# END-STAGE RENAL DISEASE IN SUB-SAHARAN AFRICA

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End-stage renal disease (ESRD) is increasing to epidemic proportions worldwide. In most parts of sub-Saharan African, poor leadership and resultant poverty have resulted in low detection and management of ESRD. Many countries in the subregion do not have the resources, both material and manpower, to cope with the number of ESRD patients, even when detected. The Committee for the Global Advancement of Nephrology (COMGAN) and the International Society of Nephrology (ISN) site visits to the region have gone a long way to increase awareness. ISN-sponsored scholarships to doctors in the region have also served to improve the availability of needed manpower. The need to enhance preventive programs and the promotion and development of renal transplantation as an option are suggested modalities for coping with ESRD in this region. (*Ethn Dis*. 2006;16[suppl 2]:S2-5–S2-9)

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## INTRODUCTION

The incidence of end-stage renal disease (ESRD) worldwide is consistently rising, currently at the rate of 6% per year.[1] This rate is much higher than the rate of population growth in the world, estimated at 1.2% yearly.

Figures for much of the developing world are unknown but are believed to be higher than those in the developed world.[2] The situation in sub-Saharan Africa is even more dismal and worsened by the almost complete lack of data as regards the situation in large parts of the subcontinent.[3] Poor leadership has resulted in poverty, and large portions of the peoples in the subregion live below the poverty level of $1 per day.[4] Eighty percent of low human development countries (countries with high population growth, low income, low literacy, and low life expectancy) are in Africa.[4]

The resultant effect of this is the combined prevalence of communicable and noncommunicable diseases, which are often undetected until late and, worse still, poorly managed even when detected.[5] The rising tide of HIV infection in the continent further compounds the situation. In South Africa, for example, ≈20% of adults are HIV positive, and the disease is responsible for 30% of deaths.[6] Kidney failure is thus a major health problem that is unfortunately poorly recognized , and as a consequence, not enough resources are devoted to its management.[7] This report attempts to summarize the current state of ESRD in the subcontinent.

## ESRD PREVALENCE IN THE SUBREGION

The United States of America, Japan, Germany, and Brazil are the top four countries in the ''ESRD league.'' Even though together they constitute <11% of the population of the world, they are responsible for 50% of patients on ESRD care worldwide.[1] The countries of sub-Saharan Africa constitute ≈20% of the world's population but contribute <5% of the total population of patients on ESRD care worldwide, despite the well-known fact that people of African descent have a greater predilection for renal failure than people of other ethnic origins.[8,9,10] Limited national economic strength imposes restrictions on the treatment of patients with ESRD, particularly in countries with gross domestic product <$10,000 per person per year.[1] Table 1 compares the estimated ESRD treatment prevalence in various countries in the subregion with their GDP per capita.

Greater awareness and the recent interest shown by the International Society of Nephrology (ISN) through the Committee for the Global Advancement of Nephrology (COMGAN) with several site visits to various countries in the subregion, has led to a consistent rise in ESRD care numbers when these figures are compared with figures obtained from an earlier survey.[3] Table 2 compares the ESRD treatment prevalence estimates as reflected by an earlier survey in the year 2000 with a similar survey carried out more recently in the year 2004. This suggests an average 75% increase in numbers over the 4-year period of review.

At the St. Nicholas Hospital Lagos, Nigeria, the numbers of patients requiring maintenance dialysis has consistently risen since the inception of the dialysis unit in August 1998. The number of patients has only recently been restricted by the size of the unit, which has necessitated an expansion and relocation of the unit to cope with the increase in ESRD numbers. Figure 1 reflects the trend of patient and dialysis session numbers at Dialysis and Trans-

**Table 1. Comparison of national end-stage renal disease (ESRD) prevalence per million population (pmp) with gross domestic product (GDP) per capita**

| Country | ESRD Prevalence pmp | GDP per Capita |
|---|---|---|
| Mauritius | 563.3 | 11,046 |
| South Africa | 75.5 | 7935 |
| Mauritania | 34.5 | 1380 |
| Kenya | 15.6 | 1430 |
| Gabon | 12.3 | 5723 |
| Benin | 11.5 | 930 |
| Togo | 8.6 | 1546 |
| Nigeria | 6.0 | 924 |
| Cameroon | 4.9 | 1485 |
| Senegal | 3.4 | 1202 |
| Burkina Faso | 1.9 | 885 |
| Ghana | 1.6 | 1302 |
| Niger | 1.5 | 673 |

plant unit of St. Nicholas hospital, Lagos Nigeria since the inception of the unit.

Many countries in the subregion do not have the resources to cope with and stem the rising tide of ESRD prevalence. No qualified nephrologists or dialysis units are available in large parts of some countries, and limited resources in areas that have them at all. As can be seen in Table 3, many countries in the subregion have no more than 2 or 3 nephrologists serving populations that run into millions. Invariably these nephrologists are located in the urban areas, which leave large portions of the population unserved.[3]

## ESRD PATIENT CHARACTERISTICS IN AFRICA

The average age of ESRD patients in Africa is much younger than that in the developed world, where nephrology is gradually becoming a geriatric practice. Various studies all around the continent reveal average age figures often <40 years.

In St. Nicholas Hospital, Lagos, Nigeria, the average age of patients is 38.6 years, at the university hospital in Ibadan, Nigeria, this age is 37±14 years, 40±4.2 years in Benin, 43.4±12.1 years in Jos, 44 years in Senegal, and 36±15 years in Burkina Faso. Men also make up a disproportionate number of ESRD patients. The male:female ratio is 2.9:1 in Jos, 2.4:1 at the university hospital in Ibadan, 2.4:1 in St. Nicholas Hospital in Lagos, 2.04:1 in Benin, 1.72:1 in Burkina Faso, and 1.3:1 in Senegal.[11–16] The reasons for this male preponderance are unknown but may be related to the tendency for families in the subregion to value male members of the family more than female members and therefore spend more money on them.[3]

**Table 2. Percentage increase in end-stage renal disease (ESRD) prevalence over 4 years**

| Country | ESRD Prevalence, 2000 | ESRD Prevalence 2004 | % Increase |
|---|---|---|---|
| South Africa | 2,200 | 3,399 | 54.5% |
| Mauritius | 500 | 676 | 35.2% |
| Nigeria | 300 | 730 | 143% |
| Kenya | 220 | 500 | 127% |
| Mauritania | 50 | 100 | 100% |
| Benin | 40 | 75 | 87.5% |
| Cameroon | 30 | 75 | 150% |
| Senegal | 25 | 35 | 40% |
| Total | 3,470 | 5,724 | 75% |

Figure 2 shows the age and sex distribution of ESRD patients managed in St. Nicholas Hospital. The slightly younger peak age seen in the female patients is a result of the contribution of pregnancy-related hypertension and its complications, which lead to renal failure because it is not well managed in these patients. Inadequately managed pregnancy-induced hypertension remains one of the more common causes of ESRD in women in the subregion.

## ESRD ETIOLOGY IN THE SUBREGION

Etiology of ESRD in the subregion also differs from that seen in the developed world. As opposed to the situation in Europe and the United States, where diabetic nephropathy constitutes close to 50% of patients on ESRD programs, the predominant causes of ESRD in Africa are essential hypertension and chronic glomerulonephritis (CGN). Briefly, the distribution of causes of ESRD in Africa is as follows: hypertension 68.5%, CGN 18.5%, and diabetic nephropathy 8.5% in Benin; CGN 49.1% and hypertension 25.4% in Cote D'Ivoire; hypertension 48.7% and CGN 42.3% in Ghana; and hypertension 34.6% in Blacks in South Africa.[11,17–19] A rise in the percentage contribution of diabetes has however been noted in various centers, which is consistent with the increase in urbanization and improvement in the living standards in these countries.[20]

Presentation of ESRD patients is often late; >70% of chronic renal failure patients in ESRD at presentation are severely ill with several co-morbidities.[15–17] Diagnosis prior to presentation is often inaccurate without the recognition of renal failure by the referring unit.

To further compound the dismal picture, the rising scourge of HIV in

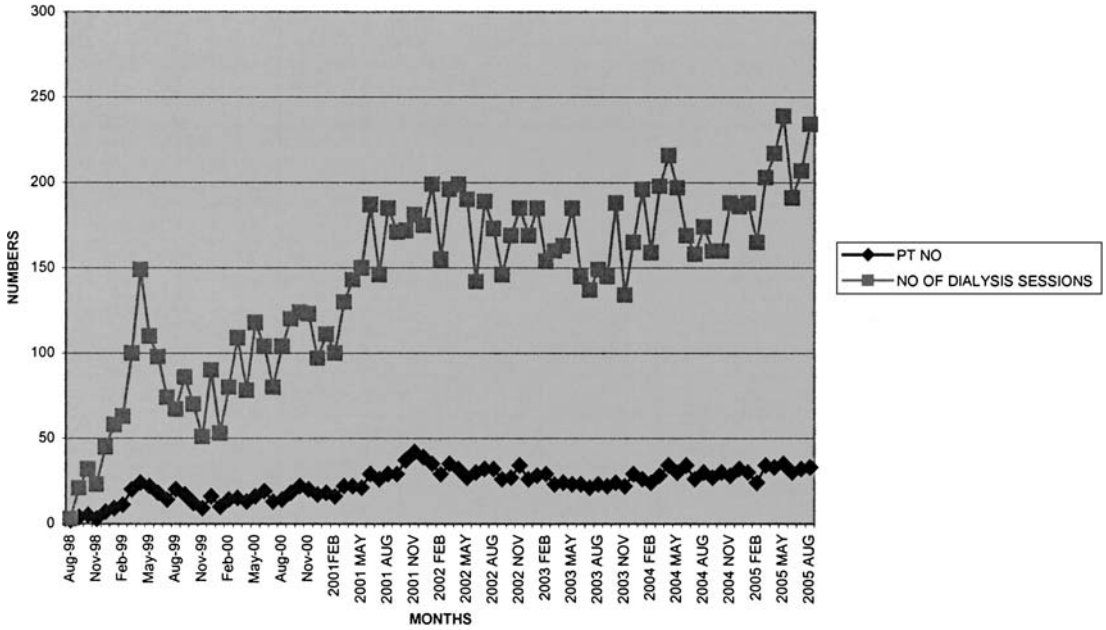


**Fig 1. Trend of incidence of end-stage renal disease patients and dialysis sessions at St. Nicholas Hospital, Lagos, Nigeria**

Africa is also further contributing to the dismal situation. In South Africa, 19.9% of the adult population is seropositive for HIV, and HIV is responsible for 30% of deaths.[6] That HIV is increasingly recognized at presentation either as a cause or coexisting in patients with ESRD is not unexpected. Unfortunately, several centers still routinely exclude such patients from their renal replacement therapy programs.[3]

## ESRD AND RENAL REPLACEMENT THERAPY IN AFRICA

Most ESRD patients are on hemodialysis because this is the only modality of management available in most countries in the subregion. Few units offer continuous ambulatory peritoneal dialysis (CAPD), and these are predominantly in South Africa, Kenya, Nigeria, Sudan, Senegal, Namibia, and Botswana. In some of these countries, this modality is the only way to manage ESRD because no functional hemodialysis units are available. However, all components of CAPD, including the fluids, must be imported, which makes CAPD even more expensive than hemodialysis as an option. This cost consideration and the high incidence of peritonitis and the absence of resources to manage it when they occur make CAPD an unattractive option in the management of ESRD in sub-Saharan Africa.[21,22]

Most hemodialysis units are set up with used, poorly maintained machines, and several units have no more than 2 or 3 machines functional at any point in time. Most are located in urban centers, and several are run by inadequately trained and poorly motivated staff.[3]

The average cost of renal replacement therapy in Africa is $100 per hemodialysis session in most public dialysis centers and $200 in the better-equipped private centers. Even though most centers are publicly run (>67%), patients still have to pay for material

**Table 3. End-stage renal disease care resource availability in sub-Saharan Africa**

| Country | Population (Millions) | Nephrologists | Dialysis Units |
|---|---|---|---|
| Nigeria | 130 | 84 | 56 |
| South Africa | 45 | 50 | ? |
| Kenya | 31.9 | 15 | 3 |
| Sudan | 40 | 7 | 22 |
| Mauritius | 1.2 | 10 | 10 |
| Senegal | 10.1 | 3 | 3 |
| Benin | 6.5 | 3 | 2 |
| Zambia | 9.9 | 2 | 2 |
| Ghana | 20.9 | 2 | 2 |
| Togo | 4.9 | 2 | 2 |
| Cape Verde | 0.5 | 1 | 1 |
| Namibia | 1.9 | 1 | 1 |
| Angola | 10.6 | 1 | 1 |

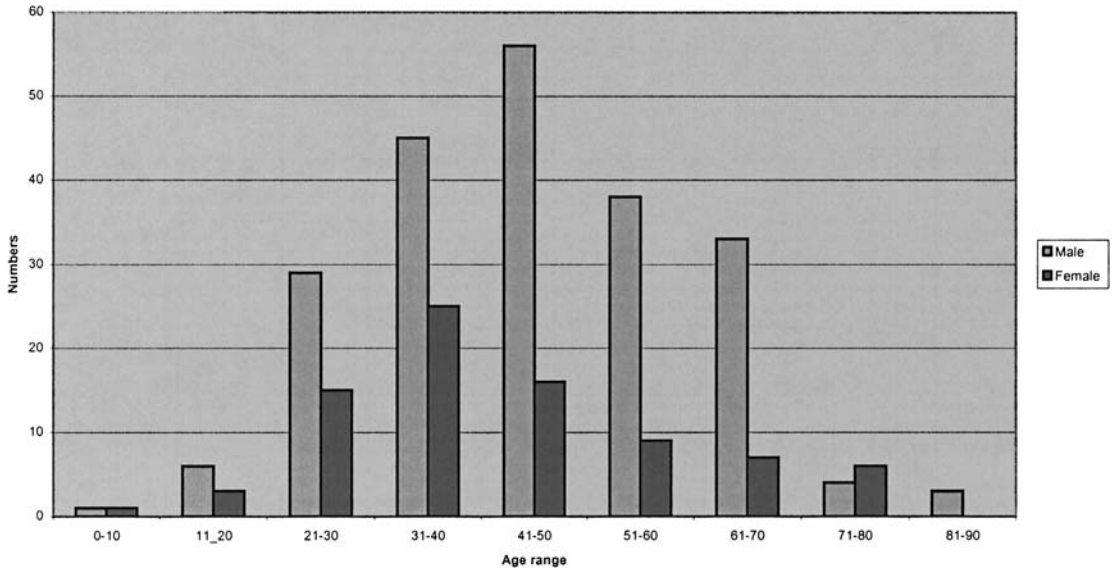


**Fig 2. Age and sex distribution of ESRD patients at St. Nicholas Hospital, Lagos, Nigeria**

used at each session of dialysis, and very few centers safely practice reuse. Mauritius and South Africa are the only two identified countries where hemodialysis and CAPD are provided free to their citizens, even with restrictions on eligibility. In South Africa, only patients who are eligible for transplantation are accepted into the maintenance dialysis program.[6]

As a consequence, most ESRD patients are often underdialyzed. In Cote D'Ivoire, 95% of patients could not be dialyzed. In Senegal, only 8.23% could afford dialysis, while in Benin republic, only those without severe comorbidities and who can afford the financial burden for 3–4 months are accepted for dialysis.[13,14,17]

In Jos, Nigeria, only 20% of patients in the unit could afford three times weekly dialysis, 10% could afford it twice weekly, and 70% could only afford once weekly as cost is borne by the patient and his family. In the university hospital in Ibadan, 70% of patients could not afford more than three sessions of dialysis.[12,16] The resultant effect is high rates of illness among the ESRD population in various countries of the subregion.

## RENAL TRANSPLANTATION IN SUB-SAHARAN AFRICA

Only 5 countries in the subregion offer renal transplantation as an option to ESRD patients: South Africa, Mauritius, Sudan, Nigeria, and Kenya. Even in these countries, many patients have to travel abroad for a kidney transplant when they can afford it.

In Nigeria, renal transplantation became available at the St. Nicholas Hospital, a privately run unit, in March 2000. Altogether, 41 patients have received transplants at the unit, all from live related donors. Two other public hospitals in Ile-Ife and Kano have also successfully begun transplantation programs and have so far transplanted 3 and 12 patients, respectively.

South Africa has the best-developed transplantation program in the subregion and in 2004 alone carried out 415 successful transplants, mainly because renal transplantation is offered free to its citizens, as it is in Mauritius. The cost in Kenya is $15,000 in private hospitals, as it is in Sudan. In Nigeria, the cost is $20,000 in the only privately run unit, while it is an average of $15,000 in the publicly run units.

## CONCLUSION

The picture painted by the situation of ESRD care in sub-Saharan Africa is dismal. Most patients are not diagnosed until late and often cannot afford the cost of basic care in ESRD.

With the interest shown with site visits and scholarships offered to doctors by ISN through COMGAN, the quantity and quality of care offered to ESRD patients in the subregion have improved. However, greater emphasis should be placed on education and prevention programs and the development of renal transplantation as an option by the various countries in the region to stem the tide of ESRD.

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*Statistical expertise:* Bamgboye
*Administrative, technical, or material assistance:* Bamgboye