



SOUTH AFRICAN RENAL REGISTRY Annual Report 2017

MR Davids, T Jardine, N Marais, M Zunza, JC Jacobs, S Sebastian

SCIENTIFIC REPORTS AND GUIDELINES

South African Renal Registry Annual Report 2017

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ABSTRACT

The sixth annual report of the South African Renal Registry summarises the 2017 data on renal replacement therapy (RRT) for patients with end-stage renal disease (ESRD) in South Africa. In December 2017, the number of patients with ESRD who were treated with chronic dialysis or transplantation stood at 10 744, a prevalence of 190 per million population (pmp). The growing prevalence observed since the registry was established is due mainly to the increasing numbers of patients accessing haemodialysis in the private sector, where the prevalence was 855 pmp. In the public sector, which serves 84% of the South African population, the prevalence of RRT (66 pmp) remained below the level reported for 1994, so that the disparity in access continued to increase. The disparities between provinces remained, with Limpopo and Mpumalanga the most under-served, as did the disparities between ethnic groups, with Blacks being the most under-served group. The Western Cape was the province with the highest public sector treatment rates 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 end-stage renal disease (ESRD) in South Africa on behalf of the South African Renal Society. This is the sixth consecutive annual report published by the SARR, which summarises the December 2017 data on renal replacement therapy (RRT) for patients with ESRD 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 leading 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. Data files are backed up daily using a specialist online backup company. Incremental backups of the registry application are also made daily and the full application is backed up weekly.

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, as a result 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 newly established 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

ESRD and start date of RRT. ESRD refers to advanced, irreversible, chronic kidney disease (CKD), which requires the initiation of RRT. 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 RRT, the start date is the date of the first dialysis, even though the diagnosis at that time was AKI and not ESRD.

Initial RRT modality. This is the intended first modality and should normally be the modality being used on day 91 of RRT. 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 should not be done for short-term transfers when the intention is that the patient will return to the “home” unit, e.g. for holiday dialysis, temporary transfer to a unit with isolation facilities, etc.

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

Chronic hypertensive nephropathy or malignant hypertensive nephropathy. This should be selected as the primary renal diagnosis 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 renal dysfunction, left ventricular hypertrophy, proteinuria < 2 g/day, and no evidence of other renal 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 renal 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 RRT (even within the same year), there should be an END entry for the initial period of RRT and then a new entry recorded for the patient when he/she starts the second period of RRT, i.e., there will be two registry entries for the same patient.

Laboratory methods

Assays for serum albumin concentrations by the different laboratories all have reference ranges of 35–52 g/L. In the public sector, the National Health Laboratory Service (NHLS) uses the bromocresol green (BCG) method on Roche platforms. In the private sector, Lancet Laboratories uses BCG on Roche platforms, Ampath Laboratories uses BCG on Abbott ARCHITECT platforms, and PathCare uses BCG on Beckman platforms.

Ethical approval

The SARR operates as a longitudinal study with ethical approval from the Health Research Ethics Committee of Stellenbosch University (reference no. NI 1/01/028). 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 obtained for the use of the expanded SARR platform for the African Renal Registry.

RESULTS

South Africa in 2017

Figure 1 illustrates the provinces and major cities of South Africa. According to the Statistics South Africa (Stats SA) mid-year estimates for 2017 [7], the population of South Africa had increased to 56.52 million people. The province of Gauteng was home to one-quarter of the population (Table 1). There was a slight female predominance (51.1%). Black/African citizens constituted 80.8% of the population,

with people of mixed ancestry (Coloured) making up 8.8%, Whites 8.0% and Indians/Asians 2.5% (Table 2).

South Africa is classified as an upper-middle-income country by the World Bank, with a GNI per capita for 2017 by the Atlas method (current US\$) of \$5 410 and by the purchasing power parity (PPP) method (current international US\$) of \$13 060. Most of the population (84%) rely on the public healthcare sector for services, with only

a small proportion (16%) having medical insurance and accessing private sector health care [8].

Life expectancy at birth for 2017 is estimated at 61.2 years for males and 66.7 years for females. The infant mortality rate is estimated at 32.8 per 1 000 live births. The overall HIV prevalence is approximately 12.6%, and is 18.0% for adults aged 15–49 [7].



Figure 1. Provinces and major cities of South Africa.

Province	Million	%
Eastern Cape (EC)	6.50	11.5
Free State (FS)	2.87	5.1
Gauteng (GT)	14.28	25.3
KwaZulu-Natal (KZN)	11.07	19.6
Limpopo (LP)	5.78	10.2
Mpumalanga (MP)	4.44	7.9
North West (NW)	3.86	6.8
Northern Cape (NC)	1.21	2.1
Western Cape (WC)	6.51	11.5
Total	56.52	100

Population group	Million	%
Black	45.65	80.8
Coloured (mixed ancestry)	4.96	8.8
White	4.49	8.0
Indian/Asian	1.41	2.5
Total	56.52	100

Treatment centres for dialysis and transplantation

The number of centres contributing data was 278; 249 of these (89.6%) 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.

Sector	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Public	3	6	6	5	0	0	3	1	5	29
Private	19	13	73	69	13	13	12	4	33	249
Total	22	19	79	74	13	13	15	5	38	278

Prevalence and incidence of renal replacement therapy

The total number of patients on RRT on 31 December 2017 was 10 744. This is a prevalence of 190 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 1 441 patients who started RRT in 2017, an incidence of 25 pmp. Most of these patients (84%) received RRT in private centres.

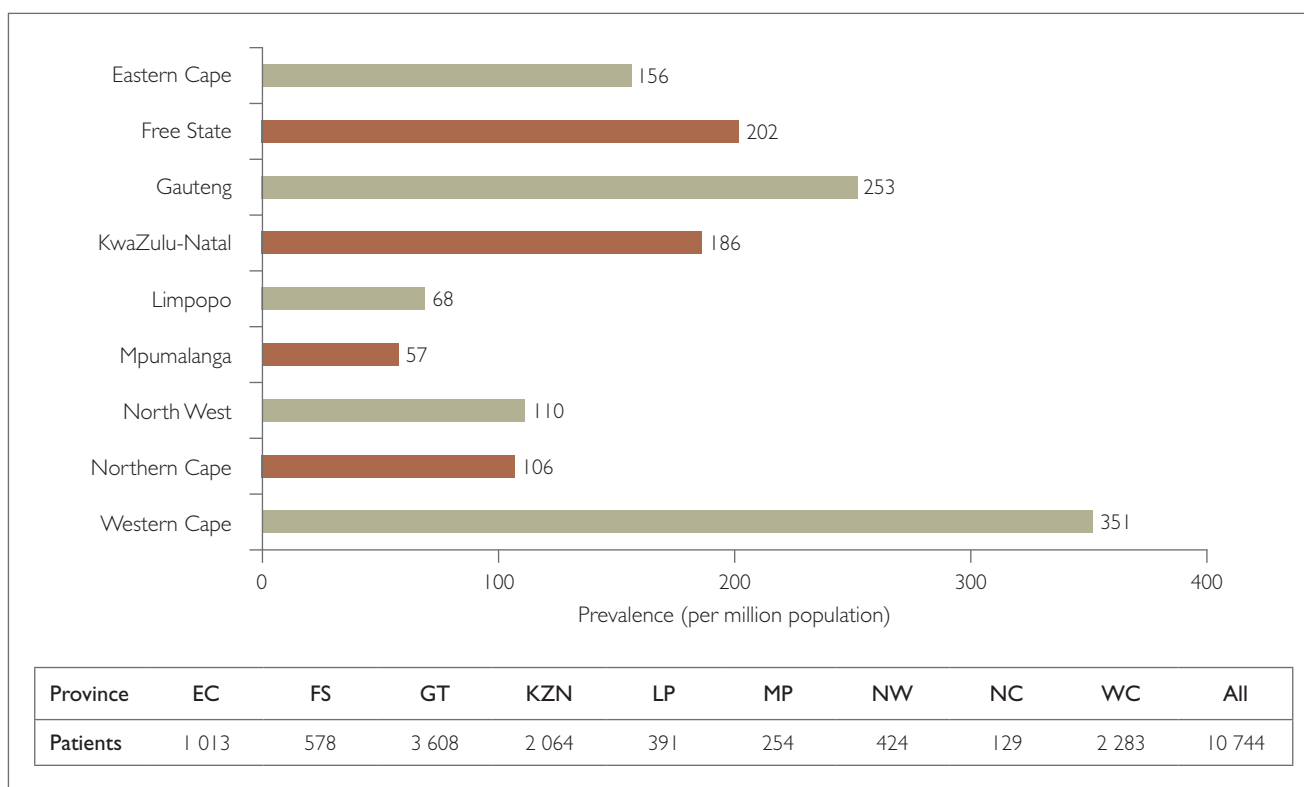


Figure 2. Prevalence and numbers of patients on RRT by province.

The number of patients treated in the public sector remains low, with a prevalence of 66 pmp (Table 4). This was lower than the 70 pmp reported for 1994, when most of the chronic dialysis and transplantation was delivered in the public sector. In the private sector, the prevalence for 2017 was 855 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 are unclassified with respect to province were allocated to provinces in proportion to the numbers of beneficiaries in each province..

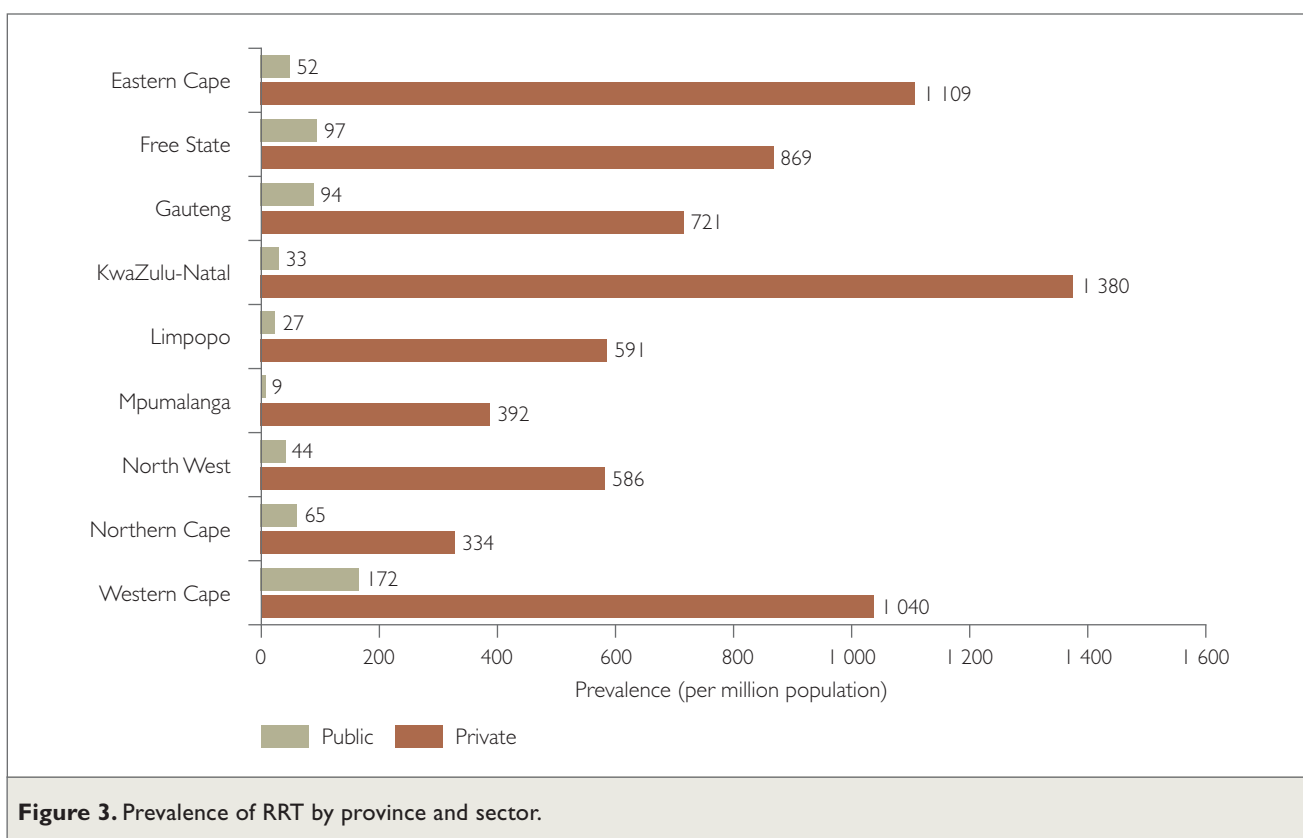
Table 4. RRT prevalence by healthcare sector.

	Public	Private
Population in millions	47.65	8.87*
ESRD patients on treatment	3 162	7 582
Treatment rate (pmp)	66	855

*Council for Medical Schemes Annual Report 2017/18

Table 5. Numbers of patients by sector and province.

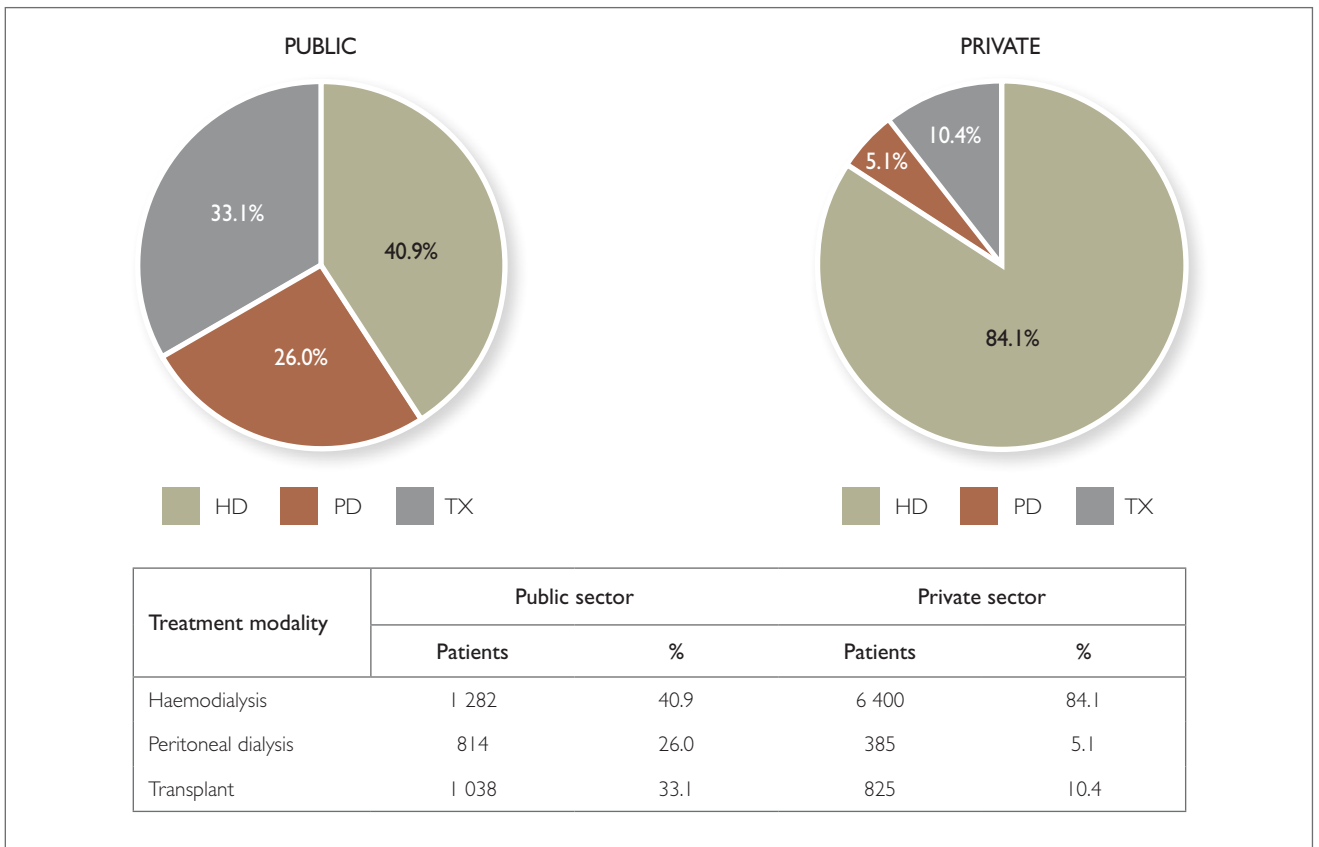
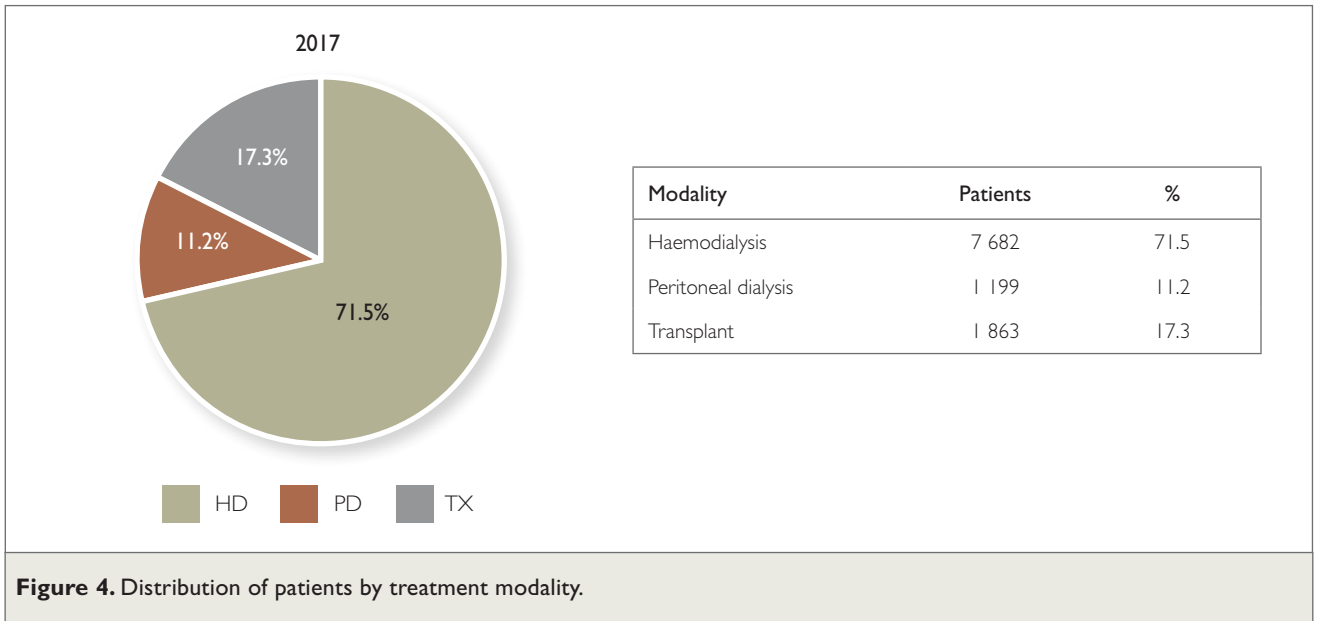
Sector	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Public	304	239	1 007	326	143	33	150	67	893	3 162
Private	709	339	2 601	1 738	248	221	274	62	1 390	7 582
Total	1 013	578	3 608	2 064	391	254	424	129	2 283	10 744



Treatment modality and RRT vintage

Of the patients on RRT in December 2017, 17.3% had a functioning renal transplant. Of the patients on dialysis, 13.5% were on peritoneal dialysis and 86.5% 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 RRT modalities (Figures 4 and 5).

Overall, the median RRT vintage was 4.4 years (inter-quartile range (IQR) 2.1–7.5 years). The median vintage was 3.8 years (IQR 1.8–6.5 years) for haemodialysis patients, 3.5 years (IQR 1.6–6.3 years) for peritoneal dialysis patients and 8.1 years (IQR 5.4–12.5 years) for transplant patients.



Data on new kidney transplants (Table 6) for 2017 were supplied by the South African Organ Donor Foundation (<http://www.odf.org.za/>). The number of transplants performed in 2017 was 260. The kidney transplant rate was 4.6 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 2017.

	Deceased donor		Living related		Living unrelated		Total
	Child	Adult	Child	Adult	Child	Adult	
Western Cape - Public	6	32	2	14	0	1	55
Western Cape - Private	0	13	0	28	0	14	55
Gauteng - Public	5	25	4	3	0	0	37
Gauteng - Private	1	36	5	21	0	20	83
KwaZulu-Natal - Public	0	0	1	6	0	0	7
KwaZulu-Natal - Private	0	7	0	6	0	3	16
Free State - Public	0	0	0	0	0	0	0
Free State - Private	0	4	0	1	0	2	7
Total	12	117	12	79	0	40	260

Child = recipient <18 years; Adult = recipient 18 years and older.

The kidney transplant rate for 2017 was 4.6 pmp. Data supplied by the SA Organ Donor Foundation.

Demographic and clinical data

The median age of the patients on RRT was 52.6 years (IQR 41.8–62.3 years) and 59.6% 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 (44.3 versus 55.9 years). Just more than half of the patients were Black. However, the prevalence was still lowest in Blacks (126 pmp) and highest in Indians/Asians (897 pmp) (Figure 6).

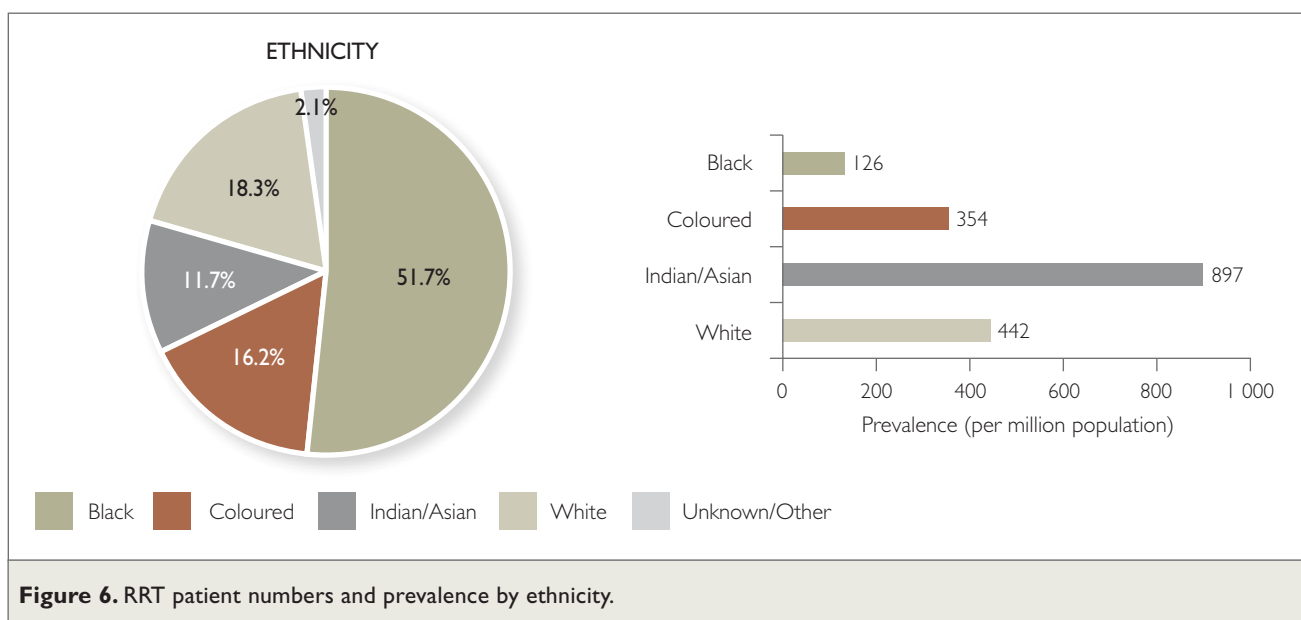


Figure 6. RRT patient numbers and prevalence by ethnicity.

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

	% of total
Hypertensive renal disease	35.1
Cause unknown	31.9
Diabetic nephropathy	15.3
Glomerular disease	10.3
Cystic kidney disease	3.0
Obstruction and reflux	1.8

Of the patients with data on diabetes status (10 095 patients), 38.7% had diabetes, with a much higher percentage in the private than in the public sector (50.1% versus 19.1%). The seropositive rate for hepatitis B virus was 2.2% (202 of 9 394 patients), for hepatitis C virus 0.8% (61 of 8 556 patients) and for HIV 10.8% (967 of 8 958 patients).

DISCUSSION

The number of patients on RRT in South Africa stood at 10 744 in December 2017, a prevalence of 190 pmp. Most of the patients were being treated with haemodialysis in the private healthcare sector. There is still no evidence of any real growth in public sector access to RRT and treatment rates remained below those seen in 1994. The RRT prevalence in South Africa was very low when compared with other countries with similar or smaller gross national incomes per capita [9]. The Western Cape had the highest public sector treatment rates 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. The number of new patients starting RRT each year was also very low, and was the lowest of any country included in the International Comparisons chapter of the latest US Renal Data System report [9]. The Constitution of South Africa promises the progressive realisation of access to treatment [10]. However, this is not being achieved and remains a cause of great concern.

Acknowledgements

The SARR is an initiative of the South African Renal Society (<http://www.sa-renal.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 Renal Society.

We thank the doctors, nurses, technologists, support staff and management of participating treatment centres for contributing to the success of our 2017 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
- Adcock Ingram Critical Care
- 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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10. Constitution of the Republic of South Africa, Act 108 of 1996. Section 27 (2).

APPENDIX I: PARTICIPATING TREATMENT CENTRES

EASTERN CAPE		
Public	Private	Private
Frere Hospital	Jeffreys Bay Kidney and Dialysis Centre (FMC)	NRC Mthatha
Livingstone Hospital	Life Mercantile Hospital	NRC Port Elizabeth HD
Nelson Mandela Academic Hospital	Living Waters Dialysis Alival North	NRC Port Elizabeth PD
	NRC Butterworth	NRC Queenstown
	NRC East London HD	NRC Uitenhage
	NRC East London PD	Port Elizabeth Kidney and Dialysis Centre (FMC)
	NRC King Williamstown	Regional Renal Services Lusikisiki
	NRC Kwadwesi	Regional Renal Services Matatiele
	NRC Mdantsane	Regional Renal Services Mthatha
FREE STATE		
Public	Private	Private
Boitumelo Regional Hospital (Kroonstad)	B. Braun Avitum Bethlehem (Hoogland)	NRC Bloemfontein HD
Bongani Regional Hospital (Welkom)	B. Braun Avitum Bloemfontein	NRC Bloemfontein PD
Dihlabeng Regional Hospital (Bethlehem)	B. Braun Avitum Welkom	NRC Kroonstad
Mofumahadi Manapo Mopeli Hospital (Qua Qua)	Bloemfontein Kidney and Dialysis Centre (FMC)	NRC Pelonomi
Pelonomi Regional Hospital	Graham and Kolff Renal Therapy Thaba Nchu	Sasolburg Kidney and Dialysis Centre (FMC)
Universitas Academic Hospital	Life Rosepark Hospital	Universitas Private Hospital
	Living Waters Dialysis - Hoopstad unit	
GAUTENG		
Public	Private	Private
Charlotte Maxeke Johannesburg Academic Hospital	Arcadia Kidney and Dialysis Centre (FMC)	Life The Glynnwood Hospital
Chris Hanani Baragwanath Hospital	Atteridgeville Kidney and Dialysis Centre (FMC)	LRC Lenasia (Lenmed)
Dr George Mukhari Hospital	B. Braun Avitum Emfuleni (Vanderbijlpark)	LRC Lenasia South (Daxina)
Helen Joseph Hospital	B. Braun Avitum Pretoria (Kloof)	Mabika Renal Solutions
Leratong Hospital	B. Braun Avitum Pretoria (Urology Hospital)	Midstream Kidney and Dialysis Centre (FMC)
Steve Biko Academic Hospital	B. Braun Avitum Sandton	Morningside Children's Kidney Treatment Centre
	B. Braun Avitum Vereeniging (Midvaal)	Morningside Kidney and Dialysis Centre (FMC)
	Carletonville Kidney and Dialysis Centre (FMC)	Morula Kidney and Dialysis Centre (FMC)
	Groenkloof Kidney and Dialysis Centre (FMC)	Naledi Kidney and Dialysis Centre (FMC)
	Harmelia Kidney and Dialysis Centre (FMC)	Nephromed Kidney Centre Kwa-Thema
	Izinso Dialysis Busamed	Netcare Transplant Centre Garden City Hospital
	Izinso Dialysis Garankuwa	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
	KwaMhlanga Dialysis Centre	NRC Arcadia
	Lenasia Kidney and Dialysis Centre (FMC)	NRC Johannesburg PD
	Lesedi Kidney and Dialysis Centre (FMC)	NRC Krugersdorp
	Life Bedford Gardens Hospital	NRC Linksfield
	Life Brenthurst Hospital	NRC Lyttleton
	Life Carstenhof Hospital	NRC Mayfair
	Life Fourways Hospital	NRC Montana
	Life Groenkloof Hospital	NRC Mulbarton

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

APPENDIX I: PARTICIPATING TREATMENT CENTRES continued

LIMPOPO		
Public	Private	Private
	B. Braun Avitum Louis Trichardt	Nephromed Kidney Centre Elim
	B. Braun Avitum Mokopane	NRC Polokwane
	B. Braun Avitum Polokwane	NRC Venda
	B. Braun Avitum Tzaneen	Phalaborwa Kidney and Dialysis Centre (FMC)
	Chantel van Rooyen Bela-Bela	Polokwane Kidney and Dialysis Centre (FMC)
	Edison Giyani Centre	Thohoyandou Kidney and Dialysis Centre (FMC)
	Edison Thohoyandou Centre	
MPUMALANGA		
Public	Private	Private
	B. Braun Avitum Ermelo	Highveld Nephrology Center
	B. Braun Avitum Nelspruit	Life Midmed Hospital
	B. Braun Avitum Trichardt	Middelburg Kidney and Dialysis Centre (FMC)
	B. Braun Avitum Witbank	NRC Nelspruit
	Edison Lebowakgomo Centre	Supreme Dialysis Malelane
	Emalahleni Kidney and Dialysis Centre (FMC)	Supreme Dialysis Standerton
	Hazyview Dialysis Centre	
NORTH WEST		
Public	Private	Private
Job Shimankana Tabane Hospital	B. Braun Avitum Vryburg	North West Dialysis Lichtenburg
Klerksdorp Hospital	Brits Kidney and Dialysis Centre (FMC)	North West Dialysis Viljoenskroon
Mafikeng Hospital	Izinso Dialysis Mafikeng	NRC Rustenberg
	Living Waters Dialysis Klerksdorp	Potchefstroom Kidney and Dialysis Centre (FMC)
	Mafikeng Kidney and Dialysis Centre (FMC)	Rustenburg Kidney and Dialysis Centre (FMC)
	North West Dialysis Klerksdorp	Zeerust Renal Unit
NORTHERN CAPE		
Public	Private	Private
Kimberley Hospital	B. Braun Avitum Kimberley	North West Dialysis Hartswater
	B. Braun Avitum Upington	RCH Kimberley
WESTERN CAPE		
Public	Private	Private
George Hospital	Athlone Kidney and Dialysis Centre (FMC)	NRC Cape Town CBD
Groote Schuur Hospital	B. Braun Avitum Cape Gate	NRC Cape Town PD
Red Cross War Memorial Children's Hospital	B. Braun Avitum Mossel Bay	NRC George
Tygerberg Hospital	B. Braun Avitum Oudtshoorn	NRC Goodwood
Worcester Hospital	B. Braun Avitum Worcester	NRC Kuilsriver
	Cape Town Kidney and Dialysis Centre (FMC)	NRC Paarl
	George Kidney and Dialysis Centre (FMC)	NRC Plumstead
	Hermanus Kidney and Dialysis Centre (FMC)	NRC Vredenburg
	Khayelitsha Kidney and Dialysis Centre (FMC)	Paardevele Kidney and Dialysis Centre (FMC)
	Life Vincent Pallotti Hospital	Panorama Kidney and Dialysis Centre (FMC)
	Life Vincent Pallotti Hospital Paediatrics	Rondebosch Dialysis Centre
	MRC Gatesville HD	Stellenbosch Kidney and Dialysis Centre (FMC)
	MRC Gatesville PD	UCT Kidney and Dialysis Centre (FMC)
	MRC Mitchells Plain	UCT Private Academic Hospital
	MRC Tokai	Winelands Kidney and Dialysis Centre (FMC)
	Netcare Transplant Centre Christiaan Barnard Memorial Hospital	Worcester Kidney and Dialysis Centre (FMC)
	NRC Blaauwberg	

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

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	