



REVIEW ARTICLE

Unaffordability of renal replacement therapy in Nigeria

Samuel Ajayi ^{a,*}, Yemi Raji ^a, Temitope Bello ^b, Lanre Jinadu ^b, Babatunde Salako ^a

^a Department of Medicine, College of Medicine, University of Ibadan, Ibadan, Nigeria

^b University College Hospital, Ibadan, Nigeria

Available online xxx

CrossMark

KEYWORDS

renal replacement therapy;
resources;
unaffordability

Abstract With the increase in epidemic proportions of diabetes worldwide, the number of patients who will require renal replacement therapy (RRT) will be a great challenge to the health infrastructures of developing countries such as Nigeria. Because those mostly affected are in the economically productive age group, a vicious circle is established whereby those who keep the economy going are the same people affected. Secondary and tertiary care of chronic kidney disease involving RRT would exact disproportionate toll on the income of patients in the developing world where patients pay out of pocket for their own care. Whilst there is an increase in the number of facilities offering RRT, there is no commensurate sustainability of care either by the patients themselves or even by the government. The level of unemployment is increasing. Kidney transplantation is out of reach in addition to the cost of post-transplant care, which includes hospitalization and immunosuppressive medications. Most of the end-stage kidney disease patients who enlisted in our dialysis program were unable to get or sustain adequate hemodialysis. The data also showed that more men were dialyzed at our facilities over the period under review and the age distribution has not changed much over the decade. From this dismal picture in the last decade emerges a series of questions as to why this is so and what must be done to increase access to RRT. Prudent fund management and cost containment, local manufacture of dialysis materials and nongovernmental sources of funding are means of driving down the cost of dialysis. In countries where drugs and equipment for health services are locally manufactured, such as India and other countries, the cost of health care is more affordable than in countries such as Nigeria where these are imported.

在全世界，糖尿病的盛行率與日俱增，然而對於發展中國家如尼日利亞，基礎醫療架構並不足以應付患者對腎置換療法 (RRT) 的需求。本地民眾必須自費支付自身的醫療費用，但其收入水平遠不足以負擔慢性腎病二級與三級照護所需的 RRT。即使目前 RRT 設施已有所增加，但無論是患者或政府均難以維持治療的長期實施。此外，腎臟移植所需的資源在本地更是相當之有限。在我們納入透析計劃的末期腎病 (ESKD) 患者間，大多數並未能接受足夠或持續的透析治療。過去十年間，在我們設施內接受透析的病人中，年齡分佈大致穩定，且男性佔較多數。目前，我們正

* Corresponding author. Department of Medicine, College of Medicine, University of Ibadan, Ibadan, Nigeria.
E-mail address: soajayi@comui.edu.ng (S. Ajayi).

研究如何能促進 RRT 普及實施的方案。透過謹慎的理財與成本控制、透析物料的本土生產、及非政府資金的運用，透析的相關費用可望得以降低。目前，發展中國家如尼日利亞的藥物與醫療器材大多仰賴進口，因此相關物資的本土生產是降低醫療成本的可行方案。

The burden of chronic kidney disease in the developing nations has engaged the attention of policy makers, health care providers, and care givers in the developing world for some time now, especially against the backdrop of economic recession and prevalent poverty. Furthermore, the population most affected by chronic kidney disease (CKD) are those most economically productive and on whom substantial investment has been made, due mostly to the epidemiological pattern of CKD in the developing world.¹ The World Health Organization recently listed CKD among noncommunicable diseases that deserve attention and has been at the vanguard of its prevention and treatment.² At present, regardless of the cause of CKD, most patients present very late and the economic burden is nothing less than catastrophic for them and their relatives.³ Renal replacement therapy (RRT) modalities such as dialysis and transplantation remain largely out of reach for most patients, even the most relatively well-off.^{4,5}

The prevalence of CKD is 8–16% globally, and the number of patients on RRT is about 1.4 million in 2002, and growing at 8% annually, it was estimated to be over 4.902 million by 2010.^{6–9} With the increase in epidemic proportions of diabetes worldwide, the number of patients who will require RRT will be a great challenge to the health infrastructures of developing countries such as Nigeria. Because those mostly affected are in the economically productive age group, a vicious circle is established whereby those who keep the economy going are the same people affected.¹⁰

Much is being written about global financing of health and catastrophic health spending in the developing world, in which individuals and households are rendered impoverished by health spending. This would appear to be more prevalent in the rural areas where the poorest in the society live.^{11–13} Onwujekwe et al,¹² for instance, found that a monthly expenditure of \$19.66 in certain communities in Nigeria, an amount that is 40% of total nonfood expenditure, rendered 27% of households impoverished. Urban dwellers spend even more because the cost of living and health is far more prohibitive.

Secondary and tertiary care of CKD involving RRT would exact a disproportionate toll on the income of patients in the developing world where patients pay out of pocket for their own care. In a weak economy and poor primary health care infrastructure for screening and prevention, RRT adds to the burden of care and dislocates individual and family finances.

Ten years ago, there were only 27 dialysis centers and one transplant center in Nigeria,⁹ but today there are about 80 established hemodialysis (HD) centers and more than five transplant centers, both public and private. So whilst there is an increase in the number of facilities offering RRT, there is no commensurate sustainability of care either by the patients themselves or even by the government. The level

of unemployment is increasing. Kidney transplantation is out of reach of many patients, especially when it costs a large lump sum to get the surgery done, in addition to the cost of post-transplant care, which includes hospitalization and immunosuppressive medications.¹⁴

It is almost 20 years since affordability of RRT was reviewed in our center, and it becomes necessary to revisit the matter again. The last study from our center was a 5-year review that concluded that over 80% of patients could only dialyze for about 3 months.¹⁵ This means that survival of patients with end-stage kidney disease was abysmal. Prior to this, a similar study had found that about 70% of patients could only afford dialysis for < 1 month.¹⁶ Very recently, a study from another region of the country also concluded that patients could dialyze only for about 8 weeks.¹⁷ We have undertaken a 10-year review to determine whether there have been a change in the last decade due to the incremental fees of dialysis and the economic changes in the country.

The last 10 years have witnessed an increase in the number of dialysis centers. This means that there have been huge investments both by the government and the private sectors. The gross domestic product (GDP) has more than doubled since 2005, from \$112 billion to \$262 billion in 2012; and the gross national income per capita from \$772 to \$1426.¹⁸ These figures and statistics should ordinarily yield health benefits in terms of infrastructural development and increased capital outlay for health spending.

In the last 10 years, the number of HD machines has increased from 5 to 15 in Ibadan, and the cost of HD has only marginally increased from N25,000 (\$125) to N30,000 (\$150). There are now three dialysis centers in Ibadan, one public and two private. We expected the number of patients admitted for maintenance dialysis to increase significantly in the last 10 years, and therefore, we were interested in how long patients can sustain RRT.

Records of all patients with CKD who dialyzed in the unit from 2004 to 2013 were abstracted. The variables of interest were age, sex, underlying kidney disease, number of dialysis sessions and duration of dialysis. All patients with acute renal failure or acute kidney injury were excluded. Our focus was primarily to explore the duration or number of dialysis patients can afford before dropping out of care or death. We also assume that the rest who did not ask to be transferred out nor had transplantation dropped out of care for financial reasons.

A total of 956 patients were dialyzed over a period of 10 years. There were 371 women (38.9%) and 585 men (61.1%). Hypertensive nephrosclerosis, chronic glomerulonephritis (CGN), diabetic nephropathy, and obstructive uropathy (benign prostatic hypertrophy, prostatic cancer and urethral obstruction in males and pelvic tumors like cervical cancer in females) account for 42.0%, 30.1%, 9.5%, and 7.0% respectively. Human immunodeficiency virus-

associated nephropathy accounts for 6%. The overall mean age was 41.1 years. The mean age of patients with hypertensive nephrosclerosis is 50 years, CGN 32.5 years, and diabetic nephropathy 56 years. There is a male preponderance in the sex distribution of various underlying kidney disease with exception of human immunodeficiency virus (Tables 1 and 2). The mean number of days on dialysis was 21.8 and the mean number of dialysis sessions was 4.6 (Figure 1). The median of these variables are not substantially different (Figure 2). This means that, overall, the number of dialysis per week was about one. This ratio of period on dialysis and number of dialysis sessions appears to be roughly the same for the decade, except for the occasional patient who dialyzed for a relatively long time, as for example in 2004, when a patient dialyzed for at least a year (Figure 1).

Our review showed that most of the end-stage renal disease patients who enlisted in our dialysis program were unable to get or sustain adequate HD. The data also showed that more men were dialyzed at our facilities over the period under review and the age distribution has not changed much over the decade. Reasons adduced for male preponderance generally in seeking health care and accounting for more hospital admission than females include higher level of education in males, cultural practices that favor males, and higher incomes. Men are bread-winners, and therefore are more likely to get more attention and the necessary support from family members. The prevalence of hypertension in the population is about the same in men and women,¹⁹ but when complications occur, men are more likely to get attention in the largely traditional settings in Nigeria. This may account for the higher prevalence of male patients with kidney disease and even diabetes mellitus in hospital data.^{20,21}

From this dismal picture in the last decade emerges a series of questions as to why this is so and what must be done to increase access to renal replacement therapy. Besides, without a reliable and affordable dialysis program, even a transplant program would be in jeopardy.

The common problems are poverty, accessibility to dialysis centers, and inadequate government support for

Table 1 Distribution of the underlying kidney disease.

Diagnosis	Age (y), median	Age (y), mean (SD)	n (%)
HTN	49	50.0 (14.7)	401 (42.0)
Chronic glomerulonephritis	30	32.5 (13.4)	288 (30.1)
DN	55	56.0 (11.1)	91 (9.5)
Obstructive uropathy	65	61.5 (14.3)	67 (7.0)
HIV nephropathy	38	38.7 (10.7)	58 (6.1)
HTN + DN	64	65.8 (9.4)	21 (2.2)
HbSS nephropathy	27	25.6 (9.4)	5 (0.5)
Other	47	47.2 (12.2)	25 (2.6)
Total			956 (100)

DN = diabetic nephropathy; HbSS = hemoglobin SS; HIV = human immunodeficiency virus; HTN = hypertensive nephrosclerosis; Other = vasculitis, unspecified or unknown; SD = standard deviation.

Table 2 Sex distribution of causes of kidney failure.

Diagnosis	Sex	Age (y), median	Age (y), mean (SD)	n (%)
HTN	Female	48.0	49.0 (14.2)	150 (15.7)
	Male	50.0	51.0 (14.9)	251 (26.3)
Chronic glomerulonephritis	Female	29.0	32.6 (14.1)	121 (12.6)
	Male	30.0	32.5 (13.0)	167 (17.4)
DN	Female	53.5	54.8 (12.2)	32 (3.3)
	Male	56.0	56.6 (10.5)	59 (6.2)
Obstructive uropathy	Female	57.0	56.0 (15.7)	21 (2.2)
	Male	65.0	64.0 (13.0)	46 (4.8)
HIV nephropathy	Female	37.5	39.1 (11.6)	32 (3.4)
	Male	39.0	38.1 (9.6)	26 (2.7)
HTN + DN	Female	62.0	62.0 (10.0)	2 (0.2)
	Male	64.0	66.2 (10.0)	19 (2.0)
HbSS nephropathy	Female	25.0	21.3 (9.1)	3 (0.3)
	Male	32.0	32.0 (7.1)	2 (0.2)
Others	Female	47.0	44.5 (12.5)	10 (1.1)
	Male	47.0	49.0 (12.1)	15 (1.6)
Total				956 (100)

DN = diabetic nephropathy; HbSS = hemoglobin SS; HIV = human immunodeficiency virus; HTN = hypertensive nephrosclerosis; Other = vasculitis, unspecified or unknown; SD = standard deviation.

renal replacement.^{10,17,22} Nigeria is now ranked the biggest economy in Africa, due to its increasing GDP over the years, but the economic gains, as in most developing nations lacking structured social security, has not trickled down to the general population. The GDP in 2013 stood at \$521.8 billion compared to South Africa's \$350.5 billion; however, the poverty headcount ratio at national poverty line is 46% of the population, or more.²³ The economy is characterized by the fact that a large proportion of population is not benefiting from the economic growth.²⁴ Individual economic empowerment is low, and without government subsidy and meaningful health insurance, many people requiring renal replacement therapy would not be able to afford it.

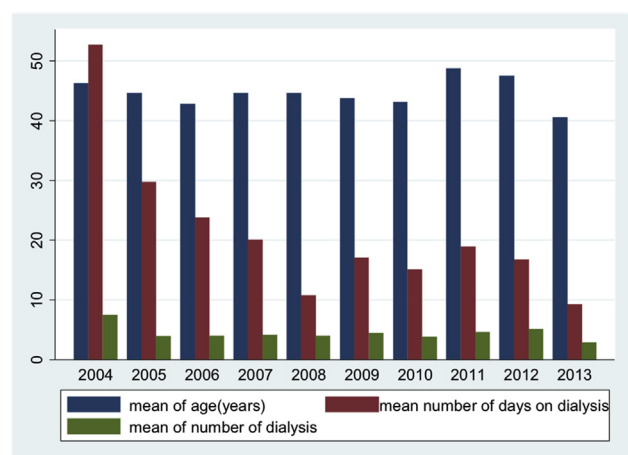


Figure 1 Mean age, number of days on dialysis, and number of dialysis sessions.

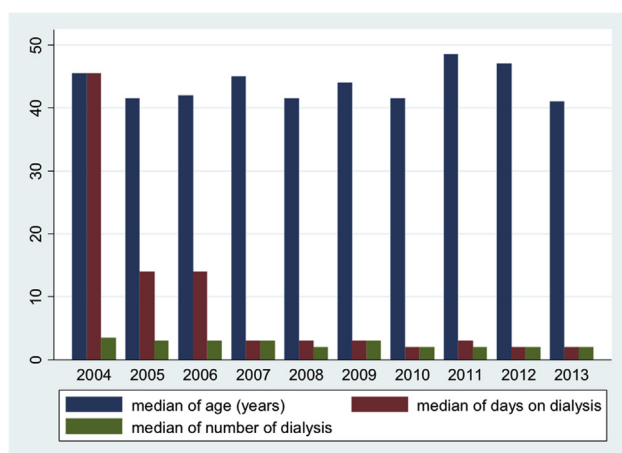


Figure 2 Median of age, number of days on dialysis, and number of dialysis sessions.

Fifteen years ago, there were only three cities within at least 100 km offering HD (Lagos, Ile-Ife, and Abeokuta) and not more than three centers in any of these cities. Today, the number has increased and there are even private dialysis centers in many cities. One would expect that accessibility to care and sustainability would improve, but this is apparently not the case, because of cost, which is paid for out-of-pocket.

What should be done?

It has been suggested that, because HD is expensive, in poor economies, the financial capability of patients to sustain dialysis for an extended period should be one of the criteria for acceptance into the program.²⁵ This will be difficult to implement in a culturally sensitive environment where care-givers never want to abandon their relatives even if they have to borrow to pay the hospital bills.

RRT is a capital intensive project, and therefore, without government support or subsidy, the majority of patients in resource-poor settings would not be able to pay for it. Health insurance is another way to enhance affordability. However, in Nigeria today, neither government subsidy nor robust and comprehensive health insurance are available. The cost of health care is borne by the patients or their relatives. There is no funding mechanism to reimburse the provider. Indeed, the only effort to provide care by public hospitals is through a mechanism of users' fee revolving system whereby the money paid by the patients is deposited in a dedicated account and used to purchase consumables for the next round of dialysis. The government does not provide subsidies or reimbursement for dialysis. Indeed, a few private dialysis facilities have been set up in big commercial cities in Nigeria, and because they are largely profit-making concerns, only rich patients can afford care in these centers. The only advantage is that these centers are better managed to provide continuity of care for those who can afford it. Therefore, are exist differences in the fees in dialysis centers, although sometimes marginal. Currently, the best the government has offered through the recently established National Health Insurance

Scheme (NHIS) for RRT are six sessions of HD, ostensibly for acute kidney injury. The Nigerian Association of Nephrology is engaging the NHIS in this regard. The association advocates increased funding for the NHIS to be able to take on more chronic kidney disease patients on requiring RRT. Government subsidy and reimbursement will substantially improve access to RRT. A state government, due to strong advocacy, has offered dialysis at highly subsidized fees and in some cases free of charge.

Today, there is no hospital in Nigeria offering peritoneal dialysis (PD) for patients with end-stage kidney disease on a regular and continuous basis, even though the overall cost of PD and HD may approximate because of pricing due to the fact that all materials for dialysis are imported. However, this is about choice and an alternative driving down the cost. It seems more profitable for the industry to promote HD, whilst recognizing the usual reason of peritonitis for not doing more PD. Middle men inflate the cost of these machines, and there is little hard bargaining because of the contract nature of procurement. For instance, it is possible for a company, and this has been done in some centers, to supply the hardware *ex gratia*, and then make their profit from supplies of dialyzers, blood lines, salt, etc. This has been known to reduce the cost considerably. This arrangement also improved the maintenance of the machines because such companies undertake to maintain them instead of waiting for public institutions and bureaucracy. Recently, the Nigerian Association of Nephrology engaged some intravenous fluid manufacturers to also produce fluids for PD. They agreed on the condition that there would be demand for the fluids to justify investment. Consequently, the association used the forum of its annual general and scientific meeting 1 year ago to emphasize the need for PD by dedicating a whole day under a subtheme to discuss PD. The International Society of Nephrology Continuing Medical Education committee sponsored an international speaker for this purpose. A committee on PD was then set up by the association to find ways to encourage the use of PD. Some centers have recommenced use of PD, especially for children. The main difficulty is occurrence of peritonitis, but with best practices guidelines, this difficulty is being overcome and the outcome is better.^{26–28}

Most of our patients typically present in emergencies, especially pulmonary edema, and are dialyzed using temporary access through neck lines, and when suitable catheters are not available, femoral lines, which we seriously discourage now. The neck lines are only now being stocked in the hospital, and patients have had to procure these from private vendors. More centers now increasingly perform fistula procedures at a cost ranging from \$100 to \$200. Local transplant surgeons and International Society of Nephrology (ISN) educational ambassadors have conducted training in some centers in Nigeria.

If the burden of chronic noncommunicable diseases can be reduced by preventive and screening programs, more funds may be available for RRT. In addition, a functional donor and transplant program will reduce substantially the number of patients dependent on dialysis. Local manufacture of dialysis machines and consumables and generic drugs will make dialysis more affordable. At the moment, all dialysis hardware and consumables are imported

without any import duties waiver, and this has added to the increase in cost of dialysis.

Conclusion

HD, and indeed RRT, is still out of reach of most patients requiring it in Nigeria and this has gone on for too long in spite of the increase in national wealth and increase in the number of facilities where hemodialysis is offered. Most patients cannot afford dialysis for more than a few weeks.

Prudent fund management and cost containment, local manufacture of dialysis materials and nongovernmental sources of funding are means of driving down the cost of dialysis.⁸ In countries where drugs and equipment for health services are locally manufactured, such as India, the cost of health care is generally affordable.

References

1. Arogundade FA, Barsoum RS. CKD Prevention in Sub-Saharan Africa: a call for governmental, nongovernmental, and community support. *Am J Kidney Dis* 2008;51:515–23.
2. United Nation General Assembly. *Political declaration of the High-level Meeting of the General Assembly on the Prevention and Control of Non-communicable Diseases*. Available from: http://www.un.org/ga/search/view_doc.asp?symbol=A/66/L.1; 2011.
3. Okunola O, Akinsola A, Ayodele O. Kidney diseases in Africa: aetiological considerations, peculiarities and burden. *Afr J Med Med Sci* 2012;41:119–33.
4. Arogundade FA. Kidney transplantation in a low-resource setting: Nigeria experience. *Kidney Int Suppl* 2013;3:241–5.
5. Bamgboye EL. End-stage renal disease in sub-Saharan Africa. *Ethn Dis* 2006;16. S2–5–9.
6. Jha V, Garcia-Garcia G, Iseki K, Li Z, Naicker S, Plattner B, et al. Chronic kidney disease: global dimension and perspectives. *Lancet* 2013;382:260–72.
7. Jha V, Wang AYM, Wang H. The impact of CKD identification in large countries: the burden of illness. *Nephrol Dial Transplant* 2012;27:32–8.
8. White SL, Chadban SJ, Jan S, Chapman JR, Cass A. How can we achieve global equity in provision of renal replacement therapy? *Bull World Health Organ* 2008;86:229–37.
9. Liyanage T, Ninomiya T, Jha V, Neal B, et al. Worldwide access to end-stage kidney disease: a systematic review. *Lancet* 2015;385:1975–82.
10. Bamgboye EL. Hemodialysis: management problems in developing countries, with Nigeria as a surrogate. *Kidney Int Suppl* 2003;63:S93–5.
11. Li Y, Wu Q, Liu C, Kang Z, Xie X, Yin H, et al. Catastrophic health expenditure and rural household impoverishment in China: what role does the new cooperative health insurance scheme play? *PLoS One* 2014;9:e93253.
12. Onwujekwe O, Hanson K, Uzochukwu B. Examining inequities in incidence of catastrophic health expenditures on different healthcare services and health facilities in Nigeria. *PLoS One* 2012;7:e40811.
13. Rahman MM, Gilmour S, Saito E, Sultana P, Shibuya K. Health-related financial catastrophe, inequality and chronic illness in Bangladesh. *PLoS One* 2013;8:e56873.
14. Ramachandran R, Jha V. Kidney transplantation is associated with catastrophic out of pocket expenditure in India. *PLoS One* 2013;8:e67812.
15. Salako BL. Managing chronic renal disease in Nigeria. *Niger Med J* 2001;40:75–7.
16. Arije A, Kadiri S, Akinkugbe O. The viability of hemodialysis as a treatment option for renal failure in a developing economy. *Afr J Med Med Sci* 2000;29:311–4.
17. Makusidi MA, Liman HM, Yakubu A, Isah MD, Abdullahi S, Chijioko A. Hemodialysis performance and outcomes among end stage renal disease patients from Sokoto, North-Western Nigeria. *Indian J Nephrol* 2014;24:82–5.
18. Data UN. *Country Profile: Nigeria*. 2013. Available at: <http://data.un.org/CountryProfile.aspx?crName=NIGERIA>.
19. Ogah OS, Okpechi I, Chukwuonye II, Akinyemi JO, Onwubere BJC, Falase AO, et al. Blood pressure, prevalence of hypertension and hypertension related complications in Nigerian Africans: a review. *World J Cardiol* 2012;4:327–40.
20. Chijioko A, Adamu AN, Makusidi AM. Pattern of hospital admission among type 2 diabetes mellitus patients in Ilorin. *Nig Endocr Pract* 2010;4:6–10.
21. Agrawal RK, Hada R, Khakurel S, Baral A. Analysis of eight years of data of renal disorders in a tertiary care hospital in Nepal. *Postgrad Med J NAMS* 2009;9:28–34.
22. Unuigbo EI. Funding renal care in Nigeria: a critical appraisal. *Trop J Nephrol* 2006;1:33–8.
23. The World Bank. *Data: Nigeria*. 2015. Available at: <http://data.worldbank.org/country/nigeria>.
24. Viljoen C. *A closer look at Nigeria's GDP rebasing*. 2014. Available at: <http://www.cnbcafrica.com/news/western-africa/2014/04/11/a-closer-look-a-nigerias-gdp-rebasing/>.
25. Ulasi Ifeoma I, Ijoma Chinwuba K. The enormity of chronic kidney disease in Nigeria: the situation in a teaching hospital in south-east Nigeria. *J Trop Med* 2010;2010:501957.
26. Arogundade FA, Ishola Jr DA, Sanusi AA, Akinsola A. An analysis of the effectiveness and benefits of peritoneal dialysis and hemodialysis using Nigerian made PD fluids. *Afr J Med Sci* 2005;34:227–33.
27. Obiagwu PN, Aliyu A. Peritoneal dialysis vs. hemodialysis in the management of pediatrics acute kidney injury in Kano, Nigeria: a cost analysis. *Trop Int Health* 2015;20:2–7.
28. Ademola AD, Asinobi AO, Ogunkunle OO, Yusuf BN, Ojo OE. peritoneal dialysis in childhood acute kidney injury: experience in southwest Nigeria. *Perit Dial Int* 2012;32:267–72.