease in Africa: Time for a Paradigm Shift

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### Abstract

**Background:** Chronic kidney disease (CKD) is a major public health problem worldwide. In many countries in Africa as in other developing countries, there has been a growing number of patients presenting in hospitals with chronic kidney disease and kidney failure. In the last two decades, in addition to the traditional risk factors for CKD, climatic factors have emerged as important contributors to the growing burden of CKD in tropical countries and are characterized by repeated exposure to heat in association with physical exertion and dehydration, and deterioration of kidney function. In the northern parts of the West Africa sub-region tropical climatic conditions characterized by extreme hot weather and intense heat during the dry season do exist and there is therefore need for studies on the impact of exposure to hot climate on kidney dysfunction in the African context. Basic infrastructure is lacking in healthcare facilities for early detection and management of CKD especially in the rural areas thus making the challenge of pushing back the CKD epidemic in the continent enormous. This article discusses the burden of chronic kidney disease in Africa and suggests key structures that need to be put in place for its successful pushback. **Conclusion:** The best hope for reducing the human and economic burden of chronic kidney disease in Africa and other developing countries lies in its prevention. The Nephrology community, policy makers, allied healthcare professionals and individual patients all have important roles to play in this respect.

**Keywords:** Chronic kidney disease; Burden; Pushback; Africa

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### I. Introduction

Chronic kidney disease (CKD) is a clinical condition characterized by a progressive damage to kidney structure and function occurring over a period of three months or more. It encompasses all degrees of decreased kidney function, from damaged kidney-at-risk through mild, moderate, advanced, to end-stage kidney disease or kidney failure. Thus, CKD is a spectrum. At one end of the spectrum is kidney structure with some degree of damage but with normal function retained, and at the other end, end-stage kidney disease with near complete loss of kidney function. End-stage kidney disease is also known as kidney failure. Chronic kidney disease can trigger other medical problems such as cardiovascular disease. These in turn can lead to premature death or disability and multiply the resources needed for patient care. The cost of treating this growing epidemic represents an enormous burden on healthcare systems worldwide.

#### *The burden of chronic kidney disease in Africa*

Chronic kidney disease (CKD) is a major public health problem worldwide. Globally, about 1 in 10 people have chronic kidney disease (CKD)<sup>1</sup>. In Africa, a meta-analysis of 98 studies involving 98,432 individuals reported an overall prevalence of 15.8% for chronic kidney disease stages 1–5 in the general population<sup>2</sup>. Again, a cross-sectional population-based study involving over 8,000 people aged 40–60 years from four Sub-Saharan African countries namely Burkina Faso, Ghana, Kenya and South Africa (Africa Wits-International Network for the Demographic Evaluation of Populations and their Health Partnership for Genomic Studies [AWI-Gen]), revealed an overall prevalence of 10.7% for chronic kidney disease<sup>3</sup>. The study involved four rural communities in Burkina Faso, Ghana, and South Africa, and two urban communities in Kenya and South Africa. Also in the study, markers of kidney damage were defined as low estimated glomerular filtration rate (eGFR; <60 mL/min per 1.73 m<sup>2</sup>), presence of albuminuria (urine albumin creatinine ratio >3 mg/mmol); or chronic kidney disease (low eGFR or albuminuria, or both)<sup>3</sup>.

Hypertension, HIV, and diabetes were all independently associated with chronic kidney disease in the study<sup>3</sup>.

In Nigeria, over the years there has been a growing number of patients presenting in hospitals with chronic kidney disease. This is evident from various reports from several of the country's major tertiary healthcare institutions. For example, in the 1960's, less than two percent of all admissions in the medical wards of the country's premier tertiary healthcare institution, University College Hospital, Ibadan was attributed to patients with kidney failure<sup>4,5</sup>. But between 1970 and 1990 the number had increased to six to nine percent of all medical admissions across tertiary centres in the country<sup>6-8</sup>. These earlier reports were however hospital-based studies and were from just the tertiary healthcare centres. More recently, community-based studies have also shown that chronic kidney disease is not uncommon in our society<sup>9-10</sup>. One study which pooled together 30 different studies across the six geographical zones in Nigeria found an aggregate prevalence of chronic kidney disease of about 12 percent among the Nigerian population<sup>9</sup>. However, these community-based studies were cross-sectional and markers for CKD such as proteinuria represented one-off records and there were no follow-ups to determine their persistence. Nonetheless, it is noteworthy that chronic kidney disease is more common among rural dwellers than urban dwellers in Nigeria<sup>9</sup>. This might be a reflection of the lack of basic healthcare facilities for early detection and management of CKD risk factors in the rural areas.

These studies also show a preponderance of young and middle-aged adults that develop chronic kidney disease/kidney failure in Nigeria<sup>9,10</sup>. This age group represents the key drivers of any country's economic activities. Thus, the negative impact of chronic kidney disease/kidney failure on the country's economy is a real concern. Even in high income countries, the very high cost of long-term dialysis for increasing numbers of people is burdensome. In low- and middle- income countries of Africa, long term dialysis is virtually unaffordable to the vast majority of those who need care. Thus, the cost of treating and caring for kidney failure patients is enormous and well beyond the financial capacity of even many high-income earners. As in most developing countries particularly in Africa, there is no social security system or functional health insurance scheme in place to assist patients with the burden of treatment cost. Consequently, this burden is borne entirely by the patient and/or family members. The result is that a large number of kidney failure patients succumb prematurely.

Also, in Nigeria as in most other African nations, hypertension, chronic glomerulonephritis, and diabetes mellitus constitute the most important risk factors<sup>4-8</sup>. In addition, interstitial nephritis associated with prolonged and inappropriate use of medications such as antibiotics and non-steroidal anti-inflammatory drugs (NSAIDs) represent an important risk factor for CKD in African countries given that these medications are usually misused and obtained over the counter. In a retrospective study of a large military population in the United States, individuals with the highest levels of dispensed NSAIDs were noted to have 20% increased risk of both acute kidney injury (AKI) and chronic kidney disease (CKD)<sup>11</sup>. The study suggested that risks for developing acute kidney injury and chronic kidney disease associated with regular use of higher doses of nonsteroidal anti-inflammatory drugs (NSAIDs) may be greater than previously estimated<sup>11</sup>. The study also found that use of NSAIDs by older persons (50 years and above) increases the risk of developing CKD seven-fold<sup>11</sup>. Furthermore, people with other medical conditions such as overweight, obesity, hypertension and diabetes who take higher doses of NSAIDs have twice the risk of developing chronic kidney disease compared to those who take lower doses<sup>11</sup>. Fortunately, the use of lower doses of NSAIDs does not appear to be associated with a greater risk of developing kidney disease<sup>11</sup>. Afolabi and colleagues in a hospital-based prospective study in Southwest Nigeria observed an independent association between habitual analgesic use and CKD<sup>12</sup>. It is therefore imperative that access to such medications by the public should only be on the basis of a prescription by qualified medical personnel. From the Southeast Nigeria, Ulasi and colleagues in a community-based study observed a significant association between the use of traditional medications and the development of chronic kidney disease especially in the rural population<sup>13</sup>.

#### ***Climate change: An emerging factor in the burden of CKD***

Climate change associated with significant rise of 0.8°C–0.9°C in global mean temperature, over the last century has been linked with significant increases in the frequency and severity of heat waves (extreme heat events)<sup>14</sup>. It has also been increasingly linked to detrimental consequences on human health. Some of the consequences of climate-related extreme heat exposure include dehydration and volume loss, leading outright heat exhaustion and heat stroke<sup>14</sup>. Recent studies have shown that recurrent heat exposure with physical exertion and inadequate hydration can lead to CKD that is distinct from that associated with the traditional risk factors such as diabetes, hypertension, or glomeronephritis<sup>15-21</sup>. Epidemics of CKD consistent with heat stress nephropathy are now reported across the world<sup>14</sup>. In the 1990s, clinicians in Central America noted that a large number of young sugarcane workers were presenting with end-stage kidney disease but the earliest report of this observation came from El Salvador in 2002<sup>15</sup>. In more recent years, numerous cases of chronic kidney disease

have emerged among certain agricultural communities typically among sugarcane workers and less frequently in other occupations such as construction workers, corn and rice farmers, cotton plantation workers, and miners. Also, there have been multiple reports of higher-than-expected rates of chronic kidney disease among sugarcane workers and other agricultural workers who work in fields along the Pacific Coast of Central America, from Guatemala to Panama<sup>15-21</sup>. This phenomenon has been called Mesoamerican nephropathy (formerly known as chronic kidney disease of unknown cause or CKDu)<sup>21</sup>. It has also been described as atypical form of chronic kidney disease due to its lack of association with the traditional risk factors for CKD such as diabetes, hypertension, and glomerular disease<sup>18</sup>. Heat stress, dehydration and kidney dysfunction were most common among sugarcane cutters<sup>21</sup>. Kidney dysfunction also occurred to a lesser extent among construction workers and high serum uric acid was associated with reduced kidney function<sup>21</sup>. Studies in South and Central America have pointed to a link between repeated exposure to heat in association with physical exertion and dehydration, and deterioration of kidney function<sup>18-21</sup>. The Northern parts of the West Africa Sub-region are also characterized by extreme hot weather and intense heat during the dry season. There is therefore a need for studies on the impact of exposure to hot climate on kidney dysfunction among workers in the African context.

### ***Addressing the Burden of CKD in Africa calls for A Paradigm Shift***

The burden of kidney disease in African countries is growing substantially and available studies probably underestimate the burden as national or regional registries related to the status of kidney health are lacking in these countries. Moreover, the various community-based studies from these nations show variable prevalence rates of CKD on account of differences in screening protocols and the standard CKD equations employed in determining presence of kidney disease and estimating glomerular filtration rate (eGFR)<sup>3,9,13</sup>. Regardless of the screening protocol employed, early detection and interventions to prevent or delay disease progression would reduce the burden of kidney failure in Africa as in the developed nations of the world. In the Nigeria context, realization of kidney health targets and strategies are unlikely to emanate from initiatives by governmental institutions or the political class. The reason is that pervasive corruption and the absence of real commitment to public health continues to pervade the country's body politic. This is evident from the near total failure of the National Health Insurance Scheme to address even the most basic of the nation's population health indices such as maternal and child health. Non-governmental agencies therefore hold the key to promoting kidney health in the country.

### ***Kidney Health Advocacy: Role of the Nephrology Community in reducing the burden of kidney disease in Africa***

The Nephrology community in Africa has a responsibility to provide real leadership in unifying efforts among the healthcare professions and other stakeholders to improve the quality and efficacy of kidney care in the continent. The first step in this collaborative effort should be to put in place a comprehensive renal health registry in conjunction with primary care, secondary and tertiary healthcare institutions across the continent. But there is paucity of data on end-stage renal disease (ESRD) in Africa and most African nations lack a renal registry. Several national renal registries have been established but have not been sustainable due to resource limitations<sup>22</sup>. The establishment of an Africa Renal Registry was mooted in 2015 by the African Association of Nephrology and the African Paediatric Nephrology Association<sup>22</sup> and could have provided data that might assist various health organizations in Africa to plan effective strategies. Moreover, evidence from such a comprehensive renal registry might also help to propel policy makers across the continent to action. However, it is yet to materialize.

In addition to targeting traditional risk factors for kidney disease such as hypertension, chronic glomerulonephritis, obesity and diabetes mellitus, attention needs also be directed to other risk factors such as high rate of over the counter analgesic and antibiotic misuse and abuse, as well as use of herbal and other alternative remedies<sup>12,13</sup> among Africans. The occurrence of infectious diseases like malaria, tuberculosis, schistosomiasis, HIV and hepatitis B and C in African regions are other important aetiologies of CKD<sup>23</sup>. Again, the occurrence of kidney failure due to pregnancy-related complications in the context of inadequate access to maternal health care, including perinatal care in low socioeconomic communities also deserves attention. In this context, nephrologists could collaborate with obstetricians and public health specialists in a comprehensive effort to determine the extent of the problem and appropriate interventional approaches. Nephrologists also need to collaborate with other health professionals such as diabetologists, hematologists, gastroenterologists and other specialists who care for people living with HIV/AIDS or who care for at risk patients for CKD as such patients need to have periodic checkups on the status of their kidney function. Moreover, given the significant association between family history and CKD it is important to proactively pay attention to first degree relatives of people diagnosed with CKD/kidney failure with a view to implementing primary prevention strategies. This places an important role for family physicians, the healthcare gate keepers.

Various National Nephrology Associations or Societies of Nephrology (NAN) across the continent could also partner with non-governmental organizations interested in Kidney health advocacy in carrying out periodic community enlightenment campaigns. Improving education and awareness about kidney disease requires getting different community members and stakeholders such as physicians, allied health care professionals, patients and family members involved. Other critical stakeholders should include advocacy groups such as Kidney Foundations, the political class, philanthropists, industry affiliates, and government officials<sup>24</sup>. Beyond publishing research findings in scientific literature, it is more important for researchers to provide feedback to the communities involved in the research on the necessary actions to take in order to mitigate the identified risk factors for CKD. For example, people should be educated about the risks associated with use of nonprescription over the counter NSAIDs, and traditional herbal remedies.

Taking a cue from the International Federation of Kidney Foundations/International Society of Nephrology (IFKF/ISN) facilitated World Kidney Day (WKD) which is commemorated yearly, the Nigerian Association of Nephrology (NAN) is already doing a good job of dedicating the day towards creating public awareness on kidney health. However, a further step would be dedicating a National Kidney Day for the purpose of carrying out kidney health awareness and promotion campaigns across the country in order to awaken national consciousness to the burden of CKD, particularly among the nation's policy makers. The effectiveness of such campaigns might benefit from the complementary support of non-governmental organizations (NGOs) community-based initiatives. Just as IFKF/ISN World Kidney Day represents a global level of advocacy for kidney health, a National Nephrology Associations or Societies facilitated National Kidney Day can play a similar role in the African nations and help to stimulate prioritization of national resources for better prevention and management of chronic kidney disease. These national Nephrology Associations or Societies could also take a cue from the International Society of Nephrology advocacy objectives in the global health stage<sup>25</sup> by:

- a. Ensuring that kidney health is represented by a truly national voice on health-related national policy developments
- b. Providing input to national health policy discussions relevant to improving kidney health e.g. surveillance and prevention, organ donation and kidney transplantation, and renal replacement therapy access.
- c. Helping to integrate kidney disease into the national health insurance coverage by leveraging on the huge health and economic burden of kidney disease on the country.

### ***Role of Policy Makers***

In Nigeria, the Nigerian National Health policy provides for a health system with three levels of operation namely primary, secondary and tertiary, with the primary healthcare level as its cornerstone. According to this policy, the federal government has the responsibility for policy formulation, strategic guidance, coordination, supervision, monitoring and evaluation at all the three levels<sup>26</sup>. However, healthcare policy requires reliable and rigorous evidence to inform the numerous critical decisions that policy makers must make especially in the face of limited available resources. One of the major constraints of healthcare policy making in Nigeria is communication gaps and poor networking between policy makers and researchers<sup>26</sup>. There is also the problem of lack of involvement of healthcare recipients in the identification and planning processes of healthcare delivery<sup>26</sup>. Strategies that encourage collaboration between researchers and policy makers, improved budgetary provision for research, as well as improvement in facilities for research activities, have been shown to improve evidence-based policy making in developed countries<sup>26</sup>. There is no reason why such an approach should not produce similar results in African nations.

A healthcare policy that drives establishment of functional primary health care units that are equipped with basic diagnostic facilities and infrastructure especially at local government level is imperative. Equipment that should be available in such centres should include regularly calibrated blood pressure machine, blood glucose monitoring machine, urine testing strips, body weighing scales, height measuring scales among others. Such primary care facilities should be situated in rural communities and should be accessible and affordable. In addition, they should be run by trained healthcare personnel. Access to unregulated traditional therapies is rife in rural communities because standard basic healthcare facilities and healthcare personnel are lacking in those communities.

A government driven programme modelled after the Chronic Disease Outreach Primary Prevention Programme (CHOPPP) in Soweto, South Africa<sup>27</sup> should be replicated in other African countries. This programme which can be effected through the primary health centres involves the use of trained health workers such as primary health care nurses, registered nurses, health educators at the primary health care level. The workers are trained to assess individuals as well as obtain basic history and carry out physical examination on the local community population and carry out basic checks of blood pressure and blood glucose, and perform urine analysis. They will then report findings to a programme manager or programme nurse coordinators, who in turn will report to a physician. Data collation and programme management activities can be centrally coordinated at a Centre designated by the Ministry of Health. Such a programme will have the added advantage of facilitating the development of a national renal registry.

### **Role of Other Healthcare Practitioners**

Healthcare professionals play a leading role in a top-down type of intervention in the prevention of disease. Collaboration among general and specialist medical professionals at primary, secondary and tertiary healthcare levels is essential in any effort directed towards prevention of chronic kidney disease in Africa. Such cooperation should include in particular, prompt referral of patients with persisting markers of kidney damage such as proteinuria and/or haematuria as detected by routine urine tests. Bosa<sup>28</sup> in a study in Kaduna, Northwest Nigeria observed that screening for CKD is rarely carried out in the routine practice of the primary and secondary care medical officers who have the first contact with patients, thus missing the opportunity for early detection and evaluation of kidney disease, and prevention of progression to end-stage kidney disease.

### **Role for the individual patient**

Individuals should take personal responsibility for their kidney health as with other aspects of their general health and wellbeing. This is the principle behind the concept of health promotion defined by the World Health Organization 1986 Ottawa Charter for Health Promotion as, “the process of enabling people to increase control over their health so as to improve it”<sup>29</sup>. As the World Kidney Day 2021 theme brought to the front burner, patient empowerment through education and awareness, with the ultimate goal of encouraging life participation could be an important part of the push back against chronic kidney disease burden in Africa.

## **II. Conclusion**

The best hope for reducing the human and economic burden of chronic kidney disease in Africa and other developing nations of the world lies in its prevention. The Nephrology community, policy makers, allied healthcare professionals and individual patients all have important roles to play in this respect.

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