SOUTH AFRICAN RENAL REGISTRY

Annual Report 2015

MR Davids, N Marais and JC Jacobs

African Journal of Nephrology
Official publication of the African Association of Nephrology
Volume 20, No 1, 2017, 201-213

SCIENTIFIC REPORTS AND GUIDELINES

South African Renal Registry Annual Report 2015

M Razeen Davids[1,2], Nicola Marais[2], Julian C Jacobs[2,3]
[1]Division of Nephrology, Stellenbosch University and Tygerberg Hospital, Cape Town, South Africa; [2]South African Renal Registry; [3]N1 City, Goodwood, Cape Town, South Africa.

ABSTRACT

The fourth annual report of the South African Renal Registry summarises the 2015 data on renal replacement therapy (RRT) for patients with end-stage renal disease (ESRD) in South Africa. The South African population increased to 54.96 million in 2015, from 54.00 million in 2014. In December 2015, the number of patients with ESRD who were treated with chronic dialysis or transplantation stood at 10 360, a prevalence of 189 per million population (pmp). The prevalence was 167 pmp in 2013 and 178 pmp in 2014. The increasing prevalence observed is due mainly to the increased numbers of patients accessing haemodialysis in the private sector. In the public sector, which serves 84% of the South African population, the prevalence of RRT (71.9 pmp in 2015) remains at levels close to those reported in 1994 so that the disparity in access continues to increase. The disparities between provinces remain, with Limpopo and Mpumalanga the most under-served, as do the disparities between ethnic groups, with Blacks being the most under-served group.

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

INTRODUCTION

The South African Renal Society has mandated the South African Renal Registry (SARR) to collect, analyse and publish information on the treatment of patients with end-stage renal disease (ESRD) in South Africa. We are pleased to present the fourth annual report of the SARR, which summarises the data on renal replacement therapy (RRT) for patients with ESRD in South Africa as at 31 December 2015.

Once again, we are indebted to all our colleagues as well as the provider companies and their staff for contributing data, and to our sponsors for their continued support. In particular, we appreciate the funding and support received from the National Department of Health.

METHODS

Registry platform

Since the inception of the SARR, our technology platform has undergone several major iterations. Our newest version is working well, and has made data entry simpler and faster. The platform has been 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 capturers interface with the central database via user-friendly web pages and can therefore access the SARR from any device that has internet access and a web browser (Google Chrome is recommended). Password protection ensures that doctors and 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.

Received 19 August 2017; published 01 September 2017.
Correspondence: Razeen Davids, mrd@sun.ac.za.

The platform is currently being expanded to accommodate the African Renal Registry and allow data capture by other African countries. Thus far, our colleagues in Ghana, Zambia and Burundi have joined the African Renal Registry and have stated entering data using our platform.

Definitions

ESRD and start date of RRT. ESRD refers to advanced chronic kidney disease (CKD), which is considered to be irreversible and which requires the initiation of renal replacement therapy. 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 are then continued on chronic 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 [1] 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 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 [2,3].

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, 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.

Ethics approval

The SARR operates as a longitudinal study with ethics 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 country-wide data collection on adults and children, 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.

RESULTS

South Africa in 2015

According to the Stats SA mid-year estimates for 2015 [4], the population of South Africa increased by nearly one million from the previous year to 54.96 million people. There was a slight female predominance (51.1%). Black/African citizens constituted 80.5% of the population, with people of mixed ethnicity (Coloured) making up 8.8%, Whites 8.3% and Indians/Asians 2.5%. The province of Gauteng had the largest population, followed by KwaZulu-Natal.

South Africa is classified as an upper-middle income country by the World Bank, with a GNI per capita by the Atlas method (current US$) of $6 090 and by the purchasing

power parity (PPP) method (current international US$) of $12 900. Most of the population (84%) relies on the public health sector for services, with only a small proportion (16%) having medical insurance and accessing private sector healthcare [5].

Life expectancy at birth for 2015 was estimated at 60.6 years for males and 64.3 years for females. The infant mortality rate for 2015 was estimated at 34.4 per 1 000 live births. The estimated overall HIV prevalence rate was approximately 11.2%, and 16.6% for adults aged 15–49 [4].

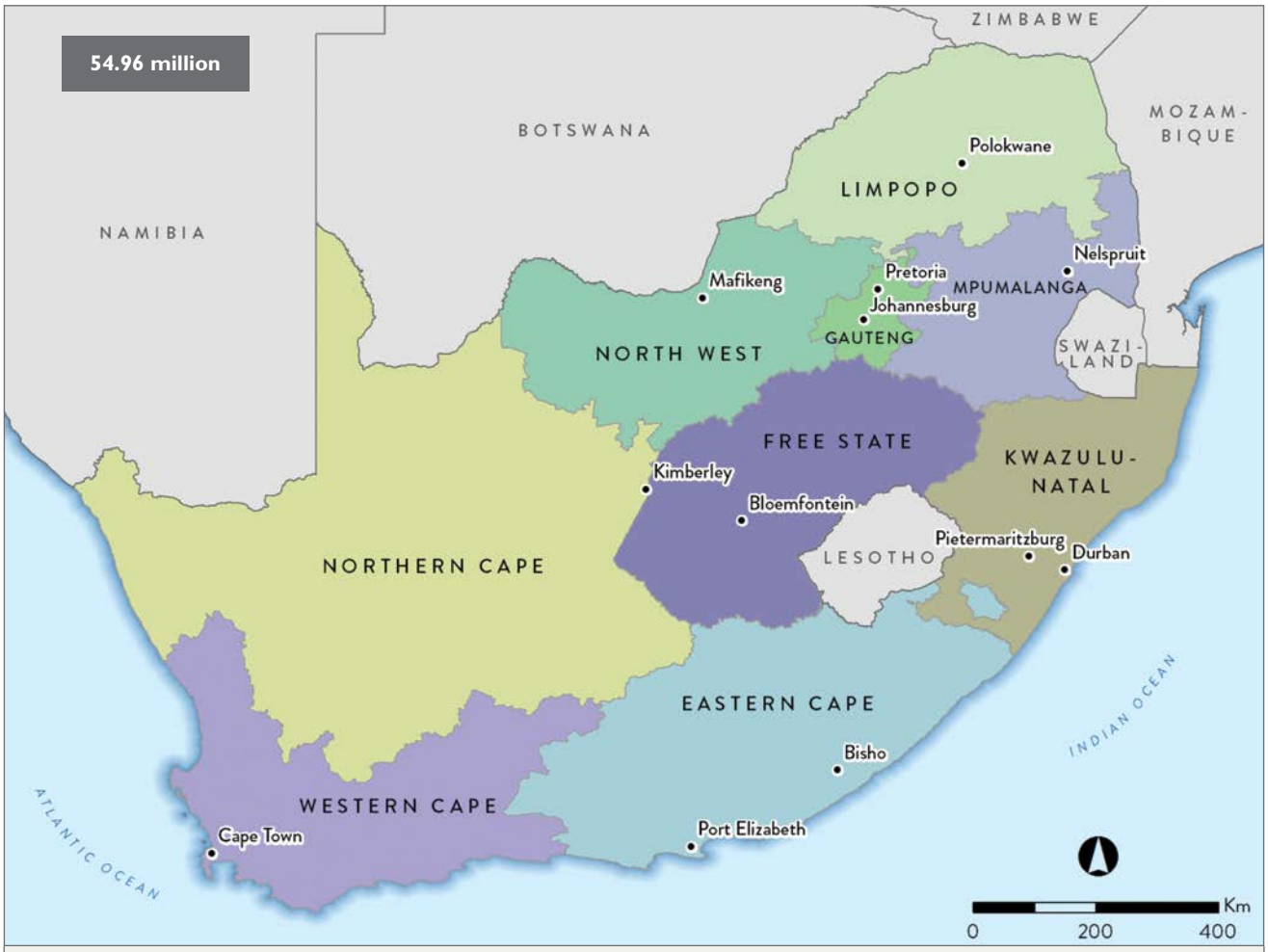


Figure 1. Provinces and major cities of South Africa.

Table 1. Population data by ethnic group.

Population group	million	%
Black	44.23	80.5
Coloured	4.83	8.8
Indian/Asian	1.36	2.5
White	4.53	8.3
Total	**54.96**	**100**

Table 2. Population data by province.

Province	million	%
Eastern Cape (EC)	6.92	12.6
Free State (FS)	2.82	5.1
Gauteng (GT)	13.20	24.0
KwaZulu-Natal (KZN)	10.92	19.9
Limpopo (LP)	5.73	10.4
Mpumalanga (MP)	4.28	7.8
North West (NW)	3.71	6.7
Northern Cape (NC)	1.19	2.2
Western Cape (WC)	6.20	11.3
Total	**54.96**	**100**

Treatment centres for dialysis and transplantation

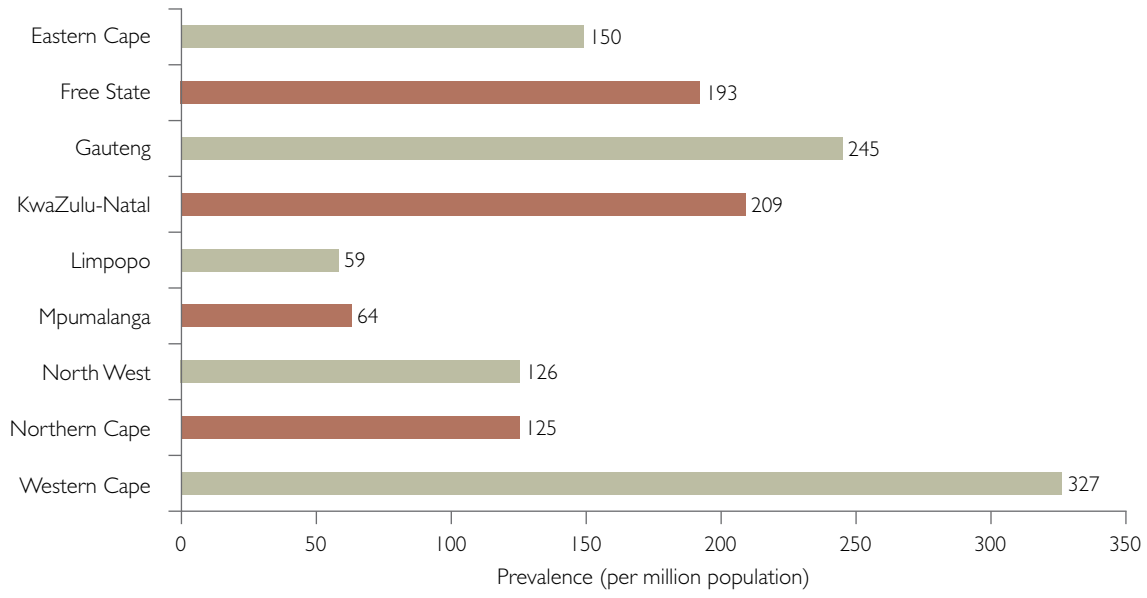
An additional 33 treatment centres, 32 of these in the private sector, contributed data for this 2015 report. The total number of centres in 2015 was 258; 228 (88.4%) of these were privately owned. One privately owned unit in Limpopo was established as a public–private partnership on the premises of a government hospital to serve public sector patients.

Table 3. Number of centres by province and sector.

Sector	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Public	3	6	7	5	0	0	3	1	5	30
Private	19	11	69	58	11	10	14	4	32	228
Total	**22**	**17**	**76**	**63**	**11**	**10**	**17**	**5**	**37**	**258**

Prevalence of renal replacement therapy

The total number of patients on RRT on 31 December 2015 was 10 360. With a population of 54.96 million, this is a prevalence of 189 per million population (pmp). The prevalence for 2014 was 178 pmp. In 2015, the province with the highest patient numbers was Gauteng, followed by KwaZulu-Natal and the Western Cape, while the province with the highest prevalence was the Western Cape, followed by Gauteng and KwaZulu-Natal.



Province	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Patients	1 040	544	3 238	2 286	337	273	466	148	2 028	10 360

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

The number of patients treated in the public sector in 2015 remained low, with a prevalence of 71.9 pmp. This is lower than the rate of 72.6 pmp reported for 2014. In the private sector, the rate increased from 716.3 pmp in 2014 to 799.3 pmp in 2015. Denominators for prevalence calculations are based on the Stats SA mid-term estimates [4] and the Council for Medical Schemes Annual Report [5]. 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	46.15	8.81*
ESRD patients on treatment	3 318	7 042
Treatment rate (pmp)	71.9	799.3

*Council for Medical Schemes Annual Report 2015/16

Table 4. Numbers of patients by sector and province.

Sector	EC	FS	GT	KZN	LP	MP	NW	NC	WC	All
Public	315	227	958	630	72	17	161	82	856	3 318
Private	725	317	2 280	1 656	265	256	305	66	1 172	7 042
Total	**1 040**	**544**	**3 238**	**2 286**	**337**	**273**	**466**	**148**	**2 028**	**10 360**

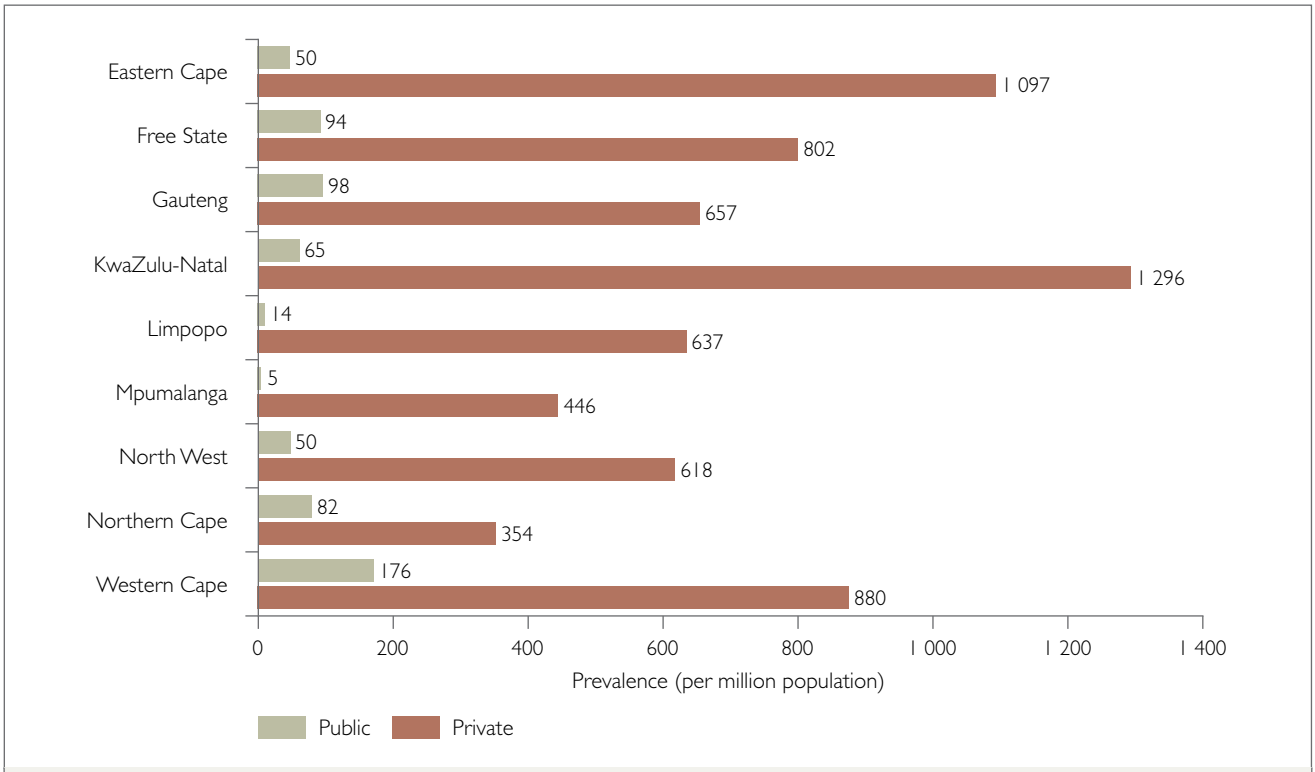
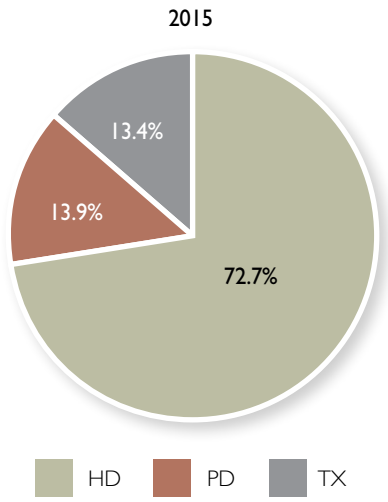


Figure 3. Prevalence of RRT by province and sector.

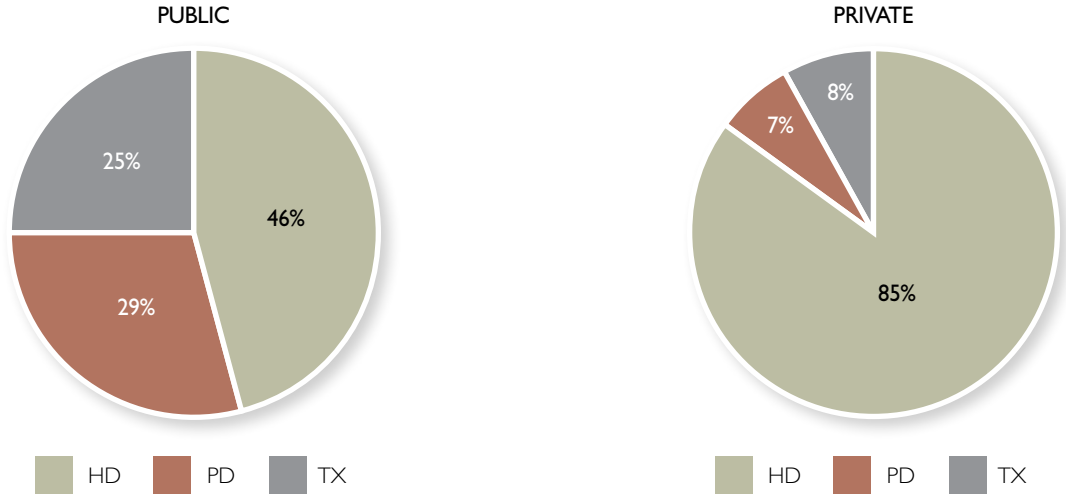
Treatment modality

Of the 10 360 patients on RRT in 2015, 13.4% had a functioning renal transplant. Of the 8 969 patients on dialysis, 16.1% were on peritoneal dialysis and 83.9% on haemodialysis. Most of the transplant and peritoneal dialysis patients are in the public sector; the private sector has much lower proportions of patients on these RRT modalities.



Modality	Patients	%
Haemodialysis	7 529	72.7
Peritoneal dialysis	1 440	13.9
Transplant	1 391	13.4

Figure 4. Distribution of patients by treatment modality.



Treatment modality	Public sector		Private sector	
	Patients	%	Patients	%
Haemodialysis	1 517	45.7	6 012	85.4
Peritoneal dialysis	963	29.0	477	6.8
Transplant	838	25.3	553	7.9

Figure 5. RRT modality by sector.

Data on new kidney transplants have been supplied by the South African Organ Donor Foundation (http://www.odf.org.za/). The decline in the number of new transplants seen in 2014 (219 transplants) appears to have reversed, with 254 transplants performed in 2015. This included 3 kidney-liver and 3 kidney-pancreas transplants. No transplants were performed in public sector hospitals in the provinces of KwaZulu-Natal and the Free State. The kidney transplant rate for 2015 was 4.6 pmp.

Table 5. New kidney transplants in 2015.

	Deceased donor		Living related		Living unrelated		Total
	Child	Adult	Child	Adult	Child	Adult	
Western Cape - Public	8	34	3	6	0	9	60
Western Cape - Private	0	19	0	21	0	16	56
Gauteng - Public	2	32	0	1	0	0	35
Gauteng - Private	5*	45*	1	11	0	14	76
KwaZulu-Natal - Public	0	0	0	0	0	0	0
KwaZulu-Natal - Private	0	9	0	9	0	5	23
Free State - Public	0	0	0	0	0	0	0
Free State - Private	0	4	0	0	0	0	4
Total	**15**	**143**	**4**	**48**	**0**	**44**	**254**

Child = recipient <18 years; Adult = recipient 18 years and older.
*Includes 2 child and 1 adult kidney-liver transplants, and 3 adult kidney-pancreas transplants. Data supplied by the SA Organ Donor Foundation.

Demographic and clinical data

The mean age of the patients on RRT was 51.3 ± 15.0 years and 59.3% were male. Because of the rationing and selection criteria applied in South African public sector hospitals [6], patients treated there are much younger than those treated in the private sector (43.4 ± 13.5 versus 55.0 ± 14.3 years). Just more than half of the patients were Black. However, the prevalence was still lowest in Blacks (125 pmp) and highest in Indians/Asians (927 pmp).

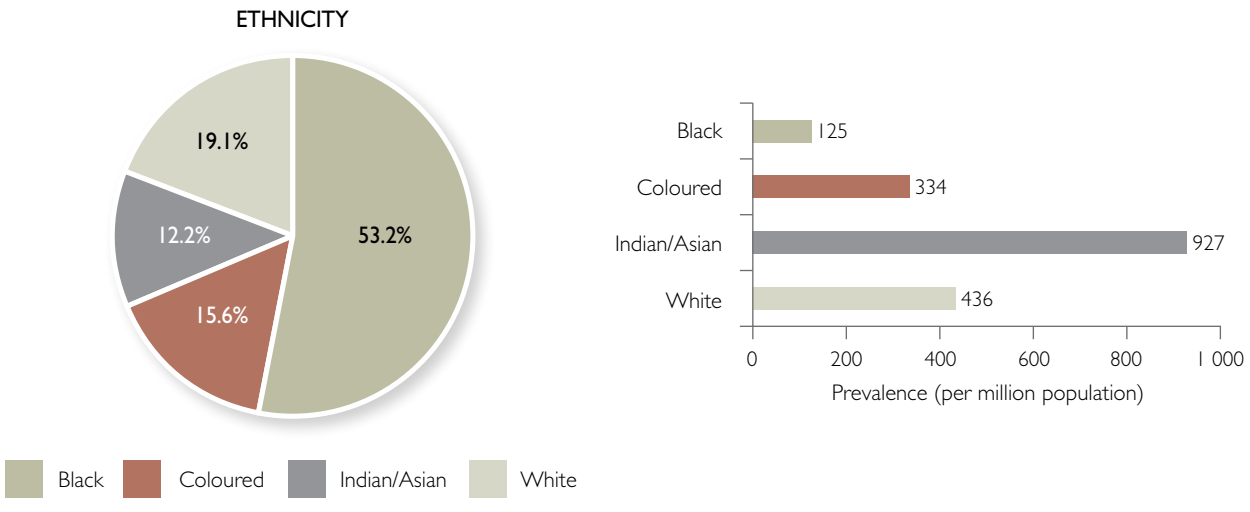


Figure 6. RRT patient numbers and prevalence by ethnicity.

During the 2015 data collection process, we recoded many patients' primary renal diagnoses (PRD) to be in line with the new EDTA-ERA coding system [1]. Taking a conservative approach, we indicated the PRD as "chronic kidney disease/chronic renal failure – aetiology uncertain/unknown" when it seemed that there was doubt about the diagnosis. For example, because of the links to ICD10 codes in previous versions of the SARR, many patients had a PRD of "chronic renal failure – includes: chronic uraemia, diffuse sclerosing glomerulonephritis" and these had been grouped under glomerular disease. They have now been coded as "uncertain/unknown" and this group is now the largest, followed by hypertensive renal disease and diabetic nephropathy.

Table 6. Most commonly reported causes of ESRD.

	% of total
Uncertain or not stated	34.1
Hypertensive renal disease	33.7
Diabetic nephropathy	14.4
Glomerular disease	9.5
Cystic kidney disease	2.9
Obstruction and reflux	1.5

Of the 8 002 patients with data on diabetes status, 51.5% were diabetic, with a much higher percentage of diabetic patients in the private than in the public sector (58.0% versus 38.2%). These percentages are substantially higher than those we have reported in the past. One reason for this may be that, for this report, we considered patients as diabetic if any previous entry indicated a patient as being diabetic even when the latest annual assessment had an entry for diabetes status as "unknown". We also classified patients as diabetic when the PRD was given as diabetic nephropathy. In addition, we are concerned that data capturers may have found the options for diabetes on our online form confusing and selected "diabetes (type unknown") instead of "unknown" when they were not sure of the diabetes status.

The seropositive rate for hepatitis B virus was 1.3% (95 of 7 056 patients), for hepatitis C virus 1.1% (65 of 6 178 patients) and for HIV 9.4% (607 of 6 464 patients).

DISCUSSION

The number of patients on RRT in South Africa has continued to increase steadily, and stood at 10 360 in December 2015, a prevalence of 189 pmp. In 2014, the prevalence was 178 pmp. As before, this growth was mainly due to an increase in the number of patients treated with haemodialysis in the private healthcare sector. There is no evidence of any real growth in public sector access to RRT and treatment rates over the past few years remain similar to those seen in 1994. The progressive realisation of access to RRT, which is promised by the South African Constitution, is not happening, and this is cause for great concern.

It is vital that a complete picture of renal replacement therapy across the country is obtained and we therefore need the support of all treatment centres to ensure the inclusion of all patients. Our next round of data collection, for December 2016, is currently under way. Treatment centres should re-check their patients' core data, such as demographic information, the date on which treatment was started, the primary renal diagnosis and diabetes status. Any changes in treatment modality, transfers to another centre, and deaths during the year 2016 need to be recorded.

During the course of the next year we will audit and improve the accuracy of our data on primary renal diagnosis and diabetes status, and we will continue to adapt our platform to accommodate countries that have joined the African Renal Registry initiative.

Acknowledgements

The SARR is a project of the South African Renal Society (http://www.sa-renalsociety.org/) which is chaired by Prof Razeen Davids and Dr Julian Jacobs.

We thank the following for contributing to the success of our 2015 data collection and annual report:

The doctors, nurses, technologists, support staff and management of participating treatment centres – these centres are listed in Appendix 1.

Funding and logistical support was received from:

- National Department of Health
- Actor Pharma
- Adcock Ingram Critical Care (Renal Division)
- Amgen
- Janssen Pharmaceutica
- National Kidney Foundation of South Africa
- National Renal Care
- Roche Pharmaceuticals
- Stellenbosch University

Our national data manager, Nicola Marais, and data capturer, Suzan Baloyi.

Supplementary materials

The figures in this report are available as PowerPoint slides via the supplementary materials.

Usage of this report

Conflict of interest

None to declare.

REFERENCES

1. Venkat-Raman G, Tomson CR, Gao Y, Cornet R, Stengel B, Gronhagen-Riska C, et al. New primary renal diagnosis codes for the ERA-EDTA. Nephrol Dial Transplant. 2012; 27:4414-4419.
2. Perneger TV, Whelton PK, Klag MJ, Rossiter KA. Diagnosis of hypertensive end-stage renal disease: effect of patient's race. Am J Epidemiol. 1995; 141:10-15.
3. Schlessinger SD, Tankersley MR, Curtis JJ. Clinical documentation of end-stage renal disease due to hypertension. Am J Kidney Dis. 1994; 23:655-660.
4. Mid-year population estimates, 2015. Pretoria, South Africa: Stats SA.
5. Council for Medical Schemes Annual Report 2015/16. Pretoria, South Africa: Council for Medical Schemes.
6. Moosa MR, Maree JD, Chirehwa MT, Benatar SR. Use of the "Accountability for Reasonableness" approach to improve fairness in accessing dialysis in a middle-income country. PLoS ONE. 2016; 11:e0164201.

APPENDIX 1: PARTICIPATING TREATMENT CENTRES

EASTERN CAPE		
Public	**Private**	**Private**
Frere Hospital	Jeffreys Bay Kidney and Dialysis Centre (FMC)	NRC Port Elizabeth HD
Livingstone Hospital	Life East London Private Hospital	NRC Port Elizabeth PD
Nelson Mandela Academic Hospital	Life New Mercantile Hospital	NRC Queenstown
	NRC Butterworth	NRC Uitenhage
	NRC East London HD	Port Elizabeth Kidney and Dialysis Centre (FMC)
	NRC East London PD	Regional Renal Services Harding
	NRC King Williamstown	Regional Renal Services Lusikisiki
	NRC Kwadwesi	Regional Renal Services Matatiele
	NRC Mdantsane	Regional Renal Services Mthatha
	NRC Mthatha	

FREE STATE		
Public	**Private**	**Private**
Boitumelo Regional Hospital (Kroonstad)	B. Braun Avitum Bethlehem (Hoogland)	NRC Bloemfontein PD
Bongani Regional Hospital (Welkom)	B. Braun Avitum Bloemfontein	NRC Kroonstad
Dihlabeng Regional Hospital (Bethlehem)	B. Braun Avitum Welkom	NRC Pelonomi
Mofumahadi Manapo Mopeli Hospital (Qua Qua)	Bloemfontein Kidney and Dialysis Centre (FMC)	Sasolburg Kidney and Dialysis Centre (FMC)
Pelonomi Regional Hospital	Life Rosepark Hospital	Universitas Private Hospital
Universitas Academic Hospital	NRC Bloemfontein HD	

GAUTENG		
Public	**Private**	**Private**
Charlotte Maxeke Johannesburg Academic Hospital	Arcadia Kidney and Dialysis Centre (FMC)	Life Groenkloof Hospital
Chris Hani Baragwanath Hospital	B. Braun Avitum Lakeview (Benoni)	Life The Glynnwood Hospital
Dr George Mukhari Hospital	B. Braun Avitum Pretoria (Kloof)	Life Wilgeheuwel Hospital
Helen Joseph Hospital	B. Braun Avitum Pretoria (Urology Hospital)	Morningside Children's Kidney Treatment Centre
Leratong Hospital	B. Braun Avitum Sandton	Morningside Kidney and Dialysis Centre (FMC)
Sebokeng Hospital	B. Braun Avitum Vanderbijlpark (Emfuleni)	Morula Kidney and Dialysis Centre (FMC)
Steve Biko Academic Hospital	B. Braun Avitum Vereeniging (Midvaal)	Naledi Kidney and Dialysis Centre (FMC)
	Baobab Kidney Care - Randburg Dialysis	Netcare Transplant Centre Garden City Hospital
	Edison Hammanskraal Centre	Netcare Transplant Centre Jakaranda Hospital
	Edison Mamelodi Centre	Netcare Transplant Centre Milpark Hospital
	Fordsburg Kidney and Dialysis Centre (FMC)	NRC Akasia
	Groenkloof Kidney and Dialysis Centre (FMC)	NRC Alberton
	Harmelia Kidney and Dialysis Centre (FMC)	NRC Arcadia
	Heidelberg Medical Centre Renal Unit	NRC Johannesburg PD
	Hibiscus Kidney and Dialysis Centre (FMC)	NRC Krugersdorp
	Izinso Soshanguwe Clinic	NRC Lenasia (Lenmed)
	Kempton Kidney and Dialysis Centre (FMC)	NRC Lenasia South (Daxina)
	Lenasia Kidney and Dialysis Centre (FMC)	NRC Linksfield
	Lesedi Kidney and Dialysis Centre (FMC)	NRC Lyttleton
	Life Bedford Gardens Hospital	NRC Mayfair
	Life Brenthurst Hospital	NRC Montana
	Life Carstenhof Hospital	NRC Mulbarton
	Life Fourways Hospital	NRC Olivedale

FMC = Fresenius Medical Care, MRC = Melomed Renal Care, NRC = National Renal Care, LRC = Lenmed Renal Centre

APPENDIX 1: PARTICIPATING TREATMENT CENTRES continued

GAUTENG cont.		
Public	**Private**	**Private**
	NRC Parktown West	Renalworx Pretoria West
	NRC Pretoria East	Renalworx 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 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	Mount Edgecombe Kidney and Dialysis Centre (FMC)
Greys Hospital	B. Braun Avitum Howick	Netcare Transplant Centre St Augustine's Hospital
Inkosi Albert Luthuli Hospital	B. Braun Avitum Newcastle	Newcastle Kidney and Dialysis Centre (FMC)
King Edward VIII Hospital	B. Braun Avitum Pietermaritzburg	NRC Athlone
Ngwelezana Hospital	B. Braun Avitum Scottburgh	NRC Ballito
	B. Braun Avitum Vryheid	NRC Berea
	Chatsworth Kidney and Dialysis Centre (FMC)	NRC Chatsworth
	Coastal Nephrology Centre Greytown	NRC Durban PD
	Coastal Nephrology Centre Nongoma	NRC Gateway
	Coastal Neprology Centre Ulundi	NRC Hillcrest
	Dr Parag and Raghubir Kidney Care Centre	NRC Ladysmith
	Durban Kidney and Dialysis Centre (FMC)	NRC Margate
	Ekuphileni Renal Centre Manguzi	NRC Pietermaritzburg CBD
	Empangeni Kidney and Dialysis Centre (FMC)	NRC Pietermaritzburg PD
	Ethekwini Kidney and Dialysis Centre (FMC)	NRC Pinetown
	Kokstad Kidney and Dialysis Centre (FMC)	NRC Richards Bay
	Kwazulu Dialysis Chatsmed Renal Unit	NRC Umhlanga
	Kwazulu Dialysis Shifa Renal Unit	Pinetown Kidney and Dialysis Centre (FMC)
	Kwazulu Dialysis Umlazi Megacity Renal Unit	Port Shepstone Kidney and Dialysis Centre (FMC)
	Kwazulu Dialysis Westville Renal Unit	Renal Care Team Durdoc
	Life Chatsmed Hospital	Renal Care Team Kwamashu
	Life Empangeni Hospital	Renomed Verulam Dialysis
	Life Entabeni Hospital	Richards Bay Kidney and Dialysis Centre (FMC)
	Life Hilton Hospital	Stanger Kidney and Dialysis Centre (FMC)
	Life Mount Edgecombe Hospital	Ultra Kidney Care Isipingo
	Life Westville Hospital	Umhlanga Kidney and Dialysis Centre (FMC)
	Merediac Durdoc	Verulam Dialysis Centre
	Merediac Pinetown	Victoria Kidney and Dialysis Centre (FMC)
	Mount Edgecombe DCG	Vryheid Kidney and Dialysis Centre (FMC)

FMC = Fresenius Medical Care, MRC = Melomed Renal Care, NRC = National Renal Care, LRC = Lenmed Renal Centre

APPENDIX 1: PARTICIPATING TREATMENT CENTRES continued

LIMPOPO		
Public	**Private**	**Private**
	B. Braun Avitum Louis Trichardt	Edison Thohoyandou Centre
	B. Braun Avitum Mokopane	Nephromed Kidney Centre Thohoyandou
	B. Braun Avitum Polokwane	NRC Polokwane
	B. Braun Avitum Tzaneen	NRC Venda
	Chantel Van Rooyen Private	Polokwane Kidney and Dialysis Centre (FMC)
	Edison Giyani Centre	

MPUMALANGA		
Public	**Private**	**Private**
	B. Braun Avitum Ermelo	Hazyview Dialysis Centre
	B. Braun Avitum Nelspruit	Life Midmed Hospital
	B. Braun Avitum Trichardt	Middelburg Kidney and Dialysis Centre (FMC)
	B. Braun Avitum Witbank	Mpumalanga Kidney and Dialysis Centre (FMC)
	Emalahleni Kidney and Dialysis Centre (FMC)	NRC Nelspruit

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	Carletonville Kidney and Dialysis Centre (FMC)	NRC Rustenberg
	Izinso Dialysis Mafikeng	NRC Rustenberg PD
	Mafikeng Kidney and Dialysis Centre (FMC)	Potchefstroom Kidney and Dialysis Centre (FMC)
	North West Dialysis Hartswater	Rustenburg Kidney and Dialysis Centre (FMC)
	North West Dialysis Klerksdorp	Zeerust Renal Unit

NORTHERN CAPE		
Public	**Private**	**Private**
Kimberley Hospital	B. Braun Avitum Kimberley	NRC Kimberley
	B. Braun Avitum Upington	NRC Kimberley PD

WESTERN CAPE		
Public	**Private**	**Private**
George Hospital	Athlone Kidney and Dialysis Centre (FMC)	NRC Blaauwberg
Groote Schuur Hospital	B. Braun Avitum Cape Gate	NRC Cape Town CBD
Red Cross War Memorial Children's Hospital	B. Braun Avitum Mossel Bay	NRC Cape Town PD
Tygerberg Hospital	B. Braun Avitum Oudtshoorn	NRC George
Worcester Hospital	B. Braun Avitum Worcester	NRC Goodwood
	Cape Town Kidney and Dialysis Centre (FMC)	NRC Kuilsriver
	George Kidney and Dialysis Centre (FMC)	NRC Paarl
	Hermanus Kidney and Dialysis Centre (FMC)	NRC Plumstead
	Life Knysna Hospital	NRC Vredenburg
	Life Vincent Pallotti Hospital	Paardevlei Kidney and Dialysis Centre (FMC)
	Life Vincent Pallotti Hospital Paediatrics	Panorama Kidney and Dialysis Centre (FMC)
	MRC Gatesville HD	Rondebosch Dialysis Centre
	MRC Gatesville PD	Stellenbosch Kidney and Dialysis Centre (FMC)
	MRC Mitchells Plain	UCT Kidney and Dialysis Centre (FMC)
	MRC Tokai	UCT Private Academic Hospital
	Netcare Christiaan Barnard Memorial Hospital	Winelands Kidney and Dialysis Centre (FMC)

FMC = Fresenius Medical Care, MRC = Melomed Renal Care, NRC = National Renal Care, LRC = Lenmed Renal Centre

APPENDIX 1: PARTICIPATING TRANSPLANT CENTRES

FREE STATE	
Public	**Private**
Universitas Academic Hospital	Universitas Private Hospital

GAUTENG	
Public	**Private**
Charlotte Maxeke Johannesburg Academic Hospital	Netcare Garden City Hospital
Steve Biko Academic Hospital	Netcare Milpark Hospital
	Wits Donald Gordon Medical Centre

KWAZULU-NATAL	
Public	**Private**
Inkosi Albert Luthuli 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	