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Projections of the incidence of treated end-stage kidney disease among Indigenous Australians, 2009–2020

A working paper with preliminary results

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Please note that there is the potential for minor revisions of data in this report. Please check the online version at <www.aihw.gov.au> for any amendments.

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Abbreviations

ABS	Australian Bureau of Statistics
AIHW	Australian Institute of Health and Welfare
CKD	chronic kidney disease
ESKD	end-stage kidney disease
ANZDATA	Australia and New Zealand Dialysis and Transplant Registry

1 Introduction

Chronic kidney disease (CKD) is a serious and increasingly common health problem in Australia, with up to 1 in 7 Australian adults having some degree of CKD in 1999–2000 (Chadban et al. 2003). CKD is clinically classified into five stages according to the level of reduced kidney function and/or evidence of kidney damage (National Kidney Foundation of America 2002). People suffering from the most severe stage of CKD (Stage 5, also known as end-stage kidney disease) usually require regular dialysis or a kidney transplant to survive (AIHW 2009).

The focus of this working paper is the incidence (number of new cases) of end-stage kidney disease treated with dialysis or transplant (hereafter referred to as treated ESKD), as these treatments are extremely resource intensive. Further, reliable data on the incidence and prevalence of treated ESKD are available from the Australia and New Zealand Dialysis and Transplant Registry (ANZDATA), which compiles data from all renal units in Australia.

As with some other chronic diseases, CKD and ESKD are more common among Aboriginal and Torres Strait Islander people than non-Indigenous Australians. Indigenous Australians also have much higher incidence rates of treated ESKD (McDonald et al. 2008). Over the period 2007 to 2008, close to 10% of new cases of treated ESKD were for Indigenous Australians, despite only 2.5% of the total Australian population identifying as Indigenous. Indigenous Australians were also 4 times as likely to die from CKD as non-Indigenous Australians (AIHW 2011a).

Indigenous Australians have higher levels of risk factors associated with chronic diseases, such as CKD and diabetes, than non-Indigenous Australians. For example, Indigenous Australians are more likely to smoke, be obese and have high blood pressure (AIHW 2011b). Furthermore, diabetes is a significant health issue among Aboriginal and Torres Strait Islander people, with Indigenous Australians being 3 times as likely to have diabetes as non-Indigenous Australians based on self-reported data (AIHW 2011a). Since diabetes is the leading cause of ESKD, it is anticipated that the high level of diabetes in the Indigenous population will result in an increasing number of Aboriginal and Torres Strait Islander people being affected by CKD and ESKD in future.

Projecting the incidence of treated ESKD among Indigenous Australians is important—both to understand the potential future burden of this disease in this population, and to assist with resource allocation and planning.

The projections of the incidence of treated ESKD among all Australians are presented in a separate report (AIHW 2011c). Due to the smaller number of cases, which results in fluctuations in incidence rates among Indigenous Australians from year to year, and uncertainties in the Indigenous population estimates over time, the projections of the incidence among Indigenous Australians has additional uncertainty. Thus these projections have been presented in a working paper as preliminary results.

It is important to note that projections are not intended to function as exact forecasts, but to give an indication of what might be expected in the future if the stated assumptions were to apply over the projection time-frame. Two main assumptions were made: first, the most recent trend in the incidence of treated ESKD will continue into the future; and second, the Indigenous population will grow and age in the next decade as projected by the Australian Bureau of Statistics (ABS). These assumptions should be taken into consideration when interpreting the results.

Projection estimates also have a level of uncertainty around them, meaning there is a statistical range in which the true value is likely to lie. In other words, the figures quoted in this report can be viewed as an 'average' of the actual value that might be expected assuming the assumptions made in this report prove realistic.

2 Methods

The treated ESKD cases among Aboriginal and Torres Strait Islander people are sourced from ANZDATA. These data show that the number of new cases of treated ESKD for Indigenous Australians was extremely small in the early 1990s, and then increased and gradually stabilised after 1995. Historical trends for the period 1989 to 2009 were examined using Joinpoint regression techniques by age and sex (Joinpoint Regression Program April 2010) to determine points where the trend changed. The Joinpoint analysis identified the most recent trends starting around 1993 to 1998 depending on the age/sex group. To be consistent with the base year data used for the national projections (AIHW 2011c), 1996 was chosen as the first year of base data.

The latest available year of data was 2009. However, as with other years, it is likely the 2009 data will be updated during the collection of the following year's data, and may therefore be incomplete at the time of this analysis. Due to the comparatively small number of cases, the incomplete data may have a bigger impact on the projection results for Indigenous Australians and it was therefore decided to use 1996 to 2008 as base data.

An age-period cohort approach was applied for the projection, which assumes disease incidence is a function of age (in age groups) and period (in calendar year) effects. The primary age-period model is the log-linear Poisson regression model (Osmond & Hardy 2004). This model assumes the incidence of treated ESKD among Indigenous Australians is a rare event that follows a Poisson distribution, and the expected logarithmic transformed incidence rate, with population as an offset, is a linear function of age and period effects. With derived age and period parameters, the regression model can be used to extrapolate the age-specific rates into the future.

The projection was done by sex and age groups, however only three age groups were used (0–39, 40–59, and 60 and over) because of the small number of cases. Poisson models with and without the interaction term of age and period were examined, and the statistical significance of the interaction term was tested using Type III analysis (Fleiss 1986). The interaction term did not have a statistically significant effect on the models, and was therefore excluded. The goodness of fit of the log-linear Poisson models for males and females without age and period interaction terms was also examined and the models fitted reasonably well.

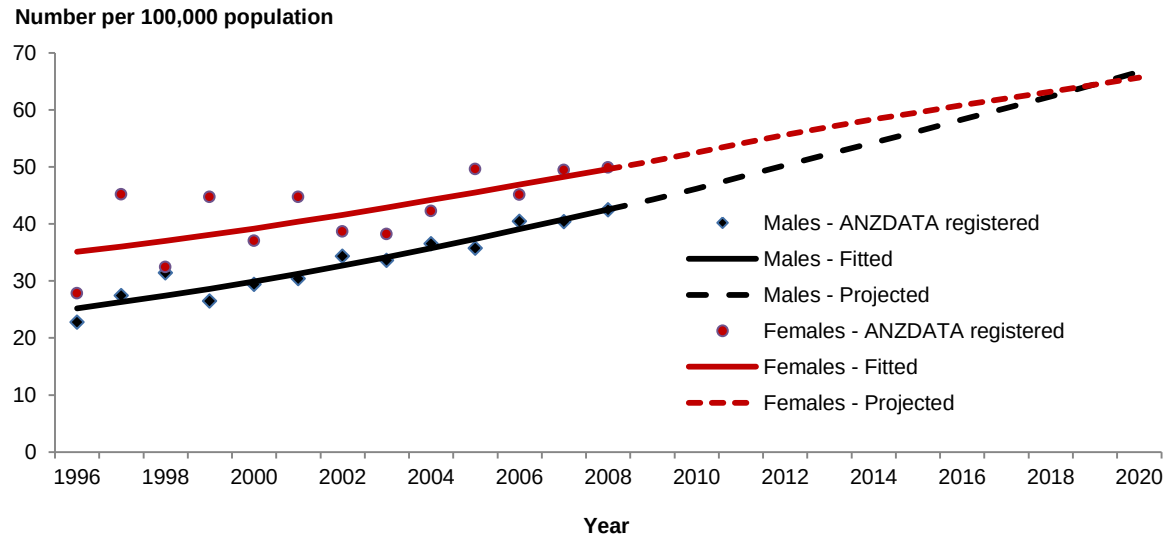
The ABS population estimates and projections of Indigenous Australians were used as denominators for the incidence rates. In September 2009, the ABS released new experimental estimates and projections of the Indigenous Australian population based on the 2006 census, with back casting to 1991 and projections to 2021 (Australian Bureau of Statistics 2009). There is some consistency between the population estimates based on the 2001 census and the 2006 census, however a gap was identified for the youngest and oldest age groups. While it is likely there is an improvement in estimating the number of Indigenous people in the oldest age groups in the new estimates, there is also a remaining level of uncertainty when the population estimates are used with the incidence data from ANZDATA to estimate the incidence rates between 1996 and 2008.

Projections by their nature involve a level of uncertainty; however the issues with both the incidence and population data in these projections add further uncertainty. As a result, the findings presented here are classed as 'preliminary' and should be interpreted with caution.

3 Results

In 2008, the incidence rate of treated ESKD for Indigenous Australians was 46 per 100,000 population compared with nearly 12 per 100,000 population for all Australians.

Figure 1 shows the registered and projected incidence rates of treated ESKD from 1996 to 2020. In contrast to those for all Australians, registered incidence rates among Indigenous females were higher compared to Indigenous males between 1996 and 2008. However, male incidence rates are projected to increase faster than female rates from 2008 onwards. By 2019, the incidence rate of treated ESKD among Indigenous males is projected to catch up with the Indigenous female rate (Figure 1). However, it is important to remember that there is a level of uncertainty around all these estimates and thus the actual gap between males and females in the earlier years may not be statistically significant.



Source: Registered cases during 1996–2008 used for calculating incidence rates from ANZDATA.

Figure 1: Incidence rates of registered and projected treated ESKD for Indigenous Australians, by sex, 1996–2020

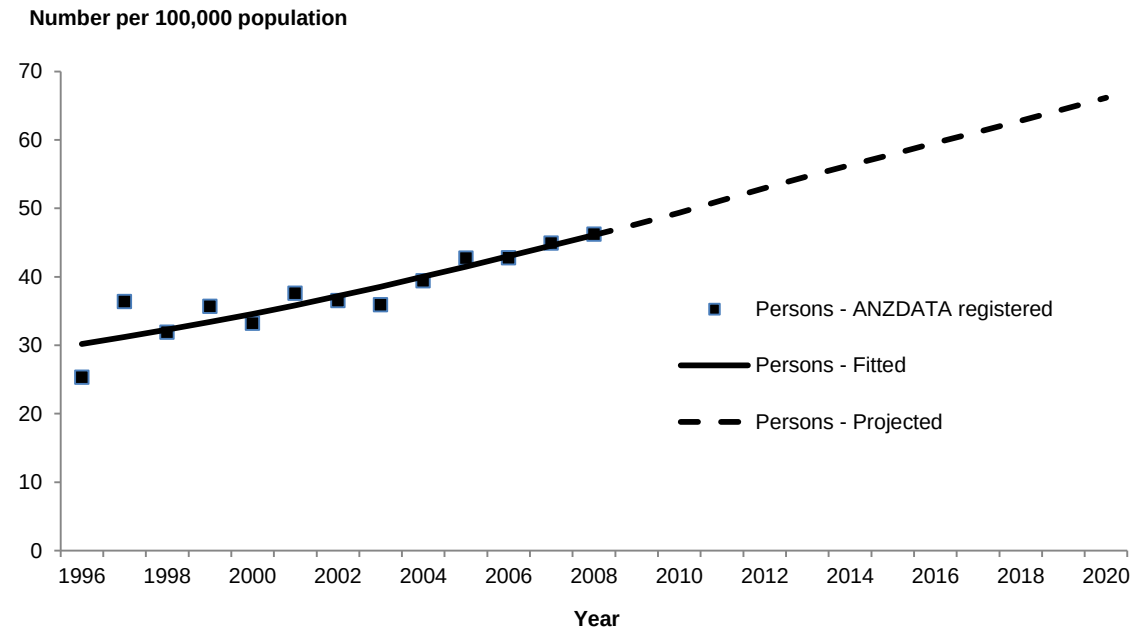
The incidence rate of treated ESKD for all Indigenous Australians is projected to increase by 43%—from 46 per 100,000 population in 2008 to 66 per 100,000 population in 2020 (Table 1 and Figure 2).

The projected increase in incidence rates is larger for Indigenous males than for females (57% compared with 32% — Table 1). For both Indigenous males and females, the increase is expected to occur predominantly among those aged 40 and over.

Table 1: Projected incidence rates of treated ESKD for Indigenous Australians, by sex, 2009–2020

Sex/Year	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
						Number per 100,000 population						
Males	44	46	48	50	52	54	56	58	60	62	64	67
Females	51	53	54	56	57	58	60	61	62	63	64	66
Total	**48**	**49**	**51**	**53**	**55**	**56**	**58**	**60**	**61**	**63**	**64**	**66**

Source: AIHW projections based on the ANZDTA Registry data.



Source: Registered cases during 1996–2008 used for calculating incidence rates from ANZDATA.

Figure 2: Registered and projected incidence rates of treated ESKD among Indigenous Australians, 1996–2020

4 Discussion

Projections are estimates of what might reasonably be expected to occur in the future, and their realisation depends on the assumptions made proving to be correct. There are also additional uncertainties with using Indigenous data, therefore, the projections of treated ESKD for Indigenous Australians presented in this working paper are considered to be preliminary and are presented separately to the national projections.

Between 2008 and 2020, the incidence rate of treated ESKD among Indigenous Australians is projected to increase by 43%, from 46 to 66 per 100,000 population. To put this in context, over the same time period the incidence rate of treated ESKD among all Australians (including Indigenous Australians) is projected to increase by 61%— from the registered rate of 12 per 100,000 in 2008, to 19 per 100,000 in 2020 (AIHW 2011c). While the percentage change is lower for Indigenous Australians than for the whole population, the absolute increase (20 per 100,000 population) among Indigenous Australians is substantially higher than among all Australians (7 per 100,000 population). However, there are differences in methods between these two analyses. The age grouping and base data period used for the Indigenous projection and national projection are different, and the national model includes Indigenous cases. Therefore, only general comparisons of the results from the two projections are appropriate.

The projected incidence rates of treated ESKD for Indigenous Australians are more on par with—but higher than—the projected incidence rates in the Northern Territory (NT), although the base data years used are slightly different (1996–2009 for the NT projections, 1996–2008 for Indigenous projections) (AIHW 2011c). This is expected considering about 86% of the population in the NT between 1996 and 2008 were Indigenous.

The higher rate of diabetes among Indigenous Australians compared with the non-Indigenous population is likely to play a role. In 2004, the self-reported prevalence of diabetes was around 6% in Australia; however, diabetes was more common among Indigenous Australians (12%) than non-Indigenous Australians (4%) (AIHW 2011a).

Given the high prevalence of diabetes, and the historically higher incidence rates of treated ESKD among Indigenous Australians, the higher projected incidence rates are expected.

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