

Chronic kidney disease in Australia

2005

The Australian Institute of Health and Welfare is Australia's national health and welfare statistics and information agency. The Institute's mission is *better health and wellbeing for Australians through better health and welfare statistics and information.*

Please note that as with all statistical reports there is the potential for minor revisions of data in *Chronic kidney disease in Australia, 2005* over its life. Please refer to the online version at <www.aihw.gov.au>.

Chronic kidney disease in Australia, 2005

October 2005

Australian Institute of Health and Welfare
Canberra

AIHW Cat. No. PHE 68

© Australian Institute of Health and Welfare 2005

This work is copyright. Apart from any use as permitted under the *Copyright Act 1968*, no part may be reproduced without prior written permission from the Australian Institute of Health and Welfare. Requests and enquiries concerning reproduction and rights should be directed to the Head, Business Promotion and Media Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601.

A complete list of the Institute's publications is available from the Business Promotion and Media Unit, Australian Institute of Health and Welfare, GPO Box 570, Canberra ACT 2601, or via the Institute's website <<http://www.aihw.gov.au>>.

ISBN 1 74024 508 3

Suggested citation

AIHW 2005. Chronic kidney disease in Australia, 2005. AIHW Cat. No. PHE 68. Canberra: AIHW.

Australian Institute of Health and Welfare

Board Chair

Hon. Peter Collins, QC, AM

Director

Dr Richard Madden

Any enquiries about or comments on this publication should be directed to:

Tracy Dixon

Australian Institute of Health and Welfare

GPO Box 570

Canberra ACT 2601

Phone: (02) 6244 1103

Published by Australian Institute of Health and Welfare

Printed by

Table of contents

- Table of contentsiii**
- List of tables v**
- List of figuresvii**
- Acknowledgments..... ix**
- Abbreviations.....x**
- Executive summary xi**
- 1 Introduction.....1**
 - The kidneys.....1
 - Chronic kidney disease.....1
 - Purpose and structure of this report5
 - References7
- 2 The burden of chronic kidney disease8**
 - Introduction.....8
 - Reduction in kidney function9
 - Comorbidities and complications of chronic kidney disease.....12
 - Disability and quality of life.....15
 - Health service usage.....17
 - Treatment for end-stage kidney disease.....22
 - Mortality27
 - Health expenditure on chronic kidney disease32
 - References36
- 3 Risk factors and causes of chronic kidney disease39**
 - Introduction.....39
 - Biomedical factors causing kidney damage.....41
 - Modifiable factors increasing risk of chronic kidney disease.....48
 - Other factors influencing chronic kidney disease53
 - References55
- 4 Causes of treated end-stage kidney disease58**
 - Introduction.....58

Major causes of treated end-stage kidney disease	59
Glomerulonephritis	62
Diabetic nephropathy	64
Hypertensive kidney disease	67
Analgesic nephropathy	69
Reflux nephropathy	72
Polycystic kidney diseases	74
References	76
5 Prevention and management of chronic kidney disease	77
Risk reduction	78
Early detection	80
Management of early chronic kidney disease	81
Management of pre-dialysis	82
Management of end-stage kidney disease	83
References	88
6 Chronic kidney disease in Aboriginal and Torres Strait Islander people	90
Prevalence of chronic kidney disease and its risk factors	90
Health care for Aboriginal and Torres Strait Islander people with chronic kidney disease	93
Hospitalisation associated with chronic kidney disease	94
Deaths associated with chronic kidney disease	95
References	96
Appendix 1. Identification of people with chronic kidney disease; statistical methods; and data sources	98
Identification of people with chronic kidney disease	98
Statistical methods	102
Data sources	104
Appendix 2. Adequacy of haemodialysis	106
Appendix 3. Potential chronic kidney disease indicators and monitoring framework	107
Potential chronic kidney disease indicators	107

List of tables

Table 2.1: Prevalence of moderate or severe reduction in kidney function, by age and sex, 1999–00	10
Table 2.2: Management of chronic kidney disease by GPs, 2003–04.....	18
Table 2.3: Hospital separations for chronic kidney disease, by principal diagnosis, 2003–04	19
Table 2.4: Hospital separations with a principal diagnosis of chronic kidney disease, 1998–99 and 2003–04	20
Table 2.5: Hospital separations with an additional diagnosis of chronic kidney disease, by principal diagnosis, 2003–04	21
Table 2.6: Method and location of dialysis, 1999–2003	24
Table 2.7: Chronic kidney disease as the underlying or an associated cause of death, by disease type, 2003	27
Table 2.8: Conditions for which chronic kidney disease was recorded as an associated cause of death, 2003.....	29
Table 2.9: Cost per year for different types of dialysis, 2000–01.....	33
Table 2.10: Expenditure on chronic kidney disease, 2000–01, \$million	34
Table 3.1: Prevalence of Type 2 diabetes, people aged 25 years and over, 1999–00	42
Table 3.2: Prevalence of high blood pressure, people aged 25 years and over, 1999–00.....	44
Table 3.3: Prevalence of daily smoking, people aged 14 years and over, 2004.....	49
Table 3.4: Trends in insufficient physical activity, people aged 18–75 years, 1997 to 2000	51
Table 3.5: Daily intake and comparison with recommended levels, adults aged 19 years and over, 1995	51
Table 3.6: Trends in prevalence of obesity, people aged 25–64 years, 1980 to 1999–00.....	52
Table 4.1: Causes of end-stage kidney disease among all treated end-stage kidney disease patients, by age group, 2003.....	62
Table 4.2: Incidence of treated end-stage kidney disease caused by glomerulonephritis, 2001–2003	62
Table 4.3: Incidence of treated end-stage kidney disease caused by diabetic nephropathy, 2001–2003	65
Table 4.4: Incidence of treated end-stage kidney disease caused by hypertensive kidney disease, 2001–2003	67
Table 4.5: Incidence of treated end-stage kidney disease caused by analgesic nephropathy, 2001–2003	70
Table 4.6: Incidence of treated end-stage kidney disease caused by reflux nephropathy, 2001–2003	72

Table 4.7: Incidence of treated end-stage kidney disease caused by polycystic kidney diseases, 2001–2003	75
Table 5.1: Elevations in blood pressure among people with hypertension aged 25 years and over, 1999–00	79
Table 5.2: Trends in survival at 1, 5 and 10 years after commencement of dialysis, by age group and 5-year cohort	86
Table 5.3: Trends in survival at 1, 5 and 10 years after kidney transplant, by age at transplant and 5-year cohort.....	87
Table 6.1: Standardised incidence ratios of treated end-stage kidney disease incidence in Indigenous compared with non-Indigenous Australians, 2001–2003.....	92
Table 6.2: Comorbidities among new end-stage kidney disease patients, by Indigenous status, 2001–2003.....	92
Table 6.3: Hospital separations with a principal diagnosis of chronic kidney disease, by Indigenous status, 2003–04.....	94
Table A1: ICD-10 coding list for chronic kidney disease.....	99
Table A2: ICPC-2 and ICPC-2 PLUS coding list for chronic kidney disease	100
Table A3: Adequacy of haemodialysis, 2000 and 2004	106

List of figures

Figure 1.1: The course of chronic kidney disease.....	4
Figure 2.1: Incidence of treated end-stage kidney disease, by age group, 1981 to 2003.....	12
Figure 2.2: Hospital separations with a principal diagnosis of chronic kidney disease, 2003–04	20
Figure 2.3: Number of treated end-stage kidney disease patients and age-standardised prevalence rate, 1981 to 2003.....	22
Figure 2.4: Prevalence of functioning kidney transplants and dialysis, by age group, 2003.....	23
Figure 2.5: International comparison of incidence and prevalence of treated end-stage kidney disease, 2002	26
Figure 2.6: Mortality in people with treated end-stage kidney disease compared with the general population, 1998–2003.....	30
Figure 2.7: Comparison of mortality, AIHW National Mortality Database and ANZDATA Registry, 2003.....	31
Figure 3.1: Risk factors and determinants of chronic kidney disease	39
Figure 3.2: Australians aged 25 years and over with diabetes, 1981 to 1999–00	42
Figure 3.3: Trends in prevalence of hypertension, people aged 25–64 years, 1980 to 1999–00	44
Figure 3.4: Trends in smoking prevalence, people aged 14 years and over, 1985 to 2004	50
Figure 3.5: Social disadvantage and variation in the incidence of treated end-stage kidney disease in Australian capital cities.....	53
Figure 4.1: Causes of new cases of treated end-stage kidney disease, by age group, 2003	59
Figure 4.2: Incidence of treated end-stage kidney disease, selected causes, 1981 to 2003	60
Figure 4.3: Prevalence of treated end-stage kidney disease, selected causes, 1981 to 2003.	61
Figure 4.4: Trends in the incidence of treated end-stage kidney disease due to glomerulonephritis, 1982 to 2002.....	63
Figure 4.5: Trends in the prevalence of treated end-stage kidney disease due to glomerulonephritis, 1981 to 2003.....	64
Figure 4.6: Trends in the incidence of treated end-stage kidney disease due to diabetic nephropathy, 1982 to 2002.....	65
Figure 4.7: Trends in the prevalence of treated end-stage kidney disease due to diabetic nephropathy, 1981 to 2003.....	66
Figure 4.8: Trends in the incidence of treated end-stage kidney disease due to hypertensive kidney disease, 1982 to 2002.....	68
Figure 4.9: Trends in the prevalence of treated end-stage kidney disease due to hypertensive kidney disease, 1981 to 2003.....	69

Figure 4.10: Trends in the incidence of treated end-stage kidney disease due to analgesic nephropathy, 1982 to 200270

Figure 4.11: Trends in the prevalence of treated end-stage kidney disease due to analgesic nephropathy, 1981 to 200371

Figure 4.12: Trends in the incidence of treated end-stage kidney disease due to reflux nephropathy, 1982 to 200273

Figure 4.13: Trends in the prevalence of treated end-stage kidney disease due to reflux nephropathy, 1981 to 200374

Figure 4.14: Trends in the incidence of treated end-stage kidney disease due to polycystic kidney diseases, 1982 to 2002.....75

Figure 4.15: Trends in the prevalence of treated end-stage kidney disease due to polycystic kidney diseases, 1981 to 2003.....76

Figure A1: Proposed chronic kidney disease monitoring framework.....110

Acknowledgments

This report was prepared and written by Bin Tong and Tracy Dixon.

The authors particularly wish to thank the Australia and New Zealand Dialysis and Transplant (ANZDATA) Registry for providing special data extractions on treated end-stage kidney disease and kidney replacement therapy used to produce this report. The assistance provided by Stephen McDonald and Victoria Shtangey from the ANZDATA Registry is greatly appreciated. The interpretation and reporting of these data are the responsibility of the authors and in no way should be seen as an official policy or interpretation of the Australia and New Zealand Dialysis and Transplant Registry.

The extensive input received from Dr Alan Cass (The George Institute for International Health), Dr Steve Chadban (Royal Prince Alfred Hospital), Dr Stephen McDonald (ANZDATA Registry) and Dr Timothy Mathew (Kidney Health Australia) is greatly appreciated.

The authors also wish to thank Garry Waller (National Centre for Classification in Health) for valuable assistance with developing the ICD-10 (International Classification of Diseases, 10th revision) coding list, and Dr Helena Britt and Dr Graeme Miller for assistance with ICPC-2 (International Classification of Primary Care, second edition) coding and use of Bettering the Evaluation and Care of Health (BEACH) survey data.

AIHW staff including Dr Fadwa Al-Yaman, Dr Kuldeep Bhatia, Nicola Bowman, Dr Ching Choi, Jenny Hargreaves, Robert van der Hoek, Dr Paul Magnus, Dr Paul Meyer, Lynelle Moon, and Dr Perri Timmins provided advice and comments on this report. Staff of the Australian Government Department of Health and Ageing, including Dr Joy Eshpeter and Bonnie Field, also provided helpful comments.

The health expenditure data used in this report was provided by John Goss and Nick Mann of the AIHW Summary Measures Unit.

The Australian Government Department of Health and Ageing provided funding to assist in the production of this report.

Abbreviations

ABS	Australian Bureau of Statistics
ACE	angiotensin converting enzyme
AIHW	Australian Institute of Health and Welfare
ANZDATA	Australia and New Zealand Dialysis and Transplant Registry
APD	automated peritoneal dialysis
AusDiab	Australian Diabetes, Obesity and Lifestyle study
BEACH	Bettering the Evaluation and Care of Health (survey)
BMI	body mass index
CAPD	continuous ambulatory peritoneal dialysis
CARI	Caring for Australians with Renal Impairment
CKD	chronic kidney disease
COPD	chronic obstructive pulmonary disease
ESKD	end-stage kidney disease
ESRD	end-stage renal disease
GFR	glomerular filtration rate
GP	general practitioner
HD	haemodialysis
ICD-10-AM	International Classification of Diseases, 10th Revision, Australian Modification
ICPC-2	International Classification of Primary Care, second edition
K/DOQI	(US) Kidney Disease Outcome Quality Initiative
MDRD	Modification of Diet in Renal Disease (formula)
NHS	National Health Survey
NKF	National Kidney Foundation of America
PD	peritoneal dialysis
PKD	polycystic kidney disease
URR	urea reduction ratio
USRDS	United States Renal Data System
WHO	World Health Organization

Executive summary

Chronic kidney disease (long-term and usually irreversible loss of kidney function) has impacts on quality of life, use of health services, health expenditure and mortality, but it is difficult to determine how many Australians are affected. Because of a lack of specific symptoms at the early stages, the diagnosis of chronic kidney disease is often delayed or missed. However, it may lead to serious illness and death from complications or comorbid conditions before it is even detected. In 2003, chronic kidney disease was recorded as the underlying cause of death in 2,431 cases and an associated cause of death in a further 9,217 cases.

In severe cases, a person's kidney function will deteriorate so much that it will no longer be sufficient to sustain their life. These people are said to have 'end-stage kidney disease', and require kidney replacement therapy – dialysis or a kidney transplant – to survive. At the end of 2003, a total of 13,625 people with end-stage kidney disease were reliant on kidney replacement therapy. The number of people receiving this treatment has more than tripled over the last 20 years, and is still growing. Care involving dialysis accounted for 11% of all hospital separations in 2003–04. Although relatively few people with chronic kidney disease require this treatment, the personal, social and economic costs relating to end-stage kidney disease make it an important public health issue.

A variety of factors, many of which are common in Australia, can increase the risk of developing chronic kidney disease. Some of these include diabetes, high blood pressure and smoking. Although it mainly affects the older population, chronic kidney disease can occur among people of any age. As there is no cure for this illness, reducing the burden of chronic kidney disease relies heavily on its prevention and management. With advanced technology and better management, the outcomes of treatment have improved, especially for people receiving kidney replacement therapy. However, not all aspects of prevention, early detection and management are covered by national programs.

Although chronic kidney disease has been a health issue for many years, it is only recently that a clear definition and conceptualisation of the disease has been developed. Many crucial issues relating to the disease remain unclear, and are under investigation and debate. There is a general lack of information on chronic kidney disease in Australia. There is no national monitoring system for chronic kidney disease, and regular information is collected and reported only for people receiving kidney replacement therapy.

Although the impacts of chronic kidney disease are substantial and the number of Australians at risk is increasing, chronic kidney disease is preventable and treatable in many cases, and there is great potential to reduce the burden of the disease.

Chronic kidney disease in Australia, 2005 is the first national report on this disease. The report compiles the latest information from a variety of data sources, and presents information on levels of kidney damage, reduced kidney function and end-stage kidney disease in the population, the factors that contribute to chronic kidney disease, and treatment and prevention programs. At times, limitations in knowledge and national information on chronic kidney disease have restricted the content and coverage of issues that are essential to a comprehensive understanding of the disease. Nevertheless, this report provides an opportunity to look at chronic kidney disease systematically, and also provides valuable baseline information for further monitoring of this disease in the future.

