

SCIENTIFIC REPORTS AND GUIDELINES

South African Renal Registry Annual Report 2018

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ABSTRACT

The seventh annual report of the South African Renal Registry summarises the 2018 data on kidney replacement therapy (KRT) for patients with kidney failure in South Africa. In December 2018, the number of patients who were being treated with chronic dialysis or transplantation stood at 10 730, a prevalence of 186 per million population (pmp). Most patients are treated with haemodialysis in the private healthcare sector, where the prevalence was 839 pmp. In the public sector, which serves 85% of the South African population, the prevalence of KRT (67 pmp) remained below the level reported for 1994. Limpopo and Mpumalanga remain the most under-served provinces and Blacks the most under-served population group. The Western Cape province had the highest public sector treatment rates by a large margin and was also where most of the country's public sector kidney transplants were performed.

Keywords: renal registry; South Africa; haemodialysis; peritoneal dialysis; transplantation.

INTRODUCTION

The South African Renal Registry (SARR) collects, analyses and publishes information on the treatment of patients with kidney failure in South Africa on behalf of the South African Renal Society. This is the seventh consecutive annual report published by the SARR, which summarises the data on record for December 2018 on kidney replacement therapy (KRT) for patients with kidney failure in South Africa. .

METHODS

Registry platform

Since the inception of the SARR, our technology platform has undergone several major iterations, all aimed at making data entry simpler and faster. Our current platform was developed using the Webdev programming environment (www.windev.com) and resides on a secure, dedicated, Windows 10 server at a reputable South African internet hosting company. It runs Windows Internet Information Services (IIS) and uses the client/server version of HFSQL (formerly Hyperfile SQL) as its relational database management system. Data capture interface with the central database via user-friendly web

pages from any device that has internet access. Password protection ensures that treatment centres have access to their own data only. Full backups are made daily.

The quality of our data has improved considerably since we began cross-checking the identity numbers of our patients with the Department of Home Affairs database of births and deaths, which is accessible via the South African Medical Research Council. This has allowed us to analyse and report on the survival of our patients for the first time [1].

Improvements to the SARR platform are made continuously. For example, because of insights gained from recent data cleaning processes, we instituted several logical checks to prevent the entry of conflicting or implausible data and we improved the data dictionary.

Over the past few years, the technology platform of the SARR has been expanded to serve as the basis for the African Renal Registry. Botswana, Burundi, Ghana, Kenya and Zambia have formally joined the African Renal Registry and have started data collection with the aid of our platform [2,3].

Definitions

Kidney failure and start date of KRT. Kidney failure refers to advanced, irreversible, chronic kidney disease (CKD), which requires the initiation of KRT. The start date is the date of first haemodialysis (HD), the date of the first peritoneal dialysis (PD) flushes or exchanges, or the date of pre-emptive transplantation (where there is no prior dialysis). For patients who are initially thought to have acute kidney injury (AKI) and are dialysed but who do not recover function and then continue KRT, the start date is the date of the first dialysis, even though the diagnosis at that time was AKI and not kidney failure.

Initial KRT modality. This is the intended first modality and should normally be the modality being used on day 91 of KRT. This means that someone who presents late and who is started on urgent HD but is soon established on PD, will have PD recorded as the initial modality.

Changes in the responsible treating unit. This refers to a change in the dialysis unit, PD follow-up unit/clinic or transplant follow-up unit/centre/practice. A transfer entry in the registry is required to record this. This is not done for short-term transfers when the intention is that the patient will return to the “home” unit, for example, for holiday dialysis, temporary transfer to a unit with isolation facilities, etc.

Primary kidney disease. Responsible nephrologists/physicians should assist their data-captors to ensure that this critical information is accurate. We are using the diagnostic codes of the ERA–EDTA [4] and have mapped all previous entries to these codes. If there is uncertainty about the diagnosis, as is often the case with patients who present late, then it should be indicated as “**chronic kidney disease (CKD) – aetiology uncertain/unknown**”. In patients who present with kidney failure, small kidneys and hypertension, there should not be an automatic default to labelling such patients as having “chronic glomerulonephritis” or “hypertensive kidney disease”.

Chronic hypertensive nephropathy or malignant hypertensive nephropathy. This should be selected as the primary kidney disease only if there is no reason to suspect that the hypertension is secondary to pre-existing renal disease. We suggest that the following criteria be met: hypertension known to precede kidney dysfunction, left ventricular hypertrophy, proteinuria <2 g/day, and no evidence of other kidney diseases [5,6].

Lost to follow-up. The SARR assumes that a functioning transplant is maintained unless there is evidence of a “transplant failure” or death. A dialysis modality is assumed to continue for one year from the date of the last registry

entry or laboratory result, in the absence of evidence of death; thereafter, the patient is considered lost to follow-up. Patients are also considered lost to follow-up one year after a “transplant failure” entry if no further entries are recorded.

Recovered kidney function. These are patients who have been initiated on chronic HD/PD and who no longer require dialysis. The period of dialysis-free recovery must persist for at least 90 days. If the period of recovery is less than 90 days and dialysis is restarted, there should be no END entry and dialysis is considered to have been continuous. If the period of recovery exceeds 90 days and the patient restarts KRT (even within the same year), there should be an END entry for the initial period of KRT and then a new entry recorded for the patient when he/she starts the second period of KRT; that is, there will be two registry entries for the same patient.

Ethical approval

The SARR operates as a longitudinal study with ethical approval from the Health Research Ethics Committee of Stellenbosch University (reference no. N11/01/028). This is renewed annually upon submission of a progress report. A waiver of individual informed consent has been granted, and the approval includes countrywide data collection on adults and children, in the public and private sectors, and the tapping of various data sources to improve the accuracy and completeness of data. These include records available through doctors' practices, dialysis and transplant centres, provider companies and medical aid funds. Ethical approval has also been granted for the use of the expanded SARR platform for the African Renal Registry.

RESULTS

South Africa in 2018

Figure 1 illustrates the provinces and major cities of South Africa. According to the Statistics South Africa (Stats SA) mid-year estimates for 2018 [7], the population of South Africa had increased to 57.73 million people. The province of Gauteng was home to one-quarter of the population, followed by KwaZulu-Natal with 19.7% (Table 1). There was a slight female predominance (51.2%). Black/African citizens constituted 80.9% of the population, with people of mixed ancestry (Coloured) making up 8.8%, Whites 7.8% and Indians/Asians 2.5% (Table 2).

South Africa is classified as an upper-middle-income country by the World Bank, with a gross national income per capita for 2018 by the Atlas method (current US\$) of \$5 750 and by the purchasing power parity (PPP) method (current international US\$) of \$12 520. Most of the population (85%) rely on the public healthcare sector for

services, with only a small proportion (15%) having medical insurance and accessing private sector health care [8].

Life expectancy at birth for 2018 was estimated at 61.1 years for males and 67.3 years for females. The infant

mortality rate was estimated at 36.4 per 1 000 live births. The overall HIV prevalence was approximately 13.1%, and was 19.0% for adults aged 15–49 [7].



Figure 1. Provinces and major cities of South Africa.

Province	Million	%
Eastern Cape (EC)	6.52	11.3
Free State (FS)	2.95	5.1
Gauteng (GT)	14.72	25.5
KwaZulu-Natal (KZN)	11.38	19.7
Limpopo (LP)	5.80	10.0
Mpumalanga (MP)	4.52	7.8
North West (NW)	3.98	6.9
Northern Cape (NC)	1.23	2.1
Western Cape (WC)	6.62	11.5
Total	57.73	100

Population group	Million	%
Black	46.68	80.9
Coloured (mixed ancestry)	5.07	8.8
White	4.52	7.8
Indian/Asian	1.45	2.5
Total	57.73	100

Treatment centres for dialysis and transplantation

The number of centres contributing data was 301; 269 of these (89.4%) are privately owned (Table 3 and Appendix 1). Several provinces have increased access for their public sector patients by utilising spare capacity at private haemodialysis centres on a fee-per-treatment basis.

There are also a few privately run centres on the premises of government hospitals which serve public sector patients.

Table 3. Number of treatment centres by province and sector.

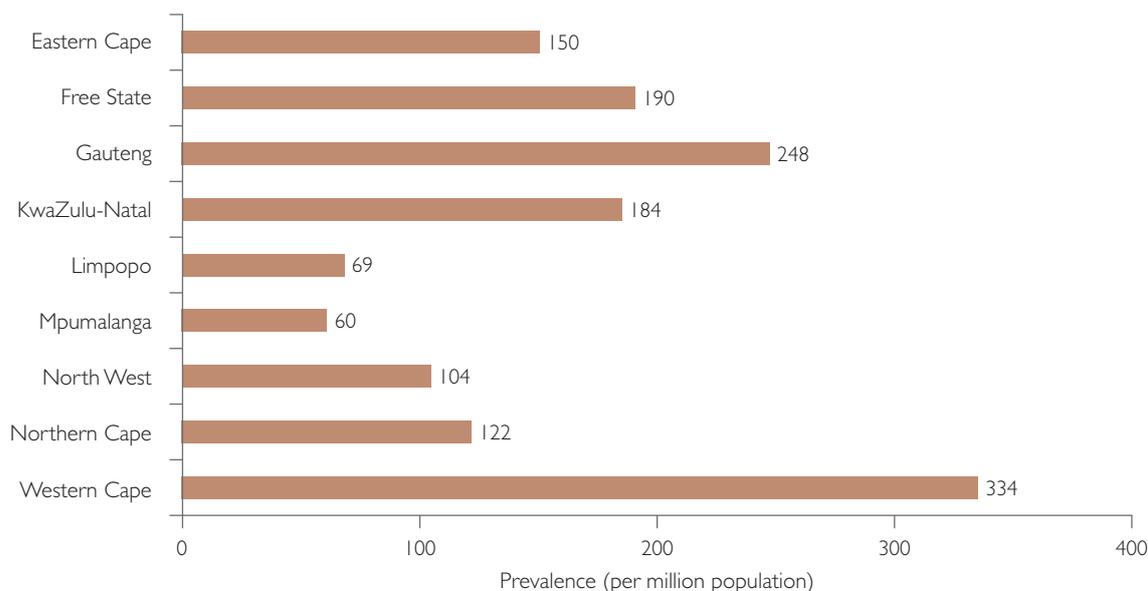
Sector	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Public	4	6	6	6	1*	0	3	1	5	32
Private	20	17	84	66	14	12	15	5	36	269
Total	24	23	90	72	15	12	18	6	41	301

*This centre is a public-private initiative on the premises of Pietersburg Provincial Hospital.

Prevalence and incidence of renal replacement therapy

The total number of patients on KRT on 31 December 2018 was 10 730. This is a prevalence of 186 per million population (pmp). The province with the highest patient numbers remained Gauteng, followed by the Western Cape and KwaZulu-Natal, whereas the province with the highest prevalence was the Western Cape, followed by Gauteng and the Free State (Figure 2).

There were 927 patients who started KRT in 2018, an incidence of 16 pmp. Most of these patients (81%) received KRT in private centres.



Province	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Patients	981	560	3 648	2 094	398	271	414	150	2 214	10 730

Figure 2. Prevalence and numbers of patients on KRT by province.

The number of patients treated in the public sector remained low, with a prevalence of 67 pmp (Table 4). In the private sector, the prevalence for 2018 was 839 pmp. The numbers of patients and prevalences by province and healthcare sector are shown in Table 5 and Figure 3. Denominators for prevalence calculations are based on the Stats SA mid-term estimates [7] and the Council for Medical Schemes Annual Report [8]. Medical aid beneficiaries who were unclassified with respect to province were allocated to provinces in proportion to the numbers of beneficiaries in each province.

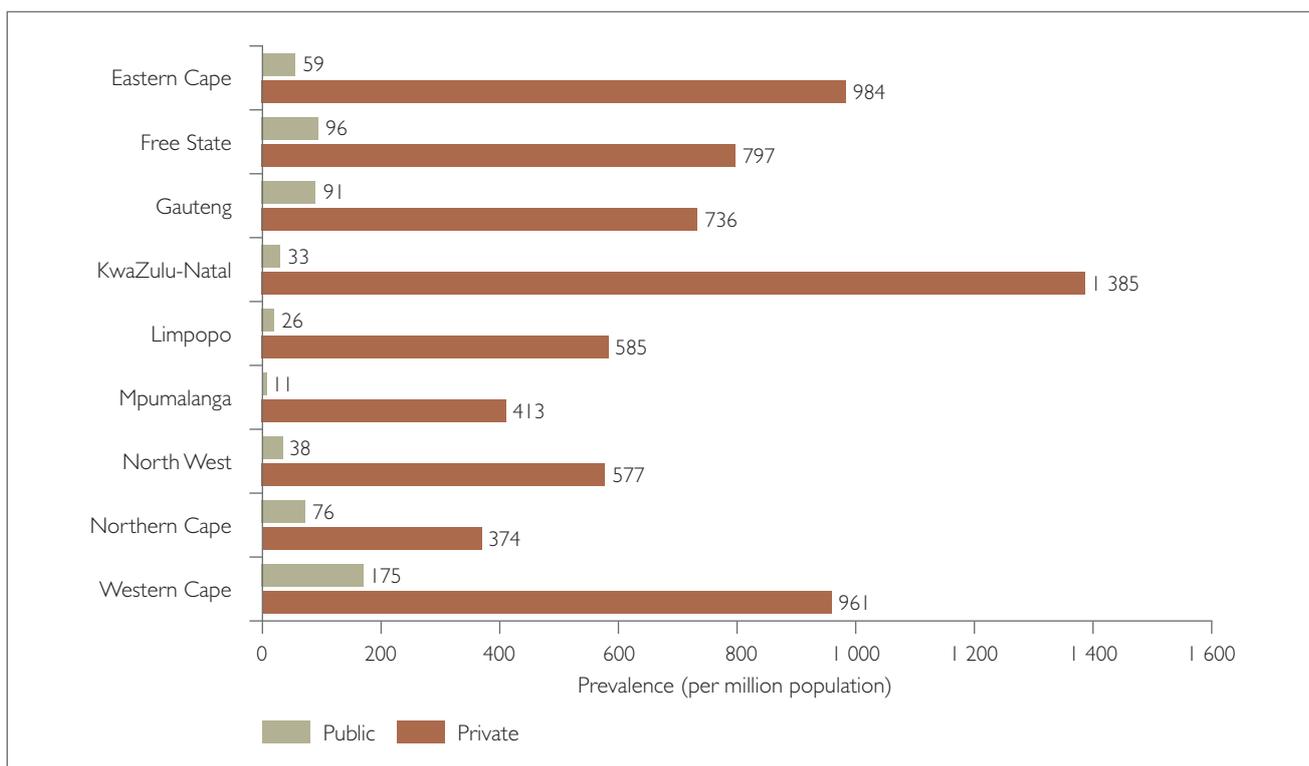
Table 4. KRT prevalence by healthcare sector.

	Public	Private
Population in millions	48.81	8.91*
ESRD patients on treatment	3 251	7 479
Treatment rate (pmp)	67	839

*Council for Medical Schemes Annual Report 2017/18

Table 5. Numbers of patients by sector and province.

Sector	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Public	346	246	1 010	333	141	42	131	79	923	3 251
Private	635	314	2 638	1 761	257	229	283	71	1 291	7 479
Total	981	560	3 648	2 094	398	271	414	150	2 214	10 730

**Figure 3. Prevalence of KRT by province and sector.**

Treatment modality and KRT vintage

Of the patients on KRT in December 2018, 18.0% had a functioning renal transplant. Of the patients on dialysis, 12.9% were on peritoneal dialysis and 87.1% on haemodialysis. Most of the transplant and peritoneal dialysis patients were in the public sector; the private sector had much lower proportions of patients on these KRT modalities (Figures 4 and 5).

Overall, the median KRT vintage was 5.0 years [inter-quartile range (IQR) 2.5–8.2 years]. The median vintage was 4.3 years (IQR 2.2–7.2 years) for haemodialysis patients, 4.2 years (IQR 2.0–7.2 years) for peritoneal dialysis patients and 8.8 years (IQR 5.8–13.1 years) for transplant patients.

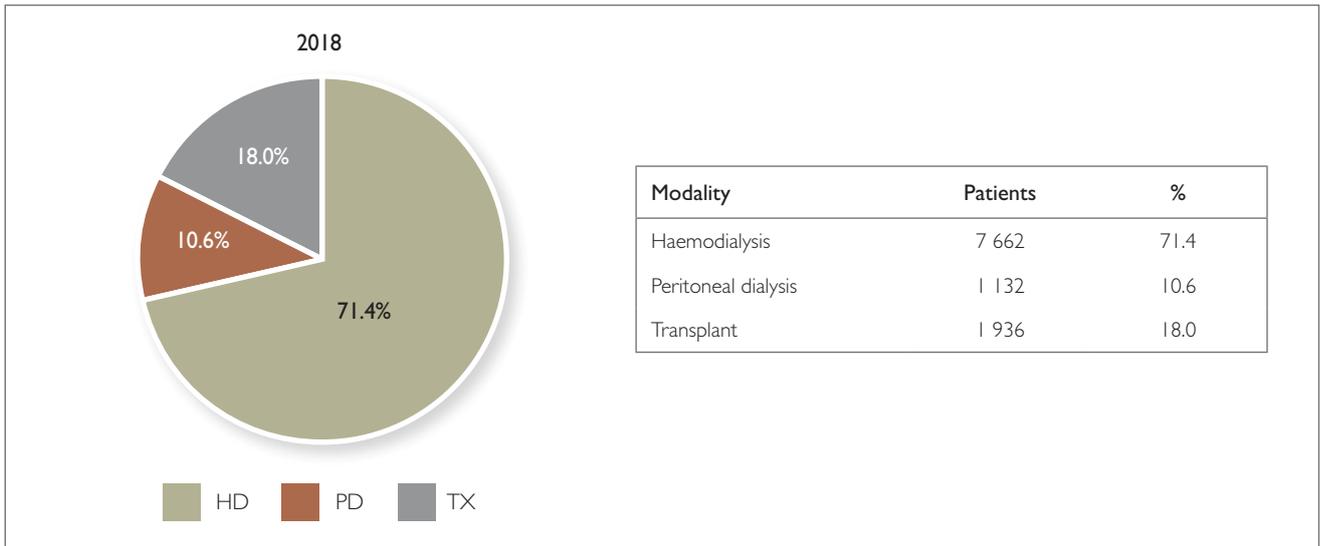


Figure 4. Distribution of patients by treatment modality.

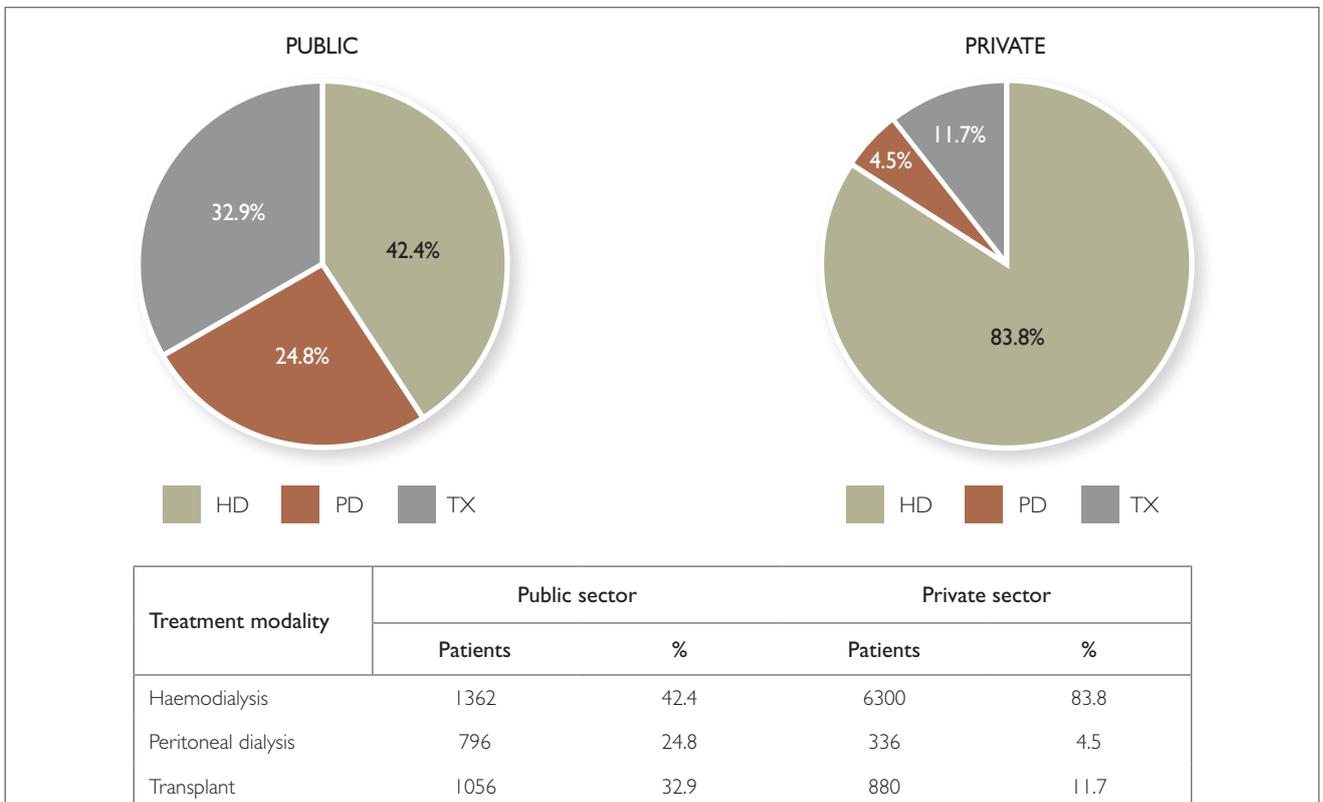


Figure 5. KRT modality by sector.

Data on new kidney transplants (Table 6) for 2018 were obtained from the South African Organ Donor Foundation (<http://www.odf.org.za/>). The number of transplants performed in 2018 was 236, down from 260 in 2017. The kidney transplant rate was 4.1 pmp. The bulk of

the country's transplants were performed in the provinces of Gauteng and the Western Cape. The Western Cape performed most of the public sector transplants; few were performed in KwaZulu-Natal and none in the Free State.

Table 6. New kidney transplants in 2018.

	Deceased donor		Living related		Living unrelated		Total
	Child	Adult	Child	Adult	Child	Adult	
Western Cape - Public	3	39	3	16	0	3	64
Western Cape - Private	0	15	0	23	0	12	50
Gauteng - Public	4	15	3	4	0	0	26
Gauteng - Private	2	39	2	21	1	14	79
KwaZulu-Natal - Public	0	0	3	3	0	0	6
KwaZulu-Natal - Private	0	3	0	1	0	2	6
Free State - Public	0	0	0	0	0	0	0
Free State - Private	0	4	0	1	0	0	5
Total	9	115	11	69	1	31	236

Child = recipient <18 years; Adult = recipient 18 years and older. The data for the Western Cape include 14 adult patients from the Eastern Cape who were transplanted at Groote Schuur Hospital. The kidney transplant rate for 2018 was 4.1 pmp. Data supplied by the SA Organ Donor Foundation.

Demographic and clinical data

The median age of the patients on KRT was 53.1 years (IQR 42.2–62.7 years) and 59.5% were male. Because of the rationing and selection criteria applied in public sector hospitals, patients treated there were much younger than those treated in the private sector (45.1 versus 56.3 years). Just more than half of the patients were Black. However, the prevalence was still lowest in Blacks (123 pmp) and highest in Indians/Asians (906 pmp) (Figure 6).

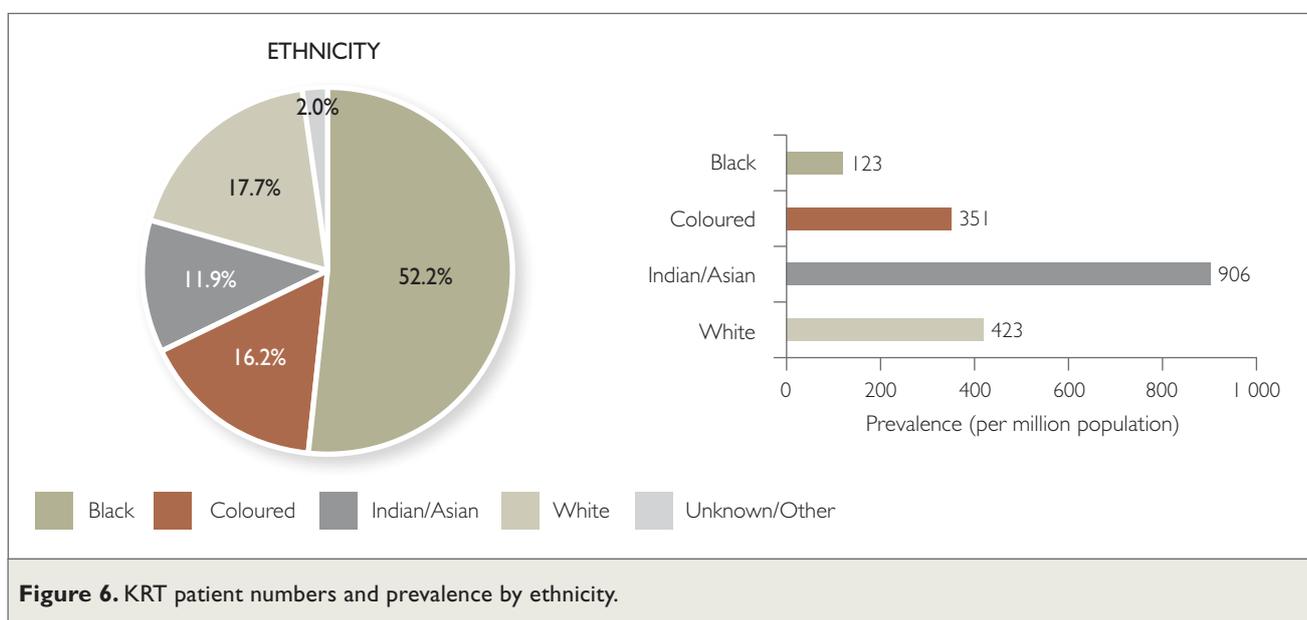


Figure 6. KRT patient numbers and prevalence by ethnicity.

The most commonly reported primary renal diagnosis was hypertensive renal disease, followed by CKD/kidney failure of unknown cause and diabetic nephropathy (Table 7).

	% of total
Hypertensive renal disease	35.1
Cause unknown	32.6
Diabetic nephropathy	15.0
Glomerular disease	10.0
Cystic kidney disease	2.9
Obstruction and reflux	1.8

Of the patients with data on diabetes status (10 041 patients), 40.9% had diabetes, with a much higher percentage in the private than in the public sector (50.0% versus 20.4%). The seropositive rate for hepatitis B virus was 2.2% (208 of 9 387 patients), for hepatitis C virus 0.7% (63 of 8 587 patients) and for HIV 11.0% (981 of 8 948 patients).

DISCUSSION

The number of patients on KRT in South Africa stood at 10 730 in December 2018, a prevalence of 186 pmp. Most of the patients were being treated with haemodialysis in the private healthcare sector. The treatment rates in the public sector remained below 70 pmp. Our KRT prevalence is very low in comparison with other countries with similar or smaller gross national incomes per capita. In the International Comparisons chapter of the latest US Renal Data System (USRDS) report, only Bangladesh is reported to have a lower prevalence than South Africa [9]. The number of new patients starting KRT in South Africa in 2018 was also very low, and was the lowest of any country included in the USRDS report [9].

The Western Cape had the highest public sector treatment rates by a large margin and was also the province where most of the public sector kidney transplants were performed. Access to transplantation for patients who rely on the public healthcare system was poor or non-existent in the rest of the country.

Acknowledgements

The SARR is an initiative of the South African Nephrology Society (<http://www.sa-renalsociety.org/>) and is chaired by Razeen Davids and Julian Jacobs. The SARR has been incorporated as a non-profit company (company registration no. 2018/401217/08, NPO no. 212-901) with Razeen Davids, Julian Jacobs and Sajith Sebastian as directors. The founding document is available from the South African Nephrology Society.

We thank the doctors, nurses, technologists, support staff and management of participating treatment centres for

contributing to the success of our 2018 data collection. These centres are listed in Appendix I. We also thank the sponsors listed below, especially the National Department of Health, for their financial and/or logistical support:

- Actor Pharma
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- Amgen
- Astellas Pharma
- Baxter Healthcare
- Insight Survey
- Janssen
- National Department of Health
- National Kidney Foundation of South Africa
- National Renal Care
- Roche Products
- Stellenbosch University
- Zydus Healthcare.

Supplementary materials

The figures in this report are available as PowerPoint slides via the supplementary materials on the *African Journal of Nephrology* website.

Usage of this report

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Conflict of interest

None to declare.

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APPENDIX I: PARTICIPATING TREATMENT CENTRES

EASTERN CAPE		
Public	Private	Private
Dora Nginza Hospital	Jeffreys Bay Kidney and Dialysis Centre (FMC)	NRC Mthatha
Frere Hospital	Life East London Private Hospital	NRC Port Elizabeth HD
Livingstone Hospital	Life Mercantile Hospital	NRC Port Elizabeth PD
Nelson Mandela Academic Hospital	NRC Alice	NRC Queenstown
	NRC Butterworth	NRC Uitenhage
	NRC East London HD	Port Elizabeth Kidney and Dialysis Centre (FMC)
	NRC East London PD	Regional Renal Services Lusikisiki
	NRC King Williamstown	Regional Renal Services Matatiele
	NRC Kwadwesi	Regional Renal Services Mount Frere
	NRC Mdantsane	Regional Renal Services Mthatha
FREE STATE		
Public	Private	Private
Boitumelo Regional Hospital (Kroonstad)	B. Braun Avitum Bethlehem (Hoogland)	Living Waters Dialysis - Hoopstad unit
Bongani Regional Hospital (Welkom)	B. Braun Avitum Bloemfontein	Netcare Transplant Centre Universitas
Dihlabeng Regional Hospital (Bethlehem)	B. Braun Avitum Harrismith	NRC Bloemfontein HD
Mofumahadi Manapo Mopeli Hospital (Qua Qua)	B. Braun Avitum Welkom	NRC Bloemfontein PD
Pelononi Regional Hospital	Bloemfontein Kidney and Dialysis Centre (FMC)	NRC Kroonstad
Universitas Academic Hospital	Bophelong Busamed Harrismith Hospital	NRC Pelononi
	Graham & Kolff Renal Therapy Ladybrand	Sasolburg Kidney and Dialysis Centre (FMC)
	JBLM Health (Qwa Qwa)	Universitas Private Hospital
	Life Rosepark Hospital	
GAUTENG		
Public	Private	Private
Charlotte Maxeke Johannesburg Academic Hospital	Arcadia Kidney and Dialysis Centre (FMC)	Life Bedford Gardens Hospital
Chris Hani Baragwanath Hospital	Atteridgeville Kidney and Dialysis Centre (FMC)	Life Brenthurst Hospital
Dr George Mukhari Hospital	B. Braun Avitum Emfuleni (Vanderbijlpark)	Life Carstenhof Hospital
Helen Joseph Hospital	B. Braun Avitum Pretoria (Kloof)	Life Fourways Hospital
Leratong Hospital	B. Braun Avitum Pretoria (Urology Hospital)	Life Groenkloof Hospital
Steve Biko Academic Hospital	B. Braun Avitum Sandton	Life Robinson Private Hospital
	B. Braun Avitum Vanderbijlpark (Emfuleni)	Life Springs Parkland Hospital
	B. Braun Avitum Vereeniging	Life The Glynnwood Hospital
	Bophelong Busamed Modderfontein Hospital	Life Wilgeheuwel Hospital
	Botshilu Kidney and Dialysis Centre (FMC)	LRC Lenasia (Lenmed)
	Carletonville Kidney and Dialysis Centre (FMC)	Mabika Renal Solutions
	Edison Hammanskraal Centre	Midstream Kidney and Dialysis Centre (FMC)
	Edison Mamelodi Centre	Morningside Children's Kidney Treatment Centre
	Groenkloof Kidney and Dialysis Centre (FMC)	Morningside Kidney and Dialysis Centre (FMC)
	Izinso Dialysis Busamed	Morula Kidney and Dialysis Centre (FMC)
	Izinso Dialysis Centre Eersterust	Naledi Kidney and Dialysis Centre (FMC)
	Izinso Dialysis Garankuwa	Netcare Transplant Centre Garden City Hospital
	Izinso Dialysis Glen Austin	Netcare Transplant Centre Jakaranda Hospital
	Izinso Dialysis Soshanguve (Pretoria)	Netcare Transplant Centre Milpark Hospital
	Izinso Dialysis Soweto	NRC Akasia
	Kempton Kidney and Dialysis Centre (FMC)	NRC Alberton
	Lenasia Kidney and Dialysis Centre (FMC)	NRC Arcadia
	Lesedi Kidney and Dialysis Centre (FMC)	NRC Gauteng Acutes

Abbreviations: BRC = Busamed Renal Care, FMC = Fresenius Medical Care, LRC = Lenmed Renal Centre, MRC = Melomed Renal Care, NRC = National Renal Care, RCH = Renal Care Holdings.

APPENDIX I: PARTICIPATING TREATMENT CENTRES continued

GAUTENG cont.		
Public	Private	Private
	NRC Johannesburg PD	Randfontein Kidney and Dialysis Centre (FMC)
	NRC Krugersdorp	Randfontein Private Hospital Dialysis Unit
	NRC Linksfield	RCH Randfontein
	NRC Lyttleton	RCH Zamokuhle (Thembisa)
	NRC Mayfair	Renalworx Dialysis Centre Pretoria West
	NRC Montana	Renalworx Dialysis Centre Wilgers
	NRC Mulbarton	Rx Dialysis Meyerton
	NRC Olivedale	Sunshine Dialysis Unit
	NRC Parktown West	Tshepo-Themba Kidney and Dialysis Centre (FMC)
	NRC Pretoria East	Tshwane Kidney and Dialysis Centre (FMC)
	NRC Pretoria PD	Vaal Kidney and Dialysis Centre (FMC)
	NRC Rynfield	Vosloorus Kidney and Dialysis Centre (Clinix)
	NRC Sebokeng	Waverley Kidney and Dialysis Centre (FMC)
	NRC Sedibeng	Westrand Dialysis Randfontein
	NRC Sunninghill	Westrand Dialysis Westonaria
	NRC Sunward Park	Westrand Kidney and Dialysis Centre (FMC)
	NRC Waterfall	Wits Donald Gordon Kidney and Dialysis Centre (FMC)
	Pretoria Kidney and Dialysis Centre (FMC)	Wits Donald Gordon Medical Centre Transplant Division
	Q Kidney Care	
KWAZULU-NATAL		
Public	Private	Private
Addington Hospital	AlphaMed Dialysis	Life Mount Edgecombe Hospital
Greys Hospital	B. Braun Avitum Dundee	Life Westville Hospital
Inkosi Albert Luthuli Hospital	B. Braun Avitum Durdoc	Merediac Durban
King Edward VIII Hospital	B. Braun Avitum Ethekwini	Midlands Dialysis and Kidney Centre
Ngwelezana Hospital	B. Braun Avitum Newcastle	Mount Edgecombe DCG
St Aidan's Hospital	B. Braun Avitum Pietermaritzburg	Mount Edgecombe Kidney and Dialysis Centre (FMC)
	B. Braun Avitum Scottburgh	Netcare Transplant Centre St Augustine's Hospital
	B. Braun Avitum Vryheid	Newcastle Kidney and Dialysis Centre (FMC)
	BRC Gateway (Busamed)	NRC Athlone
	Chatsworth Kidney and Dialysis Centre (FMC)	NRC Ballito
	Coastal Nephrology Greytown	NRC Berea
	Coastal Nephrology Nongoma	NRC Chatsworth
	Coastal Nephrology Pongola	NRC Durban PD
	Coastal Nephrology Ulundi	NRC Hillcrest
	Dr Parag and Raghbir Kidney Care Centre	NRC Ladysmith
	Durban Kidney and Dialysis Centre (FMC)	NRC Margate
	Empangeni Kidney and Dialysis Centre (FMC)	NRC Pietermaritzburg CBD
	Entabeni Kidney and Dialysis Centre (FMC)	NRC Pinetown
	Ethekwini Kidney and Dialysis Centre (FMC)	NRC Richards Bay
	Hibiscus Kidney and Dialysis Centre (FMC)	NRC Umhlanga
	Kokstad Kidney and Dialysis Centre (FMC)	Pinetown Kidney and Dialysis Centre (FMC)
	Kwazulu Dialysis Randles Renal Unit (Sparks)	Port Shepstone Kidney and Dialysis Centre (FMC)
	Kwazulu Dialysis Umlazi Megacity Renal Unit	RCH Ladysmith
	KZN Nephrology and Dialysis Clinic	RCH Shifa
	Life Chatsmed Hospital	Regional Renal Services Harding
	Life Empangeni Hospital	Regional Renal Services Ixopo
	Life Entabeni Hospital	Renal Care Team Bergville
	Life Hilton Hospital	Renal Care Team Durdoc

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APPENDIX I: PARTICIPATING TREATMENT CENTRES continued

KWAZULU-NATAL cont.		
Public	Private	Private
	Renal Care Team Kwamashu	Ultra Kidney Care City Hospital
	Renal Care Team Ladysmith	Umhlanga Kidney and Dialysis Centre (FMC)
	Renal Care Team Pinetown	Verulam Dialysis Centre
	Richards Bay Kidney and Dialysis Centre (FMC)	Victoria Kidney and Dialysis Centre (FMC)
	Stanger Kidney and Dialysis Centre (FMC)	Vryheid Kidney and Dialysis Centre (FMC)
LIMPOPO		
Public	Private	Private
Polokwane Kidney and Dialysis Centre (FMC)	B. Braun Avitum Louis Trichardt	Edison Thohoyandou Centre
	B. Braun Avitum Mokopane	Nephromed Kidney Centre Elim
	B. Braun Avitum Polokwane	NRC Polokwane
	B. Braun Avitum Tzaneen	NRC Thabazimbi
	Bophelong Louis Trichardt	NRC Venda
	Chantel van Rooyen Bela-Bela	Phalaborwa Kidney and Dialysis Centre (FMC)
	Edison Giyani Centre	Thohoyandou Kidney and Dialysis Centre (FMC)
MPUMALANGA		
Public	Private	Private
	B. Braun Avitum Ermelo	Middelburg Kidney and Dialysis Centre (FMC)
	B. Braun Avitum Nelspruit	NRC Nelspruit
	B. Braun Avitum Trichardt	Supreme Dialysis Barberton
	B. Braun Avitum Witbank	Supreme Dialysis Malelane
	Emalaheni Kidney and Dialysis Centre (FMC)	Supreme Dialysis Standerton
	Life Midmed Hospital	White River Dialysis
NORTH WEST		
Public	Private	Private
Job Shimankana Tabane Hospital	B. Braun Avitum Vryburg	North West Dialysis Klerksdorp
Klerksdorp Hospital	Brits Kidney and Dialysis Centre (FMC)	North West Dialysis Lichtenburg
Mafikeng Provincial Hospital	Izinso Dialysis Mafikeng	North West Dialysis Viljoenskroon
	Living Waters Dialysis Taung	NRC Rustenberg
	Living Waters Dialysis Klerksdorp	Potchefstroom Kidney and Dialysis Centre (FMC)
	Mafikeng Kidney and Dialysis Centre (FMC)	Rustenburg Kidney and Dialysis Centre (FMC)
	Netcare Transplant Centre Jakaranda Hospital	Zeerust Renal Unit
	Netcare Transplant Centre Milpark Hospital	
NORTHERN CAPE		
Public	Private	Private
Kimberley State Hospital	B. Braun Avitum Kimberley	North West Dialysis Hartswater
	B. Braun Avitum Upington	RCH Kimberley
	Kimberley Kidney and Dialysis Centre (FMC)	
WESTERN CAPE		
Public	Private	Private
George Hospital	Athlone Kidney and Dialysis Centre (FMC)	Khayelitsha Kidney and Dialysis Centre (FMC)
Groote Schuur Hospital	B. Braun Avitum Cape Gate	Life Vincent Pallotti Hospital
Red Cross War Memorial Children's Hospital	B. Braun Avitum Mossel Bay	Life Vincent Pallotti Hospital Paediatrics
Tygerberg Hospital	B. Braun Avitum Oudtshoorn	MRC Gatesville HD
Worcester Hospital	B. Braun Avitum Worcester	MRC Gatesville PD
	Cape Town Kidney and Dialysis Centre (FMC)	MRC Melomed Mitchells Plain HD
	Chris Barnard Tx (Dr E Steyn)	MRC Melomed PD
	George Kidney and Dialysis Centre (FMC)	MRC Tokai
	Hermanus Kidney and Dialysis Centre (FMC)	Netcare Transplant Centre Christiaan Barnard Memorial Hospital

Abbreviations: BRC = Busamed Renal Care, FMC = Fresenius Medical Care, LRC = Lenmed Renal Centre, MRC = Melomed Renal Care, NRC = National Renal Care, RCH = Renal Care Holdings.

APPENDIX I: PARTICIPATING TREATMENT CENTRES continued

WESTERN CAPE cont.		
Public	Private	Private
	NRC Blaauwberg	NRC Vredenburg
	NRC Cape Town CBD	Paardevelei Kidney and Dialysis Centre (FMC)
	NRC Cape Town PD	Panorama Kidney and Dialysis Centre (FMC)
	NRC Eersteriver	Rondebosch Dialysis Centre
	NRC George	Stellenbosch Kidney and Dialysis Centre (FMC)
	NRC Goodwood	UCT Kidney and Dialysis Centre (FMC)
	NRC Kuilsriver	UCT Private Academic Hospital
	NRC Paarl	Winelands Kidney and Dialysis Centre (FMC)
	NRC Plumstead	Worcester Kidney and Dialysis Centre (FMC)

APPENDIX I: PARTICIPATING TRANSPLANT CENTRES

FREE STATE	
Public	Private
	Universitas Private Hospital
GAUTENG	
Public	Private
Charlotte Maxeke Johannesburg Academic Hospital	Netcare Garden City Hospital
Steve Biko Academic Hospital	Netcare Jakaranda Hospital
	Netcare Milpark Hospital
	Wits Donald Gordon Medical Centre
KWAZULU-NATAL	
Public	Private
Inkosi Albert Luthuli Hospital	Life Entabeni Hospital
	Netcare St Augustine's Hospital
WESTERN CAPE	
Public	Private
Groote Schuur Hospital	Netcare Christiaan Barnard Memorial Hospital
Red Cross War Memorial Children's Hospital	UCT Private Academic Hospital
Tygerberg Hospital	