North West Adelaide Health Study

KEY BIOMEDICAL FINDINGS, POLICY IMPLICATIONS AND RESEARCH RECOMMENDATIONS

MAY 2002

human services

THE UNIVERSITY OF ADELAIDE AUSTRALIA

The Queen Elizabeth

Government of South Australia

University of South Australia

LYELL McEWIN HEALTH SERVICE

KEY BIOMEDICAL FINDINGS, POLICY IMPLICATIONS AND RESEARCH RECOMMENDATIONS

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CHAPTER 1: BACKGROUND

1.1 Background

1.1.1 Introduction

The North West Adelaide Health Study is a collaboration between the North Western Adelaide Health Service (The Queen Elizabeth Hospital and Lyell McEwin Health Service campuses), the South Australian Department of Human Services, The University of Adelaide, and the University of South Australia. The study is one of the first of its kind in Australia to provide a comprehensive health assessment of the whole adult community.

Effective interventions with chronic disease need to be evidence-based if they are to succeed by design rather than by serendipity. The better those with specific health problems or diseases are described, the more precisely they can be targeted by designing policy and interventions that consider a range of appropriate characteristics. This study has been designed to segment a large representative population sample according to stage of disease to identify each segment's characteristics and how they change over time. This segmentation will allow interventions to be targeted to those who will benefit most in terms of better health outcomes and most efficient use of resources.

The study addresses two of the six conditions identified as National Health Priority Areas, namely asthma[1] and diabetes[2], because of the significant burden that they place on the community in terms of health, social, economic and quality of life costs. It also investigates chronic obstructive pulmonary disease (COPD), which includes bronchitis and emphysema, as this adds to the burden of respiratory disease and many risk factors associated with asthma are common to bronchitis and emphysema.

Both the National Asthma Strategy[3,4] and the National Diabetes Strategy[5] have identified the need for further high quality research to increase capacity for prevention, delay, early detection and care of those people with established chronic disease. The goals of these strategies, and also the Strategic Plan for Diabetes in South Australia[6], include preventing or delaying the progression of asthma and diabetes, improving quality of life and reducing hospitalisation and complications, reducing the social and economic impact of the conditions on the community, and optimising their management. The Australian evidence base for development of policy and interventions to achieve these goals, however, is limited. There is a lack of quality population data that will inform evidence-based approaches to policy and

interventions by providing information on how to target groups of people with chronic disease. Most Australian studies on chronic lung disease (CLD) and diabetes have used convenience or clinical samples from which representative and generalisable conclusions are impossible to draw. In the case of diabetes, two recent landmark studies, the Diabetes Control and Complications Trial in the United States and the United Kingdom Prospective Diabetes Study, have advanced knowledge about the treatment and management of diabetes[7,8,9]. In addition, a number of studies of the prevalence of diabetes, complications and risk factors provide valuable population data about the disease, further endorsing it as a major health priority for intervention[10,11,12]. These studies fail, however, to provide data that facilitate segmentation and description of groups that would allow more precise targeting of policy and interventions. In addition, most studies have also failed to provide adequate psychosocial data, functioning data or cost data that can be used to profile and prioritise disease segments, thus limiting the ability to effectively intervene. For example, the AusDiab study was a national biomedical study providing some data on a South Australian sample[13]. The study was, however, highly clustered and could be relied on only for overall population estimates given its small sample size in South Australia. The AusDiab study also failed to provide the wealth of additional and integrated biomedical, biographical, social, management and economic data that was obtained from the study reported here.

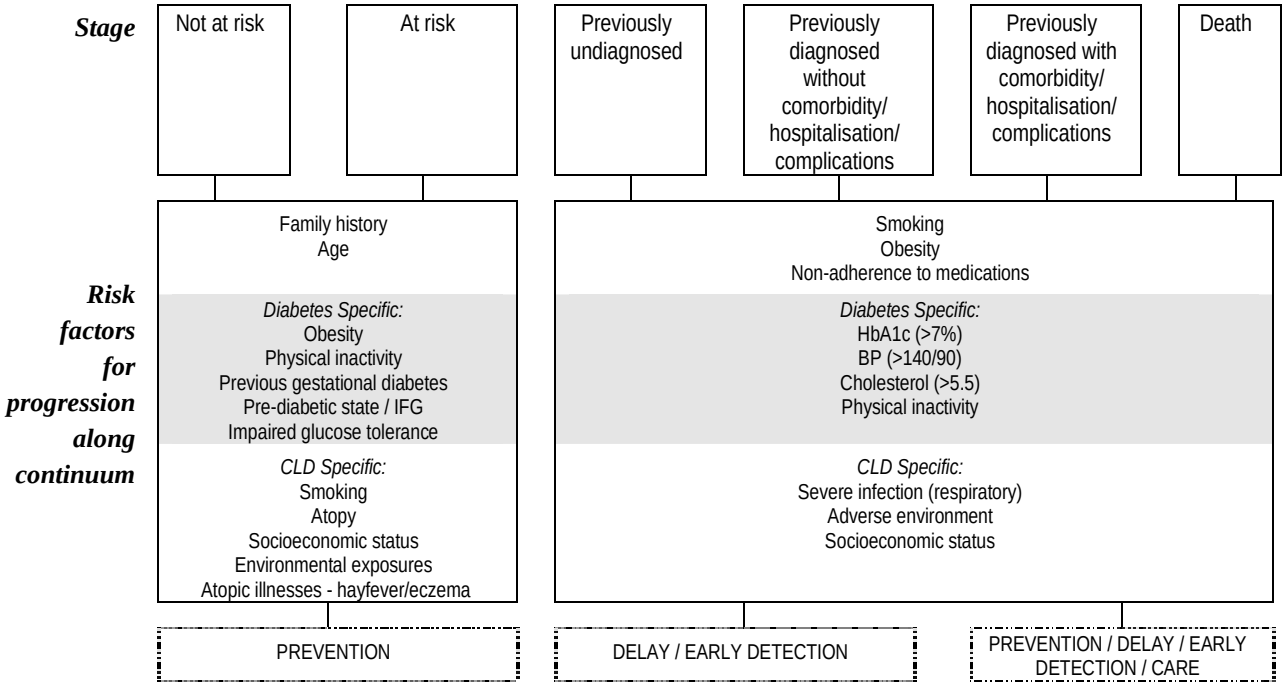
This report provides representative population information on the distribution of asthma, COPD, diabetes and health risk factors for the north west region of Adelaide. These results can be used to better inform prevention, delay, early detection and care by allowing prioritisation of intervention efforts along the disease continuum.

1.1.2 The Disease Continuum

Current management strategies, such as the National Asthma Campaign's "3+ visit plan" for asthma, consider people with chronic conditions as homogenous groups. A major assumption is that people with a particular chronic condition will respond to generic strategies and treatment plans aimed at improving health outcomes. Current guidelines also have a clinical emphasis, focusing on treatment of diagnosed chronic disease, rather than prevention and delay[14,15]. Conceptualisation of a chronic disease continuum adopts a wider framework, which identifies segments of the disease group and asserts that each segment has specific needs that will change as they progress along the continuum. It also asserts that, for greatest impact of interventions, the

population should be targeted according to the stage of development along the continuum. Figure 1 articulates the continuum for both CLD and diabetes.

Figure 1.1: **Chronic Disease Continuum**



One of the strengths of the present study is the segmentation of chronic diseases into the stages of the continuum on the basis of biomedical data. This and future reports will classify people according to their stage on the continuum and facilitate more specific targeting of chronic disease on the basis of the stage of development rather than as a homogenous disease construct. The study will also present a patient-centred view of disease through the future reporting of qualitative analyses that enrich the epidemiological information and contribute to policy and programs that address the real life issues expressed by patients in coming to terms with and managing their disease on a daily basis.

1.2 Objectives

The overall aims of the North West Adelaide Health Study are to:

- Assess the measured clinical prevalence of priority health problems: diabetes and chronic lung diseases, and the clinical prevalence of the key risk factors for these diseases and their demographic distributions.
- Segment each of the diseases to investigate the specific health issues and needs of different sub-groups so that more effective policy can be developed and more precise targeting of these diseases can occur.
- Describe the costs of these disease segments to the individual and the health system through linkage with HIC data.
- Following segmentation of the diseases, qualitatively assess the differential understanding, management and contextual difficulties associated with positive and negative health outcomes.
- Track the cohort over time to identify the incidence of new cases of disease and the rate at which complications develop in these and existing cases of disease.

1.3 Report format

This report summaries the main quantitative findings of the study for each of the following diseases or conditions:

1. Diabetes (including impaired fasting glucose and previously undiagnosed diabetes);
2. Asthma (including previously undiagnosed asthma);
3. Chronic Obstructive Pulmonary Disease or COPD (including previously undiagnosed COPD); and
4. Risk factors (self-reported and clinically measured):
    - smoking;
    - alcohol consumption;
    - physical activity;
    - body mass index;
    - waist/hip ratio;

- blood pressure;
- cholesterol;
- family history of diabetes, stroke and heart disease; and
- multiple risk factors.

For each of these diseases or conditions, the report highlights:

- the prevalence;
- the demographic profile of those with the disease or condition;
- an assessment of the role of multiple risk factors;
- an assessment of the quality of life of people with the disease or condition; and
- health service use of those with the disease or condition.

In addition, the key results, policy implications and research recommendations are highlighted.

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CHAPTER 2: DIABETES

2.1 Key Findings

- This study estimated that 6.7% of adults in the north west region of Adelaide had diabetes. This included both people with diagnosed diabetes and those who did not previously know that they had it.
- Applying this estimate to the South Australian population, approximately 78,900 adults have diabetes.
- The prevalence of previously undiagnosed diabetes was 1.2%. This means that for approximately every four people who know they have diabetes, one person has diabetes but does not know it.
- The prevalence of impaired fasting glucose (IFG), a precursor to diabetes, was 5.5%. There are approximately the same number of people with IFG as with diagnosed diabetes.
- The quality of life of people with diabetes was more impaired than for people without diabetes, particularly in terms of their physical functioning.
- People with diabetes used more health services than people without diabetes, although a significant proportion were not attending the health services that they should, such as podiatrists, dieticians and ophthalmologists.
- People with IFG were more likely to have other risk factors for developing diabetes than people with normal glucose. People with IFG also had poorer quality of life than people with normal glucose, indicating deterioration even before progression to diabetes.
- The quality of life of people with previously undiagnosed diabetes was already significantly impaired in terms of physical functioning, supporting the case for early detection to provide opportunity for delaying progression of the condition and improving quality of life.
- The prevalence of previously undiagnosed diabetes was lower than that found by the national AusDiab study. Further investigation needs to examine if this phenomenon is unique to the north west region of Adelaide, or whether it is common to the whole State.
- Of people without diabetes, 45% had two or more risk factors for developing diabetes. Research is required to determine if these people are aware that they are at increased risk of developing diabetes.

2.2 Policy implications and research recommendations

- Information from this study should be used to guide planning and policy making beyond the existing national and state diabetes strategies.
- Emerging international evidence, for example from the UK Prospective Diabetes Study, shows that good management and control of blood glucose, blood pressure, and lipid levels is effective in improving health outcomes. That the quality of life of people with diabetes is severely affected, and many people with diabetes have multiple risk factors for complications indicates that diabetes is not being managed as well as it could be. To address this and prevent or delay the development and progression of complications would involve:
- Improved programs for tracking people with diabetes in the primary health care system (eg. diabetes centres, GPs), and providing them with regular care. Links between GPs and other health services will need to be promoted, particularly given the Commonwealth initiatives of the Enhanced Primary Care Package and Practice Incentives Program, which are aimed at improving the coordination of care of people with chronic conditions.
- Improved use of required health services by people with diabetes and improved client-related data collection and analyses to improve health outcomes.
- The large number of people with undiagnosed diabetes and impaired fasting glucose (IFG) can be identified as an important target group for early detection and care, who are likely to affect health system costs. A more aggressive approach to case finding would involve:

  * a public education program on the importance of early detection and those who may be at risk;

  * improved education of health professionals on the importance of early detection and management;

  * ongoing monitoring and addition to the study cohort to identify more clearly the population with undiagnosed diabetes or IFG and how they may best respond to health policy initiatives;

  * ongoing research to assess the transition from IFG to substantive diabetes;

  * improved health promotion and service programs dealing with diabetes-associated risk factors.

- These recommendations will have implications for the diabetes health services workforce. Audits have shown that the health services workforce is already under-resourced for the functions that it is required to perform. Successful implementation of any policy recommendations will require optimal working relationships between health funders, providers and the community, as well as increased health system resources and support.

2.3 Introduction

This chapter describes people with diabetes, both diagnosed and previously undiagnosed, and those with impaired fasting glucose (IFG) in terms of their demographic, risk factor, quality of life, and health service use characteristics.

Diabetes is recognised as a State and National Health Priority Area because of the significant burden that it places on the community in terms of health, social, economic and emotional costs[1]. The National Diabetes Strategy[2] and the Strategic Plan for Diabetes in South Australia[3] identify the need to prevent or delay the progression of diabetes and related complications, improve the quality of life of people with diabetes, and reduce the social and economic impact of diabetes on the community.

The North West Adelaide Health Study population sample can be segmented into biomedical stages along the diabetes continuum. This chapter includes analyses of people across the continuum, from those without diabetes, to those with IFG who are at increased risk of diabetes, those with diabetes who did not previously know it (previously undiagnosed), and those with diagnosed diabetes. Providing an understanding of different segments of the diabetes continuum will enable more effective targeting of policy and strategic interventions to improve health outcomes.

2.4 Diabetes

2.4.1 Definition and prevalence

People with diabetes were defined as those who had a fasting plasma glucose (FPG) level of at least 7.0 mmol/L or those who self-reported having been told by a doctor that they have diabetes. The prevalence of diabetes was found to be 6.7% (95% CI 5.6 – 7.8) (Table 2.1).

Table 2.1: Prevalence of diabetes (includes diagnosed and undiagnosed)

	n	%
No	2350	93.3
Diabetes	168	6.7
Total	2517	100.0

Note: 6 cases missing due to missing fasting plasma glucose levels

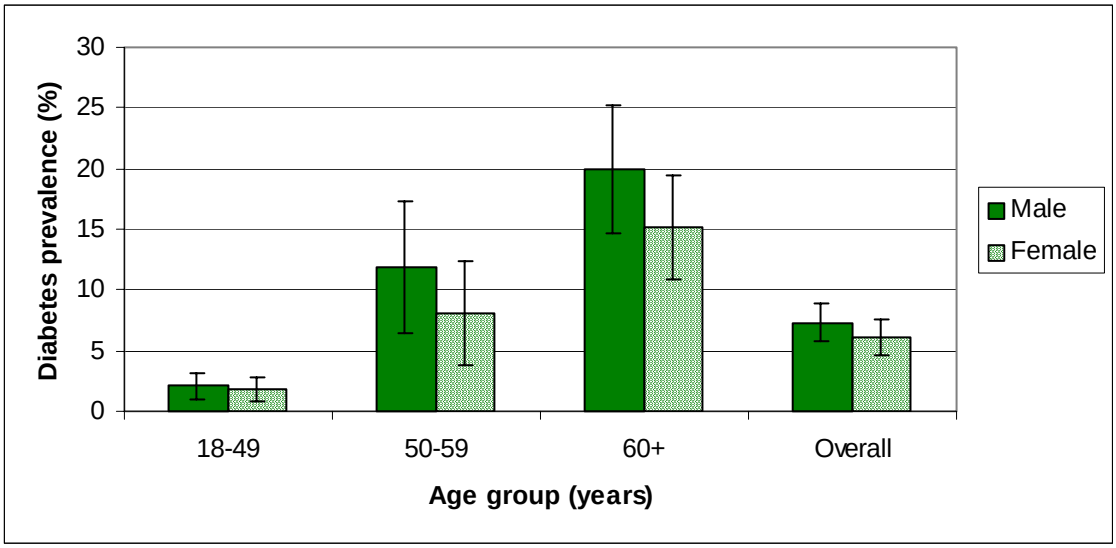
The prevalence rate of diabetes and number of people with diabetes were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 2.2).

Table 2.2: Estimated prevalence of diabetes by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**6.8**	**(5.8 – 7.9)**	**57800**
Northern	6.0	(5.0 – 7.1)	12900
Western	7.4	(6.3 – 8.6)	12600
Southern	7.0	(5.9 – 8.0)	16900
Eastern	7.1	(6.0 – 8.2)	15300
Country Regions	**7.2**	**(6.1 – 8.3)**	**21100**
Hills Mallee Southern	7.4	(6.3 – 8.5)	5500
Wakefield	7.7	(6.6 – 8.9)	4600
Mid North	7.6	(6.5 – 8.8)	1700
Riverland	7.3	(6.2 – 8.4)	2300
South East	6.8	(5.7 – 7.8)	3100
Eyre	7.1	(6.0 – 8.2)	1700
Northern & Far Western	6.1	(5.1 – 7.2)	2300
STATE	6.9	(5.8 – 8.0)	78900

In the north west region of Adelaide, the overall prevalence rate masks differences in the rate by age groups. The prevalence of diabetes in the 50 to 59 and the 60+ year age groups is statistically significantly higher than among people who are younger than 50 years of age. The prevalence of diabetes for males and females by the three age groups is shown in Figure 2.1.

Figure 2.1: Prevalence of diabetes by sex and age group



2.4.2 Demographic profile of people with diabetes

People with diabetes were statistically significantly more likely than people without diabetes to be older, to have an income lower than $20,000, to have been born in the United Kingdom, Ireland, Europe, USSR, or the Baltic States, to be widowed, and to be retired or undertaking home duties, and less likely to never have been married and to have an education level of bachelor degree or higher (Table 2.3).

Table 2.3: Univariate Odds Ratios for demographic variables associated with diabetes

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	90/1235	7.3	1.00		
Female	78/1282	6.1	0.83	(0.61 – 1.14)	0.25
Age group					
18 to 49 years	31/1578	2.0	1.00		
50 to 59 years	35/351	9.8	5.47	(3.32 – 9.02)	**<0.001**
60 years and over	102/588	17.4	10.55	(6.97 – 15.98)	**<0.001**
Area of residence					
Western suburbs	65/1023	6.4	1.00		
Northern suburbs	103/1494	6.9	1.09	(0.79 – 1.50)	0.62
Highest education level obtained					
Secondary	86/1114	7.7	1.00		
Trade/Apprenticeship/Cert/Diploma	65/1014	6.4	0.82	(0.59 – 1.14)	0.24
Bachelor degree or higher	7/294	2.5	0.31	(0.15 – 0.66)	**0.003**
Gross household income					
Up to $20,000	77/591	13.0	1.00		
$20,001-40,000	47/652	7.2	0.52	(0.36 – 0.76)	**0.001**
$40,001-60,000	17/577	2.9	0.20	(0.12 – 0.34)	**<0.001**
More than $60,000	12/552	2.1	0.14	(0.08 – 0.27)	**<0.001**
Not stated	16/146	11.0	0.83	(0.47 – 1.48)	0.53
Country of birth					
Australia	84/1754	4.8	1.00		
UK or Ireland	50/435	11.6	2.60	(1.80 – 3.74)	**<0.001**
Europe, USSR, Baltic States	24/211	11.6	2.59	(1.61 – 4.18)	**<0.001**
Asia, Other	5/109	4.9	1.02	(0.41 – 2.50)	0.97
Marital status					
Married or living with partner	124/1562	8.0	1.00		
Separated/Divorced	16/201	7.8	0.98	(0.56 – 1.69)	0.93
Widowed	21/142	15.0	2.05	(1.25 – 3.36)	**0.005**
Never married	7/600	1.1	0.13	(0.06 – 0.28)	**<0.001**
Work status					
Full time employed	29/935	3.1	1.00		
Part time/Casual employed	10/419	2.4	0.77	(0.37 – 1.58)	0.47
Unemployed	5/125	3.7	1.19	(0.44 – 3.25)	0.73
Home duties/Retired	109/789	13.8	4.98	(3.27 – 7.59)	**<0.001**
Student/Other	13/223	5.6	1.86	(0.94 – 3.67)	0.07

2.4.3 Self-reported risk factor profile of people with diabetes

Risk factors related to diabetes are presented in this section and in Section 2.4.4 according to their collection method in the questionnaire (self-reported) or at the clinic appointment (measured). The risk factors were also divided into those most frequently implicated in the development of diabetes and those most frequently implicated in the development and progression of diabetes-related complications, as presented in Section 2.4.5.

People with diabetes were statistically significantly more likely than people without diabetes to be ex-smokers, and to have a family history of diabetes, and less likely to be a low risk alcohol drinker (Table 2.4).

Table 2.4: Univariate Odds Ratios for self-reported risk factors associated with diabetes

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	60/1150	5.3	1.00		
Ex-smoker	77/690	11.2	2.27	(1.60 – 3.23)	**<0.001**
Current smoker	29/672	4.4	0.83	(0.53 – 1.30)	0.4
Alcohol risk					
Non drinker, no risk	114/1317	8.7	1.00		
Low risk	43/1014	4.2	0.46	(0.32 – 0.66)	**<0.001**
Intermediate to very high risk	8/166	4.5	0.50	(0.24 – 1.06)	0.07
Family history of diabetes					
No	84/1651	5.1	1.00		
Yes	84/866	9.7	2.01	(1.47 – 2.75)	**<0.001**
Family history of heart disease					
No	77/1226	6.3	1.00		
Yes	91/1292	7.0	1.14	(0.83 – 1.56)	0.43
Family history of stroke					
No	101/1626	6.2	1.00		
Yes	67/891	7.5	1.23	(0.89 – 1.69)	0.21
Physical activity - *sufficient time* (at least 150 minutes of walking, moderate or vigorous physical activity per week)					
No/Insufficient physical activity	92/1224	7.5	1.00		
Sufficient physical activity	75/1291	5.8	0.77	(0.56 – 1.05)	0.1

2.4.4 Measured risk factor profile of people with diabetes

People with diabetes were statistically significantly more likely than people without diabetes to be overweight or obese, and to have a high waist-hip ratio, high blood pressure, and a high HbA1c level (Table 2.5). HbA1c, or glycosylated haemoglobin, is a measure of the amount of glucose-bound haemoglobin and provides information on long-term glucose control.

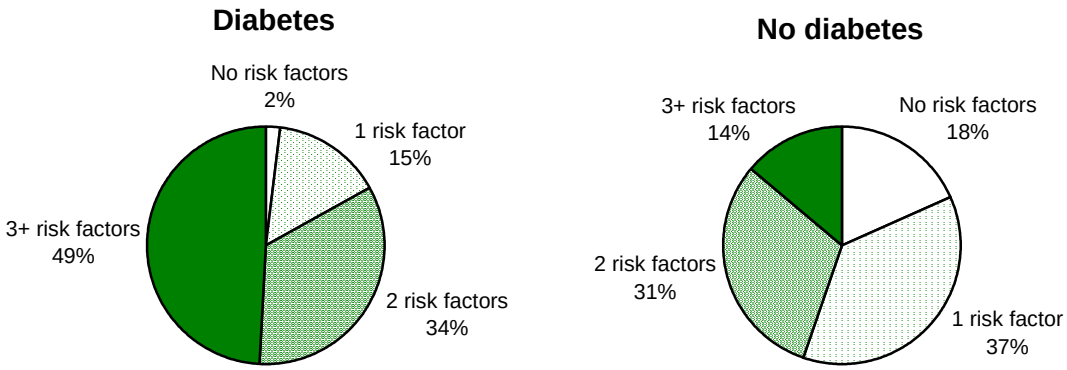
Table 2.5: Univariate Odds Ratios for measured risk factors associated with diabetes

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	18/787	2.3	1.00		
Overweight	54/888	6.1	2.75	(1.60 – 4.71)	<**0.001**
Obese	94/714	13.2	6.43	(3.85 – 10.74)	<**0.001**
Waist:hip ratio (>1.0 men, >0.85 women)					
No	98/2095	4.7	1.00		
Yes	70/422	16.6	4.05	(2.92 – 5.62)	<**0.001**
High blood pressure (≥140/90mmHg)					
No	68/1823	3.7	1.00		
Yes	100/694	14.4	4.35	(3.15 – 6.00)	<**0.001**
High total cholesterol (≥5.5mmol/L)					
No	106/1533	6.9	1.00		
Yes	59/922	6.4	0.92	(0.66 – 1.28)	0.6
High HbA1c (≥7%)					
No	94/2379	4.0	1.00		
Yes	71/74	96.2	610.28	(182.7 – 2038.4)	<**0.001**

2.4.5 Multiple risk factors among people with and without diabetes

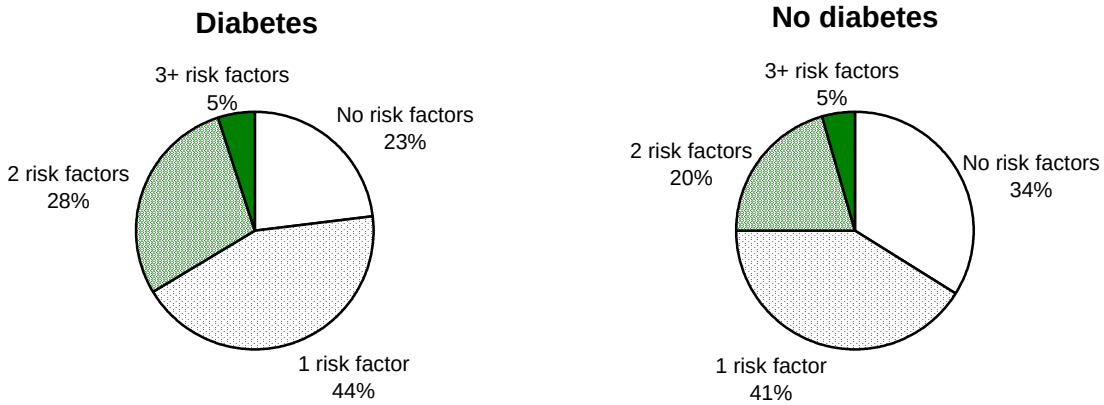
The probability of developing diabetes is significantly higher if a person is older, has a family history of the condition, is obese, and is physically inactive. The proportion of people with and without diabetes who had no, one, two or three or more risk factors for development of diabetes (age at least 50 years, family history of diabetes, obesity, and no sufficient physical activity) is shown in Figure 2.2. Among people without diabetes, 14.0% had at least three risk factors for development of diabetes.

Figure 2.2: Number of risk factors for development of diabetes among people with and without diabetes



The probability of developing diabetes-related complications such as cardiovascular events, neuropathy, nephropathy, and retinopathy increases with hypertension, high cholesterol, smoking and high alcohol intake. The proportion of people with and without diabetes who had no, one, two or three or more risk factors for development of diabetes complications (high blood pressure, high cholesterol, smoking, alcohol) is shown in Figure 2.3.

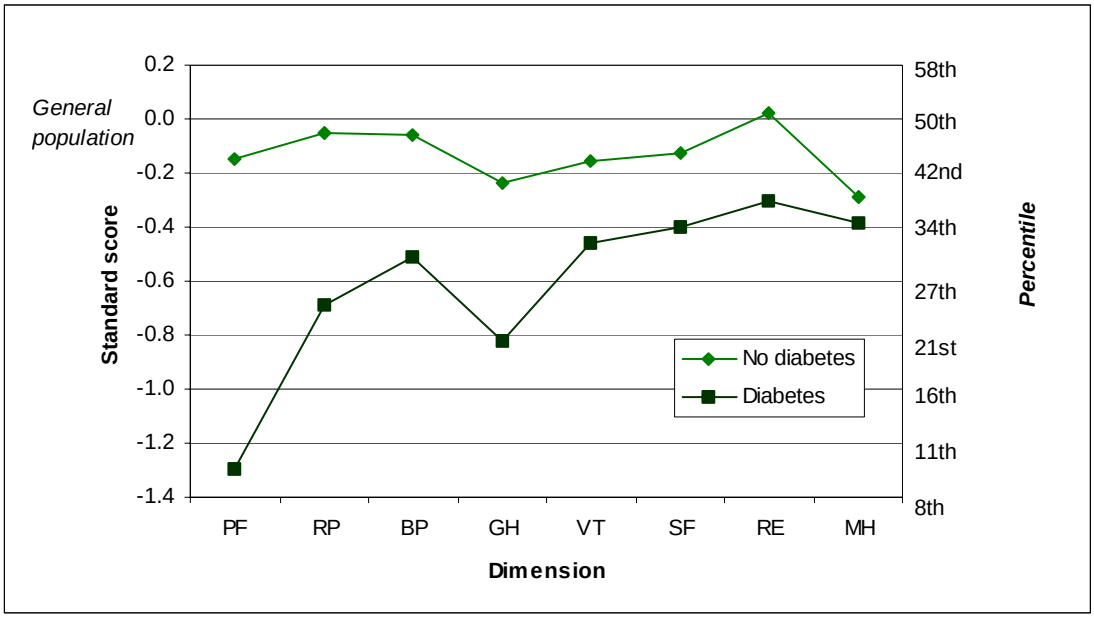
Figure 2.3: Number of risk factors for development of diabetes complications among people with and without diabetes



2.4.6 Quality of life profile of people with and without diabetes

Figure 2.4 shows the standard scores of the SF-36 subscales for people with and without diabetes. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was lower for both people with and without diabetes in the north west region of Adelaide compared to the general South Australian population. Diabetes had a severe effect on physical functioning, role-physical, and general health, and a moderate effect on bodily pain and vitality.

Figure 2.4: SF-36 standard scores for people with and without diabetes compared to the general South Australian population



2.4.7 Health service use of people with and without diabetes

People with diabetes were statistically significantly more likely than people without diabetes to have used general practitioner, community health centre, day surgery, hospital accident and emergency, hospital clinic, eye specialist or ophthalmologist, chiropractor, podiatrist, dietician or nurse educator services in the last 12 months (Table 2.6). This indicates that people with diabetes are attending appropriate services (eye specialist or ophthalmologist, podiatrist, dietician, nurse educator) although not all people with diabetes are attending these services. For example, 43.8% of people with diabetes did not report seeing an eye specialist or ophthalmologist in the last 12 months. Similarly, only 25.3% of people with diabetes saw a podiatrist and 15.0% saw a dietician in the last 12 months.

Table 2.6: Proportion of people with and without diabetes who used various health services in South Australia in the last 12 months

	No diabetes		Diabetes	
Variable	**n**	**%**	**n**	**%**
General Practitioner	2061	87.7 ∨	156	93.2 ∧
Community Health Centre	99	4.2	13	7.7
District Nurses or other Community Nurses	43	1.8 ∨	5	3.3 ∧
Psychologist/Psychiatrist	113	4.8	10	6.1
Day Surgery	251	10.7	29	17.3
Hospital – Accident & Emergency Department	279	11.9 ∨	37	22.0 ∧
Hospital – Clinic (Outpatient/Specialist/Allied Health)	345	14.7 ∨	52	31.0 ∧
Eye Specialist/Ophthalmologist	512	21.8 ∨	94	56.2 ∧
Other Specialist Doctor (not in a hospital)	379	16.1 ∨	48	28.6 ∧
Physiotherapist	294	12.5	18	10.7
Chiropractor	299	12.7 ∧	10	5.7 ∨
Alternative Therapist eg Naturopath, Osteopath	114	4.8	12	7.1
Podiatrist	177	7.5 ∨	42	25.3 ∧
Dietician	38	1.6 ∨	25	15.0 ∧
Nurse Educator	10	0.4 ∨	13	7.8 ∧
Other Health Service	131	5.6	4	2.4

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

2.5 Impaired fasting glucose (IFG)

2.5.1 Definition and prevalence

People with impaired fasting glucose (IFG) were defined as those who had a fasting plasma glucose (FPG) level of at least 6.1 mmol/L and less than 7.0 mmol/L. The prevalence of IFG was found to be 5.5% (95% CI 4.5 – 6.5) (Table 2.7). This prevalence of IFG is approximately equal to the prevalence of previously diagnosed diabetes (see Section 2.6.1).

Table 2.7: Prevalence of normal blood glucose levels, impaired fasting glucose, and diabetes

	n	%
Normal glucose (FPG < 6.1 mmol/L)	2210	87.8
IFG (FPG ≥ 6.1 mmol/L and < 7.0 mmol/L)	140	5.5
Diabetes (FPG ≥ 7.0 mmol/L or self-reported diabetes)	168	6.7
Total	2517	100.0

Note: 6 cases missing

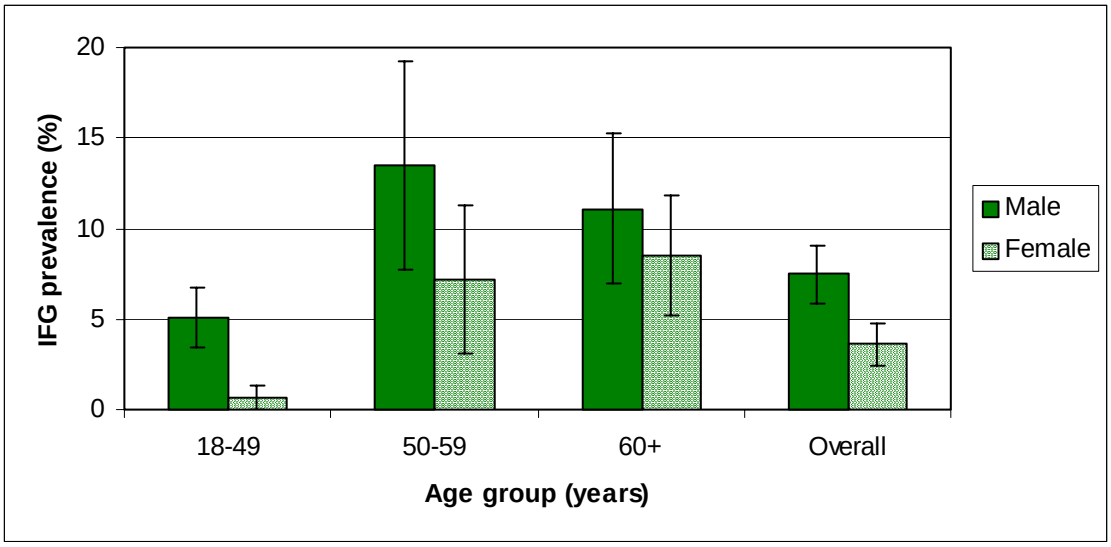
The prevalence rate of IFG and number of people with IFG were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 2.8).

Table 2.8: Estimated prevalence of IFG by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**5.6**	**(4.6 – 6.6)**	**47400**
Northern	5.3	(4.3 – 6.3)	11400
Western	5.8	(4.8 – 6.9)	9900
Southern	5.7	(4.7 – 6.7)	13800
Eastern	5.7	(4.7 – 6.7)	12400
Country Regions	**5.9**	**(4.9 – 6.9)**	**17200**
Hills Mallee Southern	6.0	(4.9 – 7.0)	4400
Wakefield	6.1	(5.1 – 7.1)	3600
Mid North	6.0	(5.0 – 7.1)	1300
Riverland	6.0	(4.9 – 7.0)	1800
South East	5.6	(4.7 – 6.6)	2600
Eyre	5.8	(4.8 – 6.9)	1400
Northern & Far Western	5.4	(4.5 – 6.4)	2100
STATE	5.7	(4.7 – 6.7)	64700

In the north west region of Adelaide, the overall prevalence rate masks differences in the rate by age and sex groups. The prevalence of IFG was statistically significantly higher among males and people aged 50 years or over. The prevalence of IFG for males and females by three age groups is shown in Figure 2.5.

Figure 2.5: Prevalence of IFG by sex and age group



2.5.2 Demographic profile of people with IFG

People with impaired fasting glucose were statistically significantly more likely than people with normal glucose levels to be older, living in the Northern suburbs, to have been born in the United Kingdom or Ireland, and to be retired or undertaking home duties, and less likely to be female, have high income, to never have been married, and to be part time or casually employed (Table 2.9).

Table 2.9: Univariate Odds Ratios for demographic variables associated with IFG

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	93/1235	7.5	1.00		
Female	46/1282	3.6	0.45	(0.32 – 0.65)	**<0.001**
Age group					
18 to 49 years	47/1578	3.0	1.00		
50 to 59 years	36/351	10.2	4.07	(2.58 – 6.40)	**<0.001**
60 years and over	57/588	9.7	4.22	(2.83 – 6.31)	**<0.001**
Area of residence					
Western suburbs	24/1023	2.4	1.00		
Northern suburbs	115/1494	7.7	3.44	(2.21 – 5.37)	**<0.001**
Highest education level obtained					
Secondary	62/1114	5.6	1.00		
Trade/Apprenticeship/Cert/Diploma	61/1014	6.0	1.07	(0.74 – 1.54)	0.7
Bachelor degree or higher	9/294	3.0	0.49	(0.24 – 1.01)	0.05
Gross household income					
Up to $20,000	47/591	7.9	1.00		
$20,001-40,000	38/652	5.9	0.68	(0.43 – 1.06)	0.08
$40,001-60,000	28/577	4.8	0.52	(0.32 – 0.84)	**0.008**
More than $60,000	16/552	2.9	0.31	(0.17 – 0.55)	**<0.001**
Not stated	11/146	7.2	0.89	(0.44 – 1.78)	0.7
Country of birth					
Australia	86/1754	4.9	1.00		
UK or Ireland	39/435	8.9	2.07	(1.39 – 3.08)	**<0.001**
Europe, USSR, Baltic States	10/211	4.9	1.09	(0.56 – 2.12)	0.8
Asia, Other	2/109	1.6	0.33	(0.07 – 1.45)	0.1
Marital status					
Married or living with partner	96/1562	6.1	1.00		
Separated/Divorced	15/201	7.4	1.23	(0.70 – 2.17)	0.5
Widowed	13/142	9.2	1.70	(0.92 – 3.13)	0.09
Never married	13/600	2.2	0.32	(0.18 – 0.58)	**<0.001**
Work status					
Full time employed	48/935	5.1	1.00		
Part time/Casual employed	6/419	1.5	0.27	(0.12 – 0.64)	**0.003**
Unemployed	7/125	5.5	1.09	(0.48 – 2.47)	0.8
Home duties/Retired	65/789	8.2	1.88	(1.28 – 2.77)	**0.001**
Student/Other	8/223	3.8	0.74	(0.35 – 1.57)	0.4

2.5.3 Self-reported risk factor profile of people with IFG

Risk factors related to diabetes are presented in this section and in Section 2.5.4 according to their collection method in the questionnaire (self-reported) or at the clinic appointment (measured). The risk factors were also divided into those most frequently implicated in the development of diabetes and those most frequently implicated in the development and progression of diabetes-related complications, as presented in Section 2.5.5.

People with IFG were statistically significantly more likely than people without IFG to be ex-smokers, and less likely to be a low risk alcohol drinker (Table 2.10).

Table 2.10: Univariate Odds Ratios for self-reported risk factors associated with IFG

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	51/1150	4.4	1.00		
Ex-smoker	56/690	8.2	2.08	(1.40 – 3.08)	**<0.001**
Current smoker	33/672	4.9	1.10	(0.70 – 1.73)	0.7
Alcohol risk					
Non drinker, no risk	91/1317	6.9	1.00		
Low risk	38/1014	3.8	0.50	(0.34 – 0.74)	**<0.001**
Intermediate to very high risk	8/166	4.7	0.63	(0.30 – 1.34)	0.2
Family history of diabetes					
No	87/1651	5.3	1.00		
Yes	52/866	6.0	1.21	(0.85 – 1.73)	0.3
Family history of heart disease					
No	73/1226	6.0	1.00		
Yes	66/1292	5.1	0.86	(0.61 – 1.22)	0.4
Family history of stroke					
No	91/1626	5.6	1.00		
Yes	48/891	5.4	0.97	(0.68 – 1.39)	0.9
Physical activity - *sufficient time* **(at least 150 minutes of walking, moderate or vigorous physical activity per week)**					
No/Insufficient physical activity	75/1224	6.1	1.00		
Sufficient physical activity	64/1291	5.0	0.79	(0.56 – 1.11)	0.2

2.5.4 Measured risk factor profile of people with IFG

People with IFG were statistically significantly more likely than people without IFG to be overweight or obese, and to have a high waist hip ratio, high blood pressure and high cholesterol (Table 2.11).

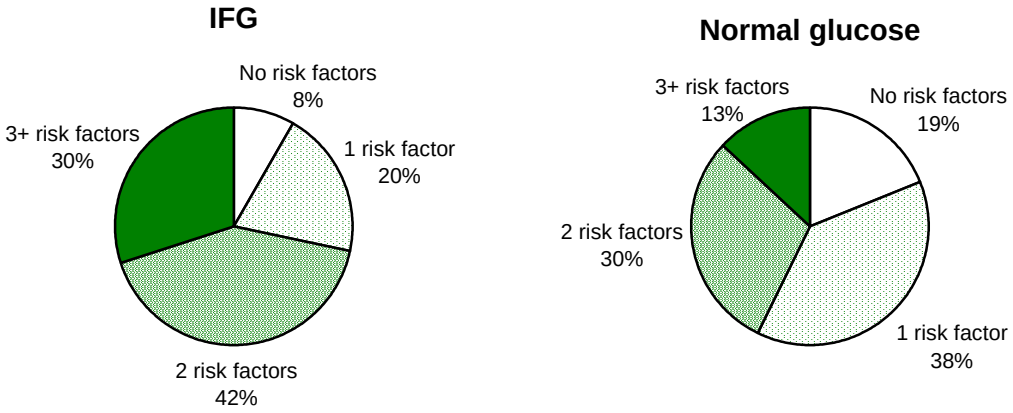
Table 2.11: Univariate Odds Ratios for measured risk factors associated with IFG

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	13/787	1.6	1.00		
Overweight	61/888	6.9	4.54	(2.47 – 8.34)	**<0.001**
Obese	59/714	8.2	6.13	(3.32 – 11.30)	**<0.001**
Waist:hip ratio (>1.0 men, >0.85 women)					
No	102/2095	4.9	1.00		
Yes	38/422	8.9	2.22	(1.50 – 3.29)	**<0.001**
High blood pressure (≥140/90mmHg)					
No	57/1823	3.1	1.00		
Yes	83/684	11.9	4.82	(3.39 – 6.86)	**<0.001**
High total cholesterol (≥5.5mmol/L)					
No	66/1533	4.3	1.00		
Yes	73/922	7.9	1.89	(1.34 – 2.67)	**<0.001**

2.5.5 Multiple risk factors among people with and without IFG

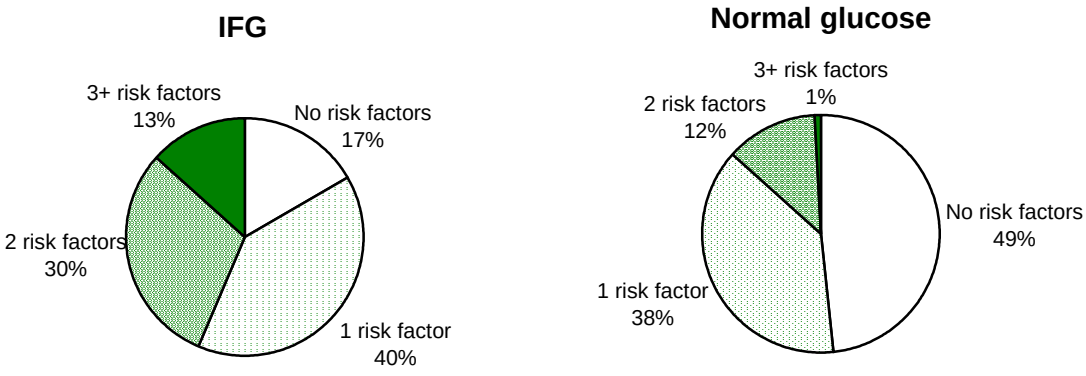
The probability of developing diabetes is significantly higher if a person is older, has a family history of the condition, is obese, and is physically inactive. The proportion of people with IFG and normal glucose levels who had no, one, two or three or more risk factors for development of diabetes (age at least 50 years, family history of diabetes, obesity, and no sufficient physical activity) is shown in Figure 2.6.

Figure 2.6: Number of risk factors for development of diabetes among people with IFG



The probability of developing diabetes-related complications such as cardiovascular events, neuropathy, nephropathy, and retinopathy increases with hypertension, high cholesterol, smoking and high alcohol intake. The proportion of people with IFG and normal glucose levels who had no, one, two or three or more risk factors for development of diabetes complications (high blood pressure, high cholesterol, smoking, alcohol) is shown in Figure 2.7.

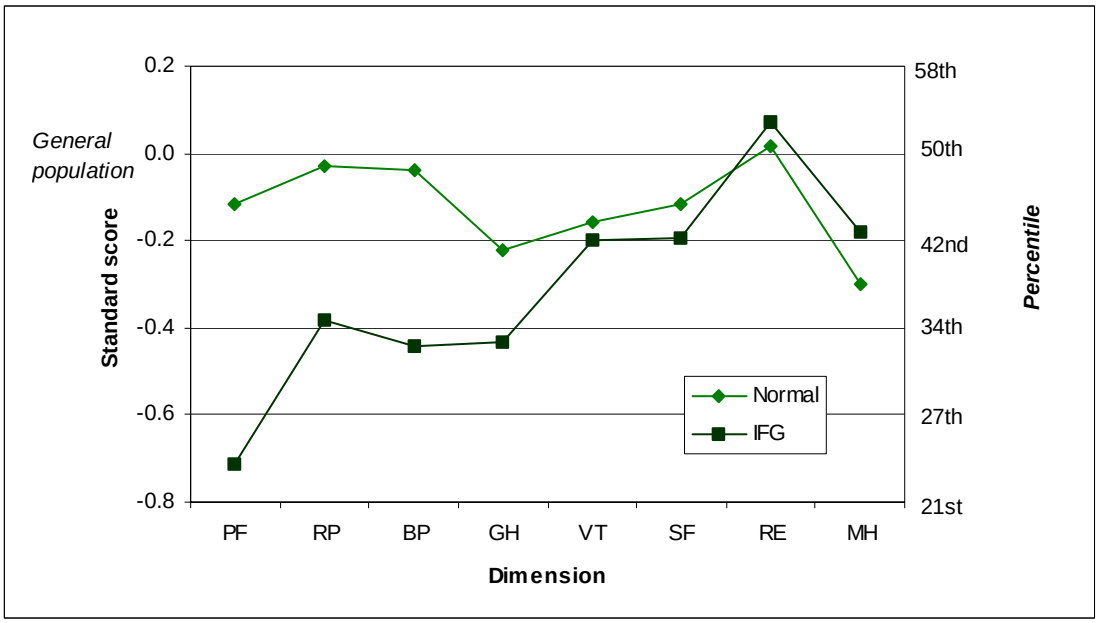
Figure 2.7: Number of risk factors for development of diabetes complications among people with normal and impaired fasting glucose (IFG)



2.5.6 Quality of life profile of people with and without IFG

Figure 2.8 shows the standard scores of the SF-36 subscales for people with IFG and normal glucose levels. For details on the calculation of standard scores, see Appendix 1. Quality of life was lower for both people with IFG and normal glucose levels in the north west region of Adelaide compared to the general South Australian population, with the exception of the role-emotional subscale. IFG had a severe effect on physical functioning, and a moderate effect on bodily pain and general health.

Figure 2.8: SF-36 standard scores for people with and without IFG compared to the general South Australian population



2.5.7 Health service use of people with and without IFG

People with impaired fasting glucose were not statistically significantly more likely than people with normal glucose levels to have used various health services in South Australia in the last 12 months (Table 2.12).

Table 2.12: Proportion of people with normal and impaired fasting glucose (IFG) who used various health services in South Australia in the last 12 months

	Normal glucose		IFG	
Variable	**n**	**%**	**n**	**%**
General Practitioner	1940	87.8	120	86.3
Community Health Centre	90	4.1	9	6.3
District Nurses or other Community Nurses	39	1.8	3	2.4
Psychologist/Psychiatrist	112	5.1	1	0.9
Day Surgery	238	10.8	12	8.9
Hospital – Accident & Emergency Department	258	11.7	21	15.0
Hospital – Clinic (Outpatient/Specialist/Allied Health)	317	14.4	27	19.6
Eye Specialist/Ophthalmologist	473	21.4	39	28.0
Other Specialist Doctor (not in a hospital)	350	15.8	29	20.6
Physiotherapist	274	12.4	20	14.4
Chiropractor	287	13.0	12	8.7
Alternative Therapist eg Naturopath, Osteopath	111	5.0	3	2.0
Podiatrist	167	7.6	10	7.0
Dietician	35	1.6	3	2.4
Nurse Educator	10	0.4	-	-
Other Health Service	125	5.6	6	4.6

2.6 Previously undiagnosed diabetes

2.6.1 Definition and prevalence

People with previously undiagnosed diabetes were defined as having a fasting plasma glucose (FPG) level of at least 7.0 mmol/L but who did not report having been told by a doctor that they had diabetes. The prevalence of previously undiagnosed diabetes was found to be 1.2% (n=31). This means that 18.3% of the participants with diabetes did not know that they had it. For approximately every four people with diagnosed diabetes, there was one person with undiagnosed diabetes. The proportion of diagnosed and undiagnosed diabetes is shown in Table 2.13.

Table 2.13: Diagnosed and undiagnosed diabetes

	n	% of Total	% of diabetes	Ratio
Diagnosed diabetes	137	5.4	81.7	4.4
Undiagnosed diabetes	31	1.2	18.3	1.0
No diabetes	2350	93.3		
Total	2517	100.0	100.0	

The prevalence of diagnosed or self-reported diabetes is consistent with estimates obtained from other South Australian population surveys. Self-reported prevalence of diabetes was found to be 6.2% in the 2000 South Australian Health and Wellbeing Survey[4], 6.0% in the 2000 Health Omnibus Survey, and 5.3% in the 1999 Health Omnibus Survey. The ratio of undiagnosed to diagnosed diabetes is lower than that observed in the AusDiab study[5]. This national prevalence study, using the same diagnostic cut-off points but an oral glucose tolerance test rather than a fasting blood test, found a ratio of one undiagnosed case for every diagnosed case of diabetes in both Australia and South Australia.

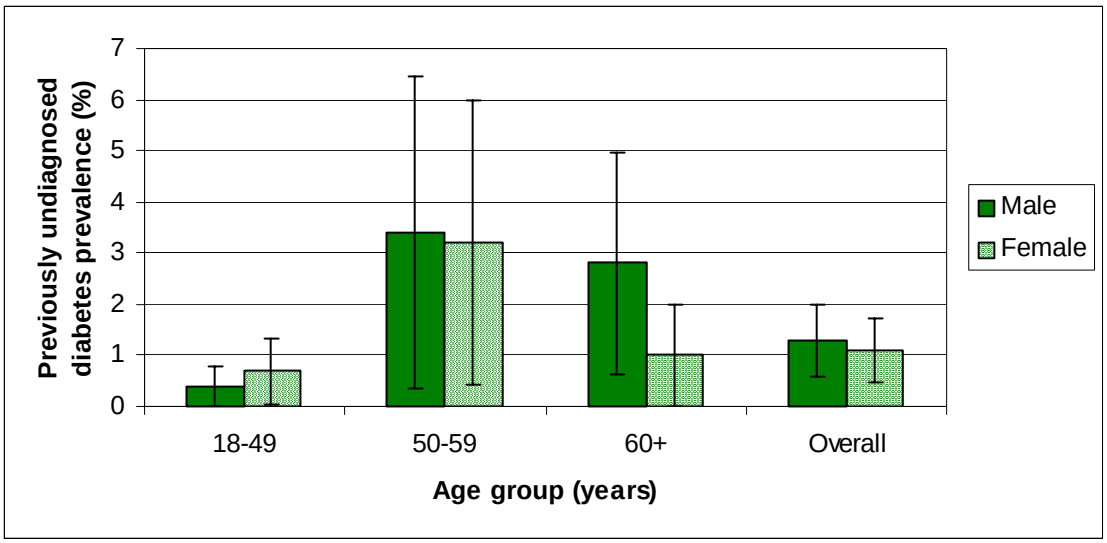
The prevalence rate of undiagnosed diabetes and number of people with undiagnosed diabetes were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 2.14).

Table 2.14: Estimated prevalence of previously undiagnosed diabetes by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**1.2**	**(0.8 – 1.7)**	**10500**
Northern	1.2	(0.7 – 1.7)	2600
Western	1.3	(0.8 – 1.7)	2100
Southern	1.3	(0.8 – 1.7)	3100
Eastern	1.3	(0.8 – 1.7)	2700
Country Regions	**1.3**	**(0.8 – 1.8)**	**3900**
Hills Mallee Southern	1.3	(0.8 – 1.8)	1000
Wakefield	1.4	(0.9 – 1.9)	800
Mid North	1.4	(0.9 – 1.9)	300
Riverland	1.3	(0.8 – 1.8)	400
South East	1.2	(0.8 – 1.7)	600
Eyre	1.3	(0.8 – 1.8)	300
Northern & Far Western	1.2	(0.7 – 1.7)	500
STATE	1.3	(0.8 – 1.7)	14400

In the north west region of Adelaide, the overall prevalence rate masks differences in the rate by age groups. The prevalence of previously undiagnosed diabetes is statistically significantly higher among people aged 50 years or over, reflecting the increased prevalence of diagnosed diabetes in older age groups. The prevalence of previously undiagnosed diabetes for males and females by three age groups is shown in Figure 2.9.

Figure 2.9: Prevalence of previously undiagnosed diabetes by sex and age group



2.6.2 Demographic profile of previously undiagnosed diabetes

People with previously undiagnosed diabetes were statistically significantly less likely than people with diagnosed diabetes to be aged 60 years or over, or to be retired oe undertaking home duties, and more likely to have an annual income greater than $60,000 (Table 2.15).

Table 2.15: Univariate Odds Ratios for demographic variables associated with previously undiagnosed diabetes

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	17/90	18.5	1.00		
Female	14/78	18.0	0.97	(0.44 – 2.12)	0.9
Age group					
18 to 49 years	9/31	27.9	1.00		
50 to 59 years	12/35	33.3	1.29	(0.45 – 3.71)	0.6
60 years and over	11/102	10.3	0.30	(0.11 – 0.81)	**0.02**
Area of residence					
Western suburbs	10/65	14.7	1.00		
Northern suburbs	21/103	20.6	1.50	(0.65 – 3.47)	0.34
Highest education level obtained					
Secondary	13/86	15.4	1.00		
Trade/Apprenticeship/Cert/Diploma	13/65	20.2	1.39	(0.60 – 3.22)	0.45
Bachelor degree or higher	3/7	34.9	2.93	(0.58 – 14.78)	0.19
Gross household income					
Up to $20,000	9/77	12.4	1.00		
$20,001-40,000	9/47	18.3	1.58	(0.58 – 4.32)	0.37
$40,001-60,000	5/17	29.6	2.97	(0.85 – 10.39)	0.09
More than $60,000	5/12	43.2	5.37	(1.40 – 20.64)	**0.02**
Not stated	3/16	16.6	1.41	(0.32 – 6.17)	0.65
Country of birth					
Australia	19/84	23.1	1.00		
UK or Ireland	7/50	14.8	0.58	(0.23 – 1.46)	0.25
Europe, USSR, Baltic States	3/24	10.8	0.41	(0.10 – 1.60)	0.20
Asia, Other	1/5	10.2	0.38	(0.03 – 14.19)	0.50
Marital status					
Married or living with partner	23/124	18.5	1.00		
Separated/Divorced	5/16	30.7	1.96	(0.61 – 6.29)	0.26
Widowed	3/21	12.4	0.63	(0.16 – 2.45)	0.50
Never married	1/7	4.7	0.22	(0.01 – 8.20)	0.41
Work status					
Full time employed	12/29	40.6	1.00		
Part time/Casual employed	1/10	9.6	0.16	(0.02 – 1.44)	0.1
Unemployed	1/5	30.6	0.64	(0.08 – 5.36)	0.7
Home duties/Retired	15/109	13.8	0.24	(0.09 – 0.59)	**0.002**
Student/Other	1/13	11.4	0.19	(0.03 – 1.25)	0.08

2.6.3 Self-reported risk factor profile of people with previously undiagnosed diabetes

Risk factors related to diabetes are presented in this section and in Section 2.6.4 according to their collection method in the questionnaire (self-reported) or at the clinic appointment (measured). The risk factors were also divided into those most frequently implicated in the development of diabetes and those most frequently implicated in the development and progression of diabetes-related complications, as presented in Section 2.6.5.

People with previously undiagnosed diabetes were statistically significantly more likely than people with diagnosed diabetes to be current smokers (Table 2.16).

Table 2.16: Univariate Odds Ratios for self-reported risk factors associated with previously undiagnosed diabetes

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	10/60	16.9	1.00		
Ex-smoker	10/77	12.8	0.72	(0.28 – 1.87)	0.5
Current smoker	11/29	35.9	2.75	(1.00 – 7.56)	**0.05**
Alcohol risk					
Non drinker, no risk	17/114	14.6	1.00		
Low risk	12/43	28.2	2.30	(0.99 – 5.36)	0.05
Intermediate to very high risk	1/8	16.8	1.18	(0.16 – 8.57)	0.87
Family history of diabetes					
No	17/84	20.9	1.00		
Yes	13/84	15.7	0.71	(0.32 – 1.56)	0.4
Family history of heart disease					
No	17/77	21.6	1.00		
Yes	14/91	15.5	0.66	(0.30 – 1.46)	0.3
Family history of stroke					
No	21/101	21.0	1.00		
Yes	9/67	14.2	0.62	(0.27 – 1.44)	0.3
Physical activity - *sufficient time* **(at least 150 minutes of walking, moderate or vigorous physical activity per week)**					
No/Insufficient physical activity	19/92	20.4	1.00		
Sufficient physical activity	12/75	15.9	0.74	(0.33 – 1.64)	0.5

2.6.4 Measured risk factor profile of people with previously undiagnosed diabetes

People with previously undiagnosed diabetes were statistically significantly more likely than people with diagnosed diabetes to have high cholesterol, and less likely to have high HbA1c (Table 2.17).

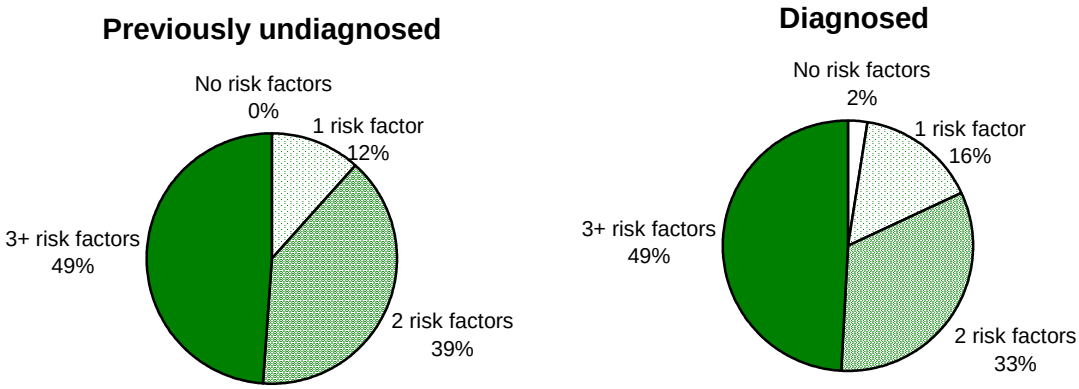
Table 2.17: Univariate Odds Ratios for measured risk factors associated with previously undiagnosed diabetes

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	1/18	5.1	1.00		
Overweight	9/54	16.9	3.81	(0.42 – 34.93)	0.2
Obese	21/94	21.8	5.24	(0.61 – 45.17)	0.1
Waist:hip ratio (>1.0 men, >0.85 women)					
No	21/98	21.9	1.00		
Yes	9/70	13.1	0.54	(0.23 – 1.25)	0.2
High blood pressure (≥140/90mmHg)					
No	14/68	20.8	1.00		
Yes	17/100	16.5	0.75	(0.34 – 1.66)	0.5
High total cholesterol (≥5.5mmol/L)					
No	10/106	9.8	1.00		
Yes	20/59	34.5	4.87	(2.11 – 11.23)	**<0.001**
High HbA1c (≥7%)					
No	23/94	24.6	1.00		
Yes	7/71	10.5	0.36	(0.15 – 0.88)	**0.03**

2.6.5 Multiple risk factors among people with diagnosed and previously undiagnosed diabetes

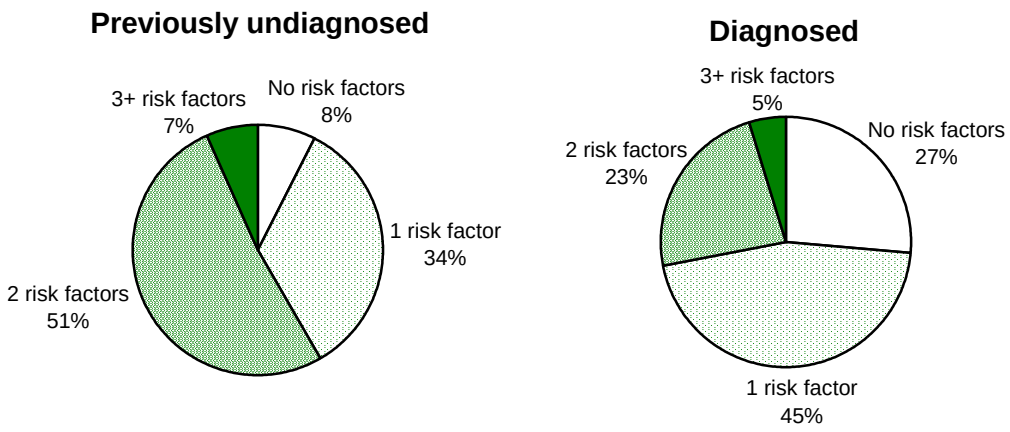
The probability of developing diabetes is significantly higher if a person is older, has a family history of the condition, is obese, and is physically inactive. The proportion of people with diagnosed and previously undiagnosed diabetes who had no, one, two or three or more risk factors for development of diabetes (age at least 50 years, family history of diabetes, obesity, and no sufficient physical activity) is shown in Figure 2.10.

Figure 2.10: Number of risk factors for development of diabetes among people with previously undiagnosed and diagnosed diabetes



The probability of developing diabetes-related complications such as cardiovascular events, neuropathy, nephropathy, and retinopathy increases with hypertension, high cholesterol, smoking and high alcohol intake. The proportion of people with diagnosed and undiagnosed diabetes who had no, one, two or three or more risk factors for development of diabetes complications (high blood pressure, high cholesterol, smoking, alcohol) is shown in Figure 2.11.

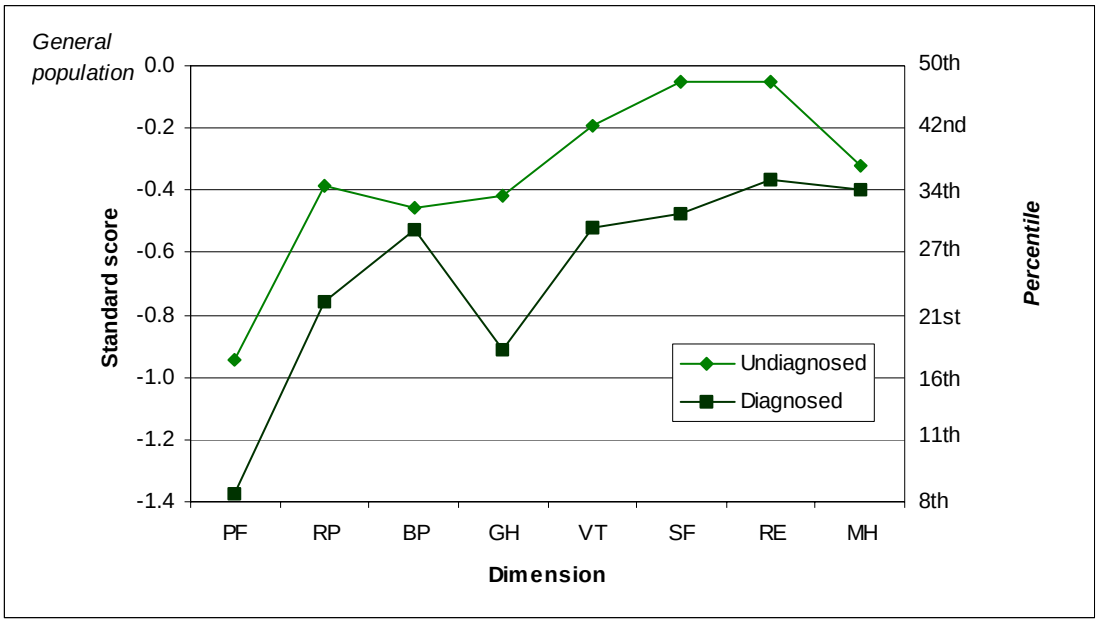
Figure 2.11: Number of risk factors for development of diabetes complications among people with previously undiagnosed and diagnosed diabetes



2.6.6 Quality of life profile of people with previously undiagnosed diabetes

Figure 2.12 shows the standard scores of the SF-36 subscales for people with previously undiagnosed and diagnosed diabetes. For details on the calculation of standard scores, see Appendix 1. Quality of life was lower for both people with previously undiagnosed and diagnosed diabetes in the north west region of Adelaide compared to the general South Australian population. People with diagnosed diabetes scored lower than those with previously undiagnosed diabetes on all subscales of the SF-36. Previously undiagnosed diabetes, however, still had a severe effect on physical functioning, and a moderate effect on bodily pain and general health.

Figure 2.12: SF-36 standard scores for people with diagnosed and previously undiagnosed diabetes compared to the general South Australian population



2.6.7 Health service use of people with diagnosed and previously undiagnosed diabetes

People with previously undiagnosed diabetes were statistically significantly less likely than people with diagnosed diabetes to have used eye specialist or ophthalmologist, and podiatrist services in the last 12 months (Table 2.18).

Table 2.18: Proportion of people with diagnosed and previously undiagnosed diabetes who used various health services in South Australia in the last 12 months

	Diagnosed		Previously undiagnosed	
Variable	**n**	**%**	**n**	**%**
General Practitioner	131	95.5	25	82.9
Community Health Centre	11	8.2	2	5.6
District Nurses or other Community Nurses	5	3.6	1	1.8
Psychologist/Psychiatrist	9	6.9	1	2.5
Day Surgery	24	17.6	5	15.6
Hospital – Accident & Emergency Department	32	23.2	5	16.3
Hospital – Clinic (Outpatient/Specialist/Allied Health)	44	32.2	8	25.8
Eye Specialist/Ophthalmologist	91	66.1 ∧	4	12.3 ∨
Other Specialist Doctor (not in a hospital)	43	31.6	5	15.1
Physiotherapist	17	12.4	1	3.5
Chiropractor	7	5.4	2	6.9
Alternative Therapist eg Naturopath, Osteopath	9	6.5	3	9.8
Podiatrist	40	29.0 ∧	3	8.9 ∨
Dietician	24	17.2	2	5.0
Nurse Educator	13	9.6	-	-
Other Health Service	3	2.2	1	3.3

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

2.7 References

1. Commonwealth Department of Health and Aged Care and Australian Institute of Health and Welfare. *National Health Priority Areas Report: Diabetes Mellitus 1998.* AIHW Cat. No. PHE 10. HEALTH and AIHW, Canberra, 1999.

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5. Dunstan D, Zimmet P, Welborn T, Sicree R, Armstrong, Atkins R, Cameron A, Shaw J, Chadban S. Diabesity and Associated Disorders in Australia – 2000: The Accelerating Epidemic. The Australian Diabetes, Obesity and Lifestyle Study (AusDiab) Report. International Diabetes Institute, Melbourne, 2001.

CHAPTER 3: ASTHMA

3.1 Key findings

- This study estimated that 11.6% of adults in the north west region of Adelaide had asthma. This includes people who reported that they were told by a doctor that they had current asthma and people who were diagnosed with asthma but did not know they had it.
- Applying this estimate to the South Australian population, approximately 131,000 adults have current asthma.
- The prevalence of previously undiagnosed asthma among adults living in the north west region of Adelaide was at least 2.2%. This equates to approximately 26,000 adults in South Australia who have asthma but do not know it.
- A high prevalence of asthma was seen among females, and people who were retired, undertaking home duties or a student, had low educational level, from low income groups, and born in Australia or the United Kingdom or Ireland.
- The quality of life of people with asthma was more impaired than people without asthma. Asthma had a severe effect on general health, and a moderate effect on physical functioning, role-physical, vitality and mental health.
- People with asthma used more health services than people without asthma, in particular general practitioner, hospital accident and emergency, hospital clinic, eye specialist or ophthalmologist or podiatrist services in South Australia.
- People with asthma were more likely than people without asthma to be allergic to rye grass, cat, house dust mites, alternaria (mould) and feather, and to have taken respiratory medications.
- Previously undiagnosed asthma has a significant effect on quality of life, with a severe effect on physical functioning, and a moderate effect on role-physical, general health and vitality.
- People with previously undiagnosed asthma were found to be aged over 50 years, to be born in the United Kingdom, Ireland, Europe, USSR or the Baltic States, to be widowed, and to be retired or undertaking home duties.

3.2 Policy implications and research recommendations

- People with previously undiagnosed current asthma represent approximately one-fifth of the asthma population. Detection and diagnosis of this group remains a priority so that people with undiagnosed asthma can be in a position to control and manage their condition and reduce their risk of hospitalisation and health service use.
- The quality of life of people with diagnosed asthma was severely impaired in terms of their general health. This highlights the need for improved management strategies for asthma to improve quality of life.
- The quality of life of people with previously undiagnosed asthma is already severely impaired in terms of their physical functioning, further supporting the case for detection and diagnosis of these people. Once they are diagnosed, good management and control of their condition will positively affect their quality of life.
- There is a need to put in place research strategies to understand reasons for lack of asthma diagnosis and impaired quality of life in previously diagnosed asthmatics. This means exploring:
  * patients' perceptions of symptoms;
  * access to medical care and drug availability;
  * patients' attitudes towards medicines; and
  * medical practitioners' awareness of issues in diagnosing asthma.

  This knowledge is the first step in improving asthma outcomes.
- A significantly lower proportion of people with undiagnosed current asthma than diagnosed current asthma saw a general practitioner in the last 12 months, which may partly explain why they remain undiagnosed. This supports the need to screen for asthma in annual health checks.
- Undiagnosed asthma was found to be more prevalent in the older age groups. This is an important target group for general practitioners.

3.2 Policy implications and research recommendations cont.

- A large proportion of the South Australian population have current diagnosed asthma and of these a large proportion are previously undiagnosed. They are higher users of hospital and accident and emergency services and therefore a high cost health group. Effective management of asthma is a priority and would involve the following:
  - * effective use of written asthma management plans;
  - * the ability of all asthmatics to effectively self-manage their asthma on a daily basis and use preventer medication where prescribed;
  - * the ability of all asthmatics to effectively self-manage slow onset attacks.
- Associated asthma literature identifies the need for extended research with the asthma population to identify management difficulties as follows:
  - * identify asthmatics' perceptions of severity compared with the reality of their severity;
  - * knowledge of management strategies and how to deal with a slow onset attack;
  - * their perception and use of preventer medication;
  - * their perception and use of health services for asthma;
  - * associated psycho-social difficulties.

3.3 Introduction

This chapter describes people with current asthma, both established and newly diagnosed, in terms of their demographic, risk factor, quality of life, and health service use.

Asthma is identified as a National Health Priority Area [1] because of the significant burden that it places on the community in terms of health, social, economic and emotional costs. Over two million Australians have asthma [1], and it is a leading cause of hospitalisation [2]. Asthma affects all age groups and also those who care for people with asthma [3]. The National Asthma Strategy [4,5] has identified the need for further high quality research to increase capacity for prevention, delay, early detection and care of those people with established chronic disease. The goals of the strategy include preventing or delaying the progression of asthma, improving quality of life and reducing hospitalisation and complications, reducing the social and economic impact of the condition on the community, and optimising asthma management.

A strength of this study is that it provides a comprehensive understanding of segmentation of the population on the basis of biomedical data along the asthma continuum. This understanding will enable more effective targeting of policy and strategic interventions to improve health outcomes. This will lead to improved health outcomes for South Australians with asthma.

This chapter includes analyses of people across the continuum, from those without asthma, to those with asthma who did not previously know it (previously undiagnosed), and those with diagnosed, or established, asthma.

3.4 Current asthma

3.4.1 Definitions (self-report and clinical) and prevalence

People with current asthma were defined as those who reported having been told by a doctor that they have asthma (9.4%), or those who had a 15% increase in FEV1 (forced expiratory volume in one second) from pre-Ventolin to post-Ventolin (2.3%), or those who had a 12% increase in FEV1 from pre-Ventolin to post-Ventolin if their absolute difference in FEV1 was greater than 200ml (1.0%). From this definition, 11.6% (95% CI 10.3 - 12.8) of the clinic attendees have current asthma (Table 3.1).

Table 3.1: Current asthma (clinical assessment and self-reported)

	n	%
No asthma	2231	88.4
Asthma	292	11.6
Total	2523	100.0

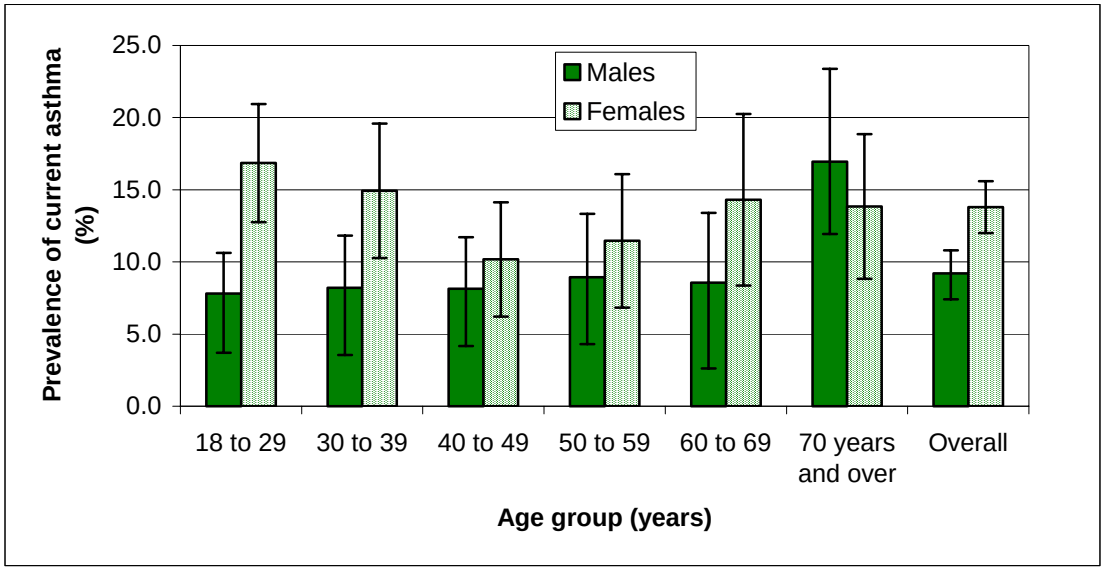
The prevalence rate of current asthma and the number of people with current asthma in South Australian and the regions were estimated by applying the age, sex specific rates to the population distribution (Table 3.2).

Table 3.2: Estimated prevalence of asthma by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**11.5**	**(10.2 - 12.9)**	**97400**
Northern	11.3	(10.0 - 12.7)	24300
Western	11.7	(10.3 - 13.1)	19800
Southern	11.5	(10.2 - 12.9)	28100
Eastern	11.6	(10.3 - 13.0)	25200
Country Regions	**11.4**	**(10.1 - 12.8)**	**33500**
Hills Mallee Southern	11.5	(10.1 - 12.8)	8500
Wakefield	11.5	(10.1 - 12.8)	6800
Mid North	11.5	(10.2 - 12.9)	2500
Riverland	11.4	(10.0 - 12.7)	3500
South East	11.4	(10.0 - 12.8)	5200
Eyre	11.4	(10.0 - 12.7)	2700
Northern & Far Western	11.2	(9.9 - 12.6)	4300
STATE	11.5	(10.1 - 12.9)	131000

The prevalence of current asthma, including the 95% confidence intervals, for males and females by age groups is shown in Figure 3.1. This graph shows that females have a higher prevalence of current asthma than males for all age groups except the 70 years and over age group.

Figure 3.1: Prevalence of asthma by sex and age group



3.4.2 Demographic profile of people reporting or diagnosed with current asthma

Statistical analyses (Table 3.3) were conducted to determine which demographic characteristics best described people with current asthma. People with current asthma were statistically significantly more likely than people without current asthma to be female, people living in the northern suburbs, and to be retired, undertaking home duties, a student or 'other', and less likely to have an educational level of bachelor degree or higher, to have an income higher than $40,000 per annum and to be born in Asia or 'other'.

Table 3.3: Univariate Odds Ratios for demographic variables associated with current asthma

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	113/1236	9.2	1.00		
Female	178/1287	13.8	1.59	(1.24 - 2.04)	**<0.001**
Age group					
18 to 29 years	82/675	12.1	1.00		
30 to 39 years	53/454	11.6	0.95	(0.65 - 1.37)	0.77
40 to 49 years	42/455	9.2	0.73	(0.49 - 1.08)	0.12
50 to 59 years	36/351	10.3	0.83	(0.55 - 1.25)	0.37
60 to 69 years	31/268	11.5	0.94	(0.60 - 1.46)	0.78
70 years and over	49/320	15.1	1.29	(0.88 - 1.89)	0.19
Area of residence					
Western suburbs	100/1024	9.8	1.00		
Northern suburbs	191/1499	12.8	1.35	(1.04 - 1.74)	**0.02**
Highest education level obtained					
Secondary	130/1114	11.6	1.00		
Trade/Apprenticeship/Cert/Diploma	119/1014	11.7	1.00	(0.77 - 1.31)	0.97
Bachelor degree or higher	20/294	6.8	0.55	(0.34 - 0.90)	**0.02**
Gross household income					
Up to $20,000	86/591	14.5	1.00		
$20,001- 40,000	81/652	12.4	0.84	(0.61 - 1.16)	0.29
$40,001- 60,000	57/577	9.9	0.65	(0.45 - 0.92)	**0.02**
$60,001 and over	44/552	8.0	0.52	(0.35 - 0.76)	**0.001**
Not stated	24/151	15.6	1.09	(0.66 - 1.79)	0.74
Country of birth					
Australia	220/1754	12.6	1.00		
UK or Ireland	46/435	10.6	0.82	(0.59 - 1.15)	0.26
Europe, USSR, Baltic States	17/211	8.1	0.62	(0.37 - 1.03)	0.06
Asia / Other	6/109	5.1	0.38	(0.16 - 0.90)	**0.03**
Marital status					
Married or living with partner	188/1562	12.0	1.00		
Separated/Divorced	21/201	10.2	0.83	(0.52 - 1.35)	0.46
Widowed	22/142	15.2	1.31	(0.81 - 2.13)	0.27
Never married	57/600	9.5	0.76	(0.56 - 1.04)	0.09
Work status					
Full time employed	83/935	8.8	1.00		
Part time/Casual employed	45/419	10.7	1.23	(0.84 - 1.80)	0.29
Unemployed	11/125	9.1	1.03	(0.54 - 1.97)	0.94
Home duties/Retired	116/789	14.6	1.77	(1.31 - 2.38)	**<0.001**
Student/Other	37/223	16.5	2.04	(1.34 - 3.11)	**0.001**

3.4.3 Self-reported risk factor profile of people reporting of diagnosed with current asthma

Statistical analyses (Table 3.4) were conducted to determine which risk factor variables best described people with current asthma. People with current asthma were statistically significantly more likely than people without current asthma to be ex-smokers, to be classified as a low alcohol risk drinker, and to have a family history of diabetes or heart disease, and less likely to have done sufficient physical activity.

Table 3.4: Univariable Odds Ratios for self-reported risk factor variables associated with current asthma

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	125/1150	10.9	1.00		
Ex-smoker	98/690	14.2	1.35	(1.02 - 1.80)	**0.04**
Light smoker	29/351	8.3	0.74	(0.49 - 1.13)	0.17
Moderate smoker	26/193	13.6	1.29	(0.82 - 2.03)	0.27
Heavy smoker	13/128	9.9	0.90	(0.49 - 1.66)	0.74
Alcohol risk					
Non drinker, no risk	134/1317	10.2	1.00		
Low risk	138/1014	13.6	1.39	(1.08 - 1.79)	**0.01**
Intermediate to very high risk	19/166	11.6	1.16	(0.70 - 1.93)	0.57
Family history of diabetes					
No	175/1657	10.6	1.00		
Yes	117/866	13.5	1.32	(1.03 - 1.69)	**0.03**
Family history of heart disease					
No	107/1231	8.7	1.00		
Yes	185/1292	14.3	1.76	(1.37 - 2.27)	**<0.001**
Family history of stroke					
No	189/1632	11.6	1.00		
Yes	102/891	11.5	0.99	(0.77 - 1.25)	0.94
Physical activity - *sufficient time* (at least 150 minutes of walking, moderate or vigorous exercise per week)					
No/Insufficient physical activity	145/1224	11.8	1.00		
Sufficient physical activity	147/1291	11.4	0.96	(0.75 - 1.22)	0.74

The risk factors listed in Table 3.4 and Table 3.5 are general health risk factors not necessarily determinants of asthma. Causal relationships between those risk factors and asthma are not implied.

3.4.4 Measured risk factor profile of people reporting or diagnosed with current asthma

Statistical analyses (Table 3.5) were conducted to determine which biomedically measured risk factor variables best described people with current asthma. People with current asthma were statistically significantly more likely than people without current asthma to have a high waist-hip ratio, and to have an allergy, in particular rye grass, cat, house dust mites, alternaria (mould) and feather.

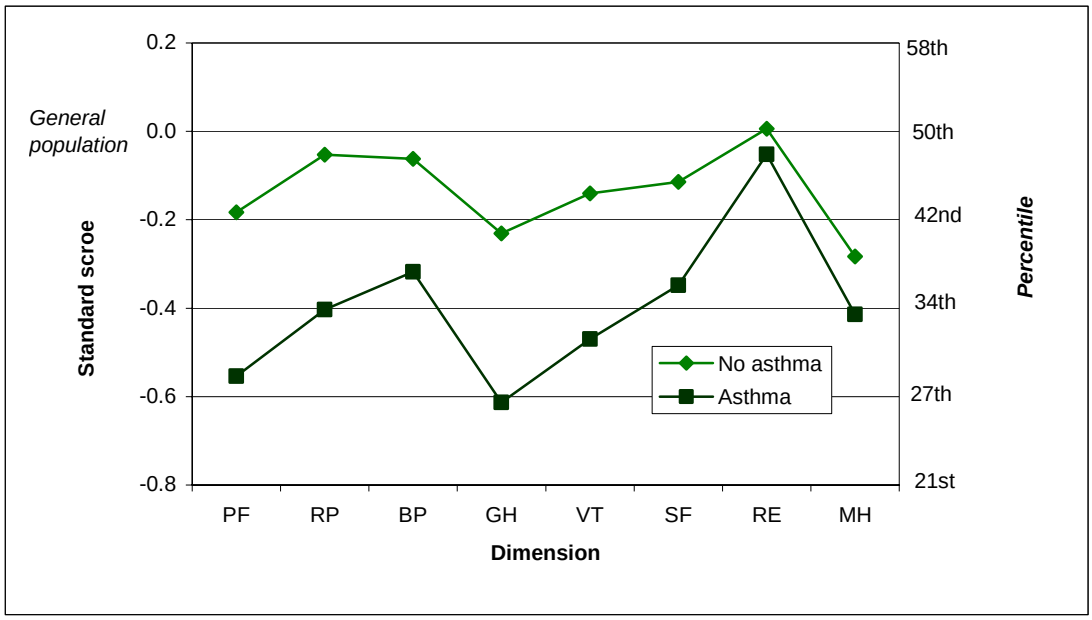
Table 3.5: Univariable Odds Ratios for measured risk factor variables associated with current asthma

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	84/787	10.7	1.00		
Underweight	13/126	10.3	0.96	(0.52 - 1.78)	0.89
Overweight	94/888	10.9	1.03	(0.75 - 1.40)	0.87
Obese	96/720	13.4	1.29	(0.95 - 1.77)	0.10
Waist:hip ratio (>1.0 men, >0.85 women)					
No	220/2101	10.5	1.00		
Yes	71/422	16.9	1.73	(1.29 - 2.31)	**<0.001**
High blood pressure (≥140/90mmHg)					
No	205/1824	11.2	1.00		
Yes	87/699	12.4	1.12	(0.85 - 1.46)	0.42
High total cholesterol (≥5.5mmol/L)					
No	191/1533	12.5	1.00		
Yes	93/922	10.1	0.79	(1.02 - 0.07)	0.61
Reaction to rye grass					
No	121/1420	8.5	1.00		
Yes	171/1101	15.5	1.97	(1.54 - 2.53)	**<0.001**
Reaction to cat					
No	179/1930	9.3	1.00		
Yes	113/593	19.0	2.30	(1.80 - 2.98)	**<0.001**
Reaction to house dust mites					
No	164/1825	9.0	1.00		
Yes	127/698	18.3	2.26	(1.80 - 2.91)	**<0.001**
Reaction to alternaria (mould)					
No	180/2039	8.9	1.00		
Yes	111/484	23.0	3.07	(2.40 - 3.99)	**<0.001**
Reaction to feather					
No	244/2295	10.7	1.00		
Yes	47/228	20.7	2.19	(1.50 - 3.1)	**<0.001**
Reaction to cockroach					
No	222/1951	11.4	1.00		
Yes	70/572	12.2	1.09	(0.80 - 1.45)	0.57
Reaction to at least one of the six allergens					
No	83/1020	8.2	1.00		
Yes	208/1501	13.9	1.81	(1.39 - 2.37)	**<0.001**

3.4.5 Quality of life profile of people with and without asthma

Figure 3.2 shows the standard scores of the SF-36 subscales for people with current asthma compared to those without asthma. For details on the calculation and interpretation of standard scores, see Appendix 1. Current asthma had a severe effect on general health, and a moderate effect on physical functioning, role-physical, vitality and mental health.

Figure 3.2: SF-36 standard scores for people reporting or diagnosed with and without current asthma compared to the general South Australian population



3.4.6 Health service use of people with and without asthma

Table 3.6 shows the people with current asthma who have used health services in South Australia in the last 12 months. In addition, the table shows statistical analyses to determine which health services in South Australia were significantly more likely to be used in the last 12 months by people with current asthma.

Table 3.6: Proportion of people with and without current asthma who used various health services in South Australia in the last 12 months

	No Asthma		Current Asthma	
Variable	**n**	**%**	**n**	**%**
General Practitioner	1948	87.3 ∨	270	92.5 ∧
Community Health Centre	97	4.4	14	4.9
District Nurses or other Community Nurses	45	2.0	3	1.1
Psychologist/Psychiatrist	107	4.8	17	5.7
Day Surgery	239	10.7	41	14.0
Hospital – Accident & Emergency Department	262	11.7 ∨	54	18.5 ∧
Hospital – Clinic (Outpatient/Specialist/Allied Health)	328	14.7 ∨	69	23.7 ∧
Eye Specialist/Ophthalmologist	518	23.2 ∨	88	30.1 ∧
Other Specialist Doctor (not in a hospital)	367	16.4	60	20.6
Physiotherapist	281	12.6	31	10.6
Chiropractor	272	12.2	37	12.6
Alternative Therapist eg Naturopath, Osteopath	105	4.7	21	7.2
Podiatrist	176	7.9 ∨	43	14.8 ∧
Dietician	52	2.3	11	3.8
Nurse Educator	18	0.8	4	1.4
Other Health Service	119	5.3	16	5.6

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

People with asthma were statistically significantly more likely than people with asthma to have used general practitioner, hospital accident and emergency, hospital clinic, eye specialist or ophthalmologist or podiatrist services in the last 12 months in South Australia.

3.4.7 Chronic Lung Disease (CLD) Index, and use of antihistamines, Ventolin and other respiratory medications

Statistical analyses (Table 3.7) were conducted to determine how the Chronic Lung Disease (CLD) Index and use of antihistamines, Ventolin and other respiratory medications were related to asthma. For more details on these issues, see Appendix 2. People with asthma were statistically significantly more likely than people without asthma to rate moderate or severe on the CLD index, and to have taken antihistamines, Ventolin and any other respiratory medication.

Table 3.7: Univariate Odds Ratios for the CLD index and medication use associated with current asthma

Variable	n	%	OR	(95% CI OR)	p value
CLD Index for severity of chronic lung disease					
Mild	207/2265	9.1	1.00		
Moderate	59/170	34.7	5.25	(3.73 - 7.46)	**<0.001**
Severe	22/46	47.9	9.14	(5.04 - 16.60)	**<0.001**
Taking any antihistamines					
No	260/2363	11.0	1.00		
Yes	29/144	20.4	2.07	(1.40 - 3.16)	**<0.001**
Taken any Ventolin					
No	181/2361	7.7	1.00		
Yes	107/145	73.6	33.41	(22.40 - 49.78)	**<0.001**
Taken any other respiratory medication					
No	205/2388	8.6	1.00		
Yes	84/110	76.0	33.80	(21.30 - 53.53)	**<0.001**

3.5 Previously undiagnosed asthma

3.5.1 Definition and prevalence

People with previously undiagnosed asthma were defined was having a 15% increase in FEV1 from pre-Ventolin to post-Ventolin, or a 12% increase in FEV1 from pre-Ventolin to post-Ventolin with an absolute difference in FEV1 greater than 200ml and who did not report a previous diagnosis. The prevalence of previously undiagnosed asthma was found to be 2.2% (95% CI 1.6 - 2.8). Of the people who had current asthma by self-report or clinical diagnosis, 19.1% did not know they had current asthma prior to participating in the study. The proportion of diagnosed and undiagnosed current asthma is shown in Table 3.8. For approximately every 4 people who were diagnosed with current asthma, one person had current asthma but did not know it.

Table 3.8: Undiagnosed current asthma (clinical assessment and self-reported)

	n	% of Total	% of Current Asthma	Ratio
Diagnosed asthma	236	9.3	80.9	4.2
Undiagnosed asthma	56	2.2	19.1	1.0
No current asthma	2231	88.4		
Total	2523	100.0	100.0	

The prevalence of diagnosed, self-reported current asthma (9.3%) is lower than estimates obtained from other South Australian population surveys. In the South Australian Health and Wellbeing Survey (n=2545) [6], the prevalence of current asthma was 12.7%. In the 2000 Health Omnibus Survey (n=2863, the prevalence of current asthma was 11.6%.

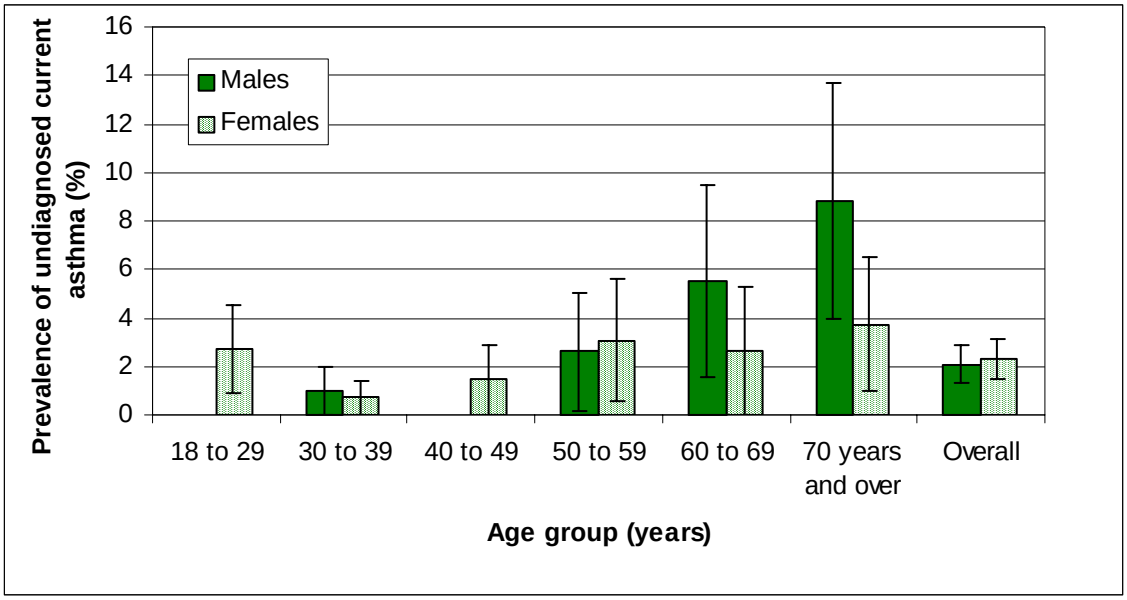
The prevalence rate of undiagnosed asthma and number of people with undiagnosed asthma were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 3.9). The age-sex adjusted estimates were similar across the regions.

Table 3.9: Estimated prevalence of previously undiagnosed asthma by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**2.3**	**(1.6 - 2.9)**	**19200**
Northern	2.0	(1.4 - 2.6)	4400
Western	2.4	(1.8 - 3.1)	4100
Southern	2.3	(1.7 - 3.0)	5600
Eastern	2.3	(1.7 - 3.0)	5000
Country Regions	**2.3**	**(1.7 - 3.0)**	**6900**
Hills Mallee Southern	2.4	(1.8 - 3.1)	1800
Wakefield	2.5	(1.8 - 3.2)	1500
Mid North	2.5	(1.8 - 3.1)	500
Riverland	2.4	(1.7 - 3.0)	700
South East	2.2	(1.6 - 2.9)	1000
Eyre	2.3	(1.7 - 3.0)	600
Northern & Far Western	2.0	(1.4 - 2.6)	800
STATE	2.3	(1.6 - 2.9)	26000

The prevalence of undiagnosed current asthma for males and females by age groups is shown in Figure 3.3. The prevalence of undiagnosed asthma is higher among males and people in the older age groups.

Figure 3.3: Prevalence of undiagnosed current asthma by sex and age group



3.5.2 Demographic profile of previously undiagnosed asthma

Statistical analyses (Table 3.10) were conducted to determine which demographic characteristics best described people with previously undiagnosed asthma. People with previously undiagnosed asthma were statistically significantly more likely than people with diagnosed asthma to be aged over 50 years, to be born in the United Kingdom, Ireland, Europe or the USSR and the Baltic States, to be widowed, and to be retired or undertaking home duties, and less likely to have an annual income between $40,000 and $60,000, and to be never married.

Table 3.10: Univariate Odds Ratios for demographic variables associated with undiagnosed asthma

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	26/113	22.7	1.00		
Female	30/178	16.8	0.69	(0.38 - 1.24)	0.22
Age group					
18 to 29 years	9/82	10.8	1.00		
30 to 39 years	4/53	7.4	0.66	(0.19 - 2.31)	0.52
40 to 49 years	3/42	7.9	0.71	(0.19 - 2.68)	0.62
50 to 59 years	10/36	27.8	3.19	(1.16 - 8.76)	**0.02**
60 to 69 years	11/31	35.3	4.53	(1.64 - 12.53)	**0.004**
70 years and over	19/49	38.8	5.27	(2.13 - 13.04)	**<0.001**
Area of residence					
Western suburbs	22/100	22.3	1.00		
Northern suburbs	33/191	17.5	0.74	(0.41 - 1.35)	0.32
Highest education level obtained					
Secondary	27/130	20.7	1.00		
Trade/Apprenticeship/Cert/Diploma	25/119	21.1	1.03	(0.56 - 1.89)	0.94
Bachelor degree or higher	3/20	14.7	0.66	(0.18 - 2.45)	0.54
Gross household income					
Up to $20,000	21/86	19.1	1.00		
$20,001- 40,000	24/81	29.0	1.22	(0.62 - 2.42)	0.57
$40,001- 60,000	5/57	9.4	0.31	(0.11 - 0.85)	**0.02**
$60,001 and over	5/44	12.0	0.41	(0.15 - 1.14)	0.41
Country of birth					
Australia	34/220	15.4	1.00		
UK or Ireland	14/46	29.5	2.30	(1.11 - 4.78)	**0.03**
Europe, USSR, Baltic States	6/17	34.6	2.91	(1.01 - 8.40)	**0.05**
Asia / Other	2/6	41.2	3.85	(0.69 - 21.56)	0.13
Marital status					
Married or living with partner	38/188	20.1	1.00		
Separated/Divorced	4/21	20.9	1.05	(0.34 - 3.22)	0.93
Widowed	10/22	46.6	3.47	(1.39 - 8.68)	**0.008**
Never married	4/57	6.3	0.27	(0.09 - 0.83)	**0.02**
Work status					
Full time employed	12/83	14.2	1.00		
Part time/Casual employed	7/45	16.6	1.20	(0.44 - 3.26)	0.72
Unemployed	1/11	12.0	0.82	(0.12 - 5.49)	0.84
Home duties/Retired	34/116	29.9	2.57	(1.23 - 5.35)	**0.01**
Student/Other	1/37	1.8	0.11	(0.01 - 1.35)	0.09

3.5.3 Self-reported risk factor profile of people with previously undiagnosed asthma

Statistical analyses (Table 3.11) were conducted to determine which risk factor variables best described people with previously undiagnosed asthma. People with previously undiagnosed asthma were not statistically significantly more likely than people with diagnosed asthma to have any of the self-reported risk factors.

Table 3.11: Univariable Odds Ratios for self-reported risk factor variables associated with previously undiagnosed asthma

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	22/125	17.7	1.00		
Ex-smoker	22/98	22.4	1.34	(0.69 - 2.60)	0.38
Light smoker	6/29	22.0	1.31	(0.49 - 3.52)	0.59
Moderate smoker	3/26	12.2	0.65	(0.19 - 2.27)	0.50
Heavy smoker	2/13	15.3	0.84	(0.17 - 4.15)	0.83
Alcohol risk					
Non drinker, no risk	29/134	21.3	1.00		
Low risk	26/138	18.9	0.86	(0.48 - 1.56)	0.62
Intermediate to very high risk	1/19	4.9	-	-	-
Family history of diabetes					
No	35/175	20.2	1.00		
Yes	20/117	17.5	0.84	(0.46 - 1.53)	0.57
Family history of heart disease					
No	22/107	21.0	1.00		
Yes	33/185	18.0	0.83	(0.45 - 1.50)	0.53
Family history of stroke					
No	33/189	17.3	1.00		
Yes	23/102	22.5	1.39	(0.77 - 2.53)	0.28
Physical activity - *sufficient time* (at least 150 minutes of walking, moderate or vigorous exercise per week)					
No/Insufficient physical activity	26/227	16.9	1.00		
Sufficient physical activity	29/65	26.7	1.79	(0.93 - 3.42)	0.08

The risk factors listed in Table 3.11 and Table 3.12 are general health risk factors not necessarily determinants of undiagnosed asthma. Causal relationships between those risk factors and undiagnosed asthma are not implied.

3.5.4 Measured risk factor profile of people with previously undiagnosed asthma

Statistical analyses (Table 3.12) were conducted to determine which biomedically measured risk factor variables best described people with previously undiagnosed asthma. People with previously undiagnosed asthma were statistically significantly more likely than people with previously diagnosed with asthma to have high blood pressure, and less likely to have an allergy, in particular to rye grass, house dust mites and alternaria (mould).

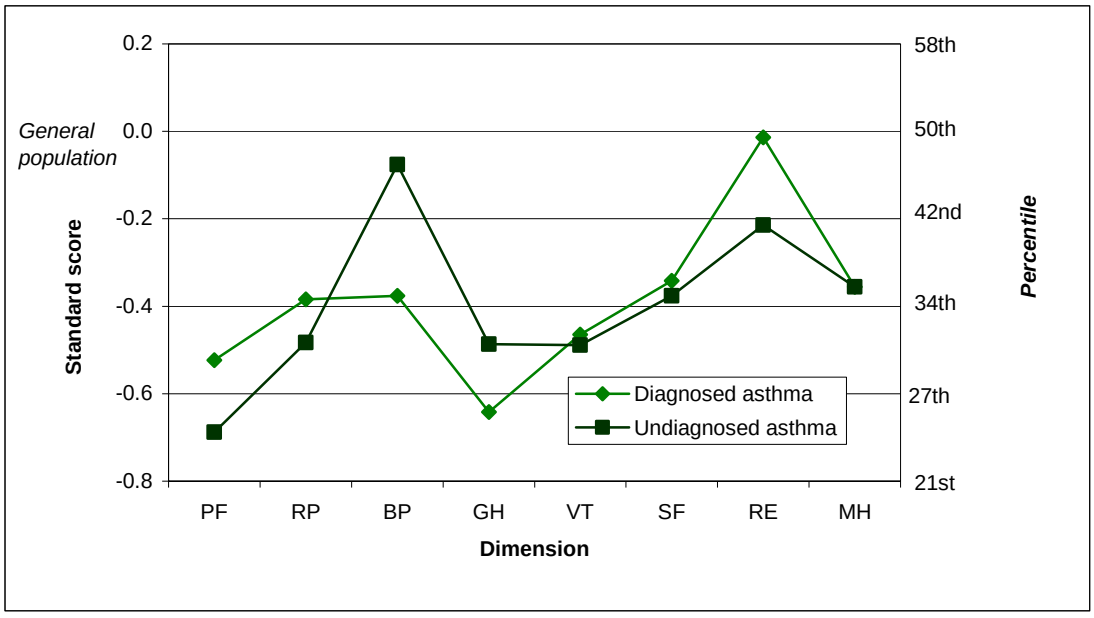
Table 3.12: Univariable Odds Ratios for measured risk factor variables associated with previously undiagnosed asthma

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	14/84	16.5	1.00		
Underweight	4/13	30.2	2.19	(0.58 - 8.18)	0.25
Overweight	23/97	24.0	1.60	(0.76 - 3.36)	0.22
Obese	15/96	15.3	0.91	(0.41 - 2.04)	0.83
Waist:hip ratio (>1.0 men, >0.85 women)					
No	41/220	18.7	1.00		
Yes	14/71	20.3	1.11	(0.57 - 2.16)	0.76
High blood pressure (≥140/90mmHg)					
No	30/205	14.8	1.00		
Yes	25/87	29.4	2.40	(1.31 - 4.38)	**<0.001**
High total cholesterol (≥5.5mmol/L)					
No	37/191	19.6	1.00		
Yes	18/93	19.6	1.00	(0.54 - 1.87)	0.99
Reaction to rye grass					
No	32/121	26.4	1.00		
Yes	24/171	14.0	0.45	(0.25 - 0.82)	**0.009**
Reaction to cat					
No	39/179	21.7	1.00		
Yes	17/113	15.1	0.64	(0.34 - 1.20)	0.17
Reaction to house dust mites					
No	43/164	26.0	1.00		
Yes	13/127	10.2	0.32	(0.16 - 0.63)	**0.001**
Reaction to alternaria (mould)					
No	42/180	23.4	1.00		
Yes	13/111	12.1	0.45	(0.23 - 0.88)	**0.02**
Reaction to feather					
No	47/244	19.3	1.00		
Yes	9/47	18.3	0.94	(0.42 - 2.10)	0.88
Reaction to cockroach					
No	47/222	21.0	1.00		
Yes	9/70	13.1	0.57	(0.26 - 1.22)	0.15
Reaction to at least one of the six allergens					
No	24/83	28.6	1.00		
Yes	32/208	15.3	0.45	(0.25 - 0.83)	**0.01**

3.5.5 Quality of life profile of people with previously undiagnosed asthma

Figure 3.4 shows the standard scores of the SF-36 subscales for people with previously undiagnosed asthma and diagnosed asthma. For details on the calculation of the standard scores, see Appendix 1. Quality of life was lower for both people with previously undiagnosed and diagnosed asthma in the north west region of Adelaide compared to the general South Australian population. Previously undiagnosed asthma had a severe effect on physical functioning, and a moderate effect on role-physical, general health and vitality.

Figure 3.4: SF-36 standard scores for people who reported current asthma and previously undiagnosed asthma compared to the general South Australian population



3.5.6 Health service use of people with previously undiagnosed asthma

Statistical analyses (Table 3.13) were conducted to determine which health services in South Australia were more likely to be used in the last 12 months by people with previously undiagnosed asthma. People with previously undiagnosed asthma were statistically significantly less likely than people with previously diagnosed with asthma to have used general practitioners, and hospital accident and emergency departments.

Table 3.13: Proportion of people with diagnosed and previously undiagnosed asthma who used various health services in South Australia in the last 12 months

	Diagnosed/self-reported asthma		Undiagnosed current asthma	
Variable	**n**	**%**	**n**	**%**
General Practitioner	222	94.1 ^	48	85.7 v
Community Health Centre	12	5.0	2	4.1
District Nurses or other Community Nurses	3	1.2	1	0.5
Psychologist/Psychiatrist	121	4.9	3	5.1
Day Surgery	32	13.4	9	16.5
Hospital – Accident & Emergency Department	49	20.7 ^	5	9.0 v
Hospital – Clinic (Outpatient/Specialist/Allied Health	60	25.3	9	17.0
Eye Specialist/Ophthalmologist	72	30.4	16	28.9
Other Specialist Doctor (not in a hospital)	48	20.2	12	22.4
Physiotherapist	26	10.9	5	9.1
Chiropractor	34	14.5	3	4.7
Alternative Therapist eg Naturopath, Osteopath	20	8.7	1	1.1
Podiatrist	35	14.9	8	14.4
Dietician	10	4.1	1	2.4
Nurse Educator	3	1.3	1	2.0
Other Health Service	16	7.0	-	-

^ v Statistically significantly higher or lower than comparison group ($p<0.05$)

3.5.7 Chronic Lung Disease (CLD) Index, and use of antihistamines, Ventolin and other respiratory medications of people with previously undiagnosed asthma

Statistical analyses (Table 3.14) were conducted to determine how the Chronic Lung Disease (CLD) Index, and use of antihistamines, Ventolin and other respiratory medications were related to asthma. People with previously undiagnosed asthma were statistically significantly less likely than people with diagnosed asthma to have taken antihistamines, Ventolin and any other respiratory medication.

Table 3.14: Univariate Odds Ratios for the CLD index and medication use associated with previously undiagnosed asthma

Variable	n	%	OR	(95% CI OR)	p value
CLD Index for severity of chronic lung disease					
Mild	41/207	19.6	1.00		
Moderate	10/59	17.1	0.84	(0.39 - 1.80)	0.66
Severe	4/22	16.6	0.81	(0.25 - 2.63)	0.73
Taking any antihistamines					
No	54/260	20.9	1.00		
Yes	1/29	2.6	0.1	(0.01 - 1.00)	**0.05**
Taken any Ventolin					
No	49/181	27.0	1.00		
Yes	5/107	4.3	0.12	(0.04 - 0.33)	**<0.001**
Taken any other respiratory medication					
No	50/205	24.3	1.00		
Yes	4/84	4.7	0.15	(0.05 - 0.45)	**0.001**

3.6 References

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CHAPTER 4: CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

4.1 Key findings

- This study estimated that 20.1% of adults in the north west region of Adelaide had COPD. This includes both people with diagnosed COPD and those who did not previously know that they had it. The majority had mild COPD.
- Applying this estimate to the South Australian population, an estimated 324,600 adults have COPD.
- The prevalence of previously undiagnosed COPD was 19.9% or 226,100 people in South Australia have undiagnosed COPD. This means that for approximately every person with COPD, 13 people have COPD but do not know it, although the majority of these unknown cases are mild in severity.
- People with COPD were more likely than people without COPD to be ex-smokers, light to heavy smokers and to be classified as intermediate to very high alcohol risk drinkers.
- People classified as having moderate or severe COPD were severely impaired on physical functioning, role-physical and general health, and moderately impaired on role-emotional.
- People with previously undiagnosed COPD were more likely to be male, to be in the younger age groups, living in the western suburbs, and to have an education level of trade, apprenticeship, certificate or diploma, and less likely to be undertaking home duties, retired or a student.

4.2 Policy implications and research recommendations

- Almost one-fifth of the North West Adelaide adult population has COPD but has not been diagnosed. Early detection of COPD is important and guidelines are required for primary care to identify those with early symptoms and those at risk (ie smokers and occupational risk).
- People with undiagnosed COPD were hardly impaired in terms of quality of life, compared to people with diagnosed COPD. The natural history of COPD is one of progressive airflow deterioration. Simple spirometric measures should occur in all people at risk (smokers and others at occupational risk) to detect early stage COPD and to act to prevent further deterioration and complications.
- The prevalence of COPD was more than double for moderate and heavy smokers, and was higher for ex-smokers or light smokers than for non-smokers. This knowledge provides specific targeting information and highlights the importance of continuing anti-smoking and quit smoking campaigns to reduce the prevalence of smoking.
- Intermediate to very high risk alcohol drinkers had a high prevalence of COPD. This provides support for alcohol campaigns to target this population.
- A large proportion of people with COPD have mild COPD. Programs need to be developed to prevent these people developing severe COPD, which is associated with a lower quality of life.
- Further analyses are needed to determine if the Chronic Lung Disease Index is an appropriate screening tool for the general population to identify the mild cases of COPD.
- Additional research is needed to explore progression along the continuum of COPD and the factors associated with people progressing from mild to moderate or severe COPD, and the impact this will have on health services.

4.3 Introduction

This chapter describes people with chronic obstructive pulmonary disease (COPD), which includes bronchitis and emphysema, both established and newly diagnosed, in terms of their demographic, risk factor, quality of life, and health service use.

COPD is a serious health problem in Australia, being the fourth leading cause of death and accounting for 5.0% of total deaths[1]. COPD and asthma are the third and ninth leading causes of overall disease burden in Australia, accounting for 6.3% of the total burden in terms of disability-adjusted life years (DALYs)[2]. Chronic lung disease (COPD and asthma) accounts for the majority of the burden of chronic respiratory diseases, being responsible for 88% of chronic respiratory disease DALYs.

A strength of this study is that it provides a comprehensive understanding of segmentation of the population on the basis of biomedical data along the COPD continuum. This understanding will enable more effective targeting of policy and strategic interventions to improve health outcomes. This will lead to improved health outcomes for South Australians with chronic disease.

This chapter includes analyses of people across the continuum, from those without COPD, to those with COPD who did not previously know it (previously undiagnosed), and those with diagnosed COPD.

4.4 COPD

4.4.1 Definitions (self-report and clinical) and prevalence

People with COPD were defined as those with a measured FEV1:FVC ratio less than the result of the formula (87.21 - (0.18 x age)) for males, and (89.10 - (0.19 x age)) for females[3]. In addition, the definition of COPD requires that people have not been diagnosed with asthma[a]. According to the results of the FEV1:FVC ratio formulae and no asthma diagnosis, 21.3% (95% CI 19.7 - 22.9) of participants had COPD.

Table 4.1: COPD (Clinical assessment and Self reported COPD)

	n	%
No	1968	78.7
COPD	533	21.3
Total	2501	100.0

Note: 22 cases had insufficient FEV1 or FVC results and were excluded

People with COPD can be categorised into three categories: mild, moderate or severe according to their percentage of predicted FEV1 value[3]. The categories are:

Table 4.2: Severity of COPD

COPD severity level	% FEV1 predicted	n	%
No		1968	78.7
Mild	≥70	504	20.1
Moderate	50-69	21	0.8
Severe	<50	9	0.3
Total		2501	100.0

Table 4.2 shows that the majority of people with COPD were mild (20.1%, 95% CI 18.6 - 21.7) and only a small proportion had moderate or severe COPD (1.2%, 95% CI 0.08 - 1.6).

[a] Self-reported, current asthma; 15% increase in FEV1 from pre-Ventolin to post-Ventolin; or those who had a 12% increase or FEV1 from pre-Ventolin to post-Ventolin if their absolute difference in FEV1 was greater than 200ml.

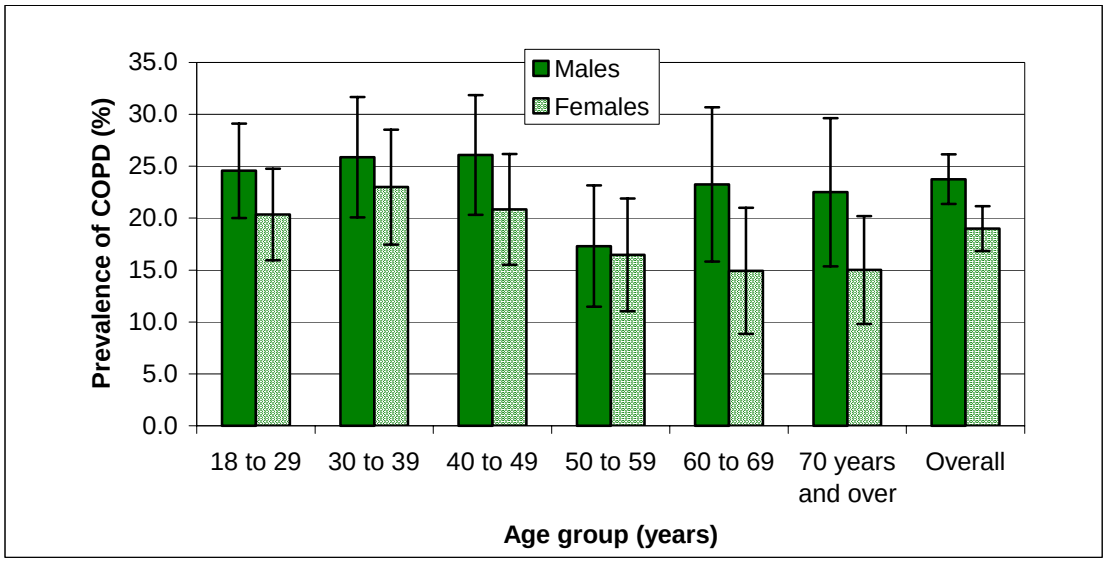
The prevalence rate of COPD and number of people with COPD were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 4.3). These are estimates only, and the true prevalence may vary by region because of other factors, such as smoking prevalence that may also vary among regions.

Table 4.3: Estimated prevalence of COPD by region, age-sex adjusted to the 1999 Estimated Residential Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**21.2**	**(19.5 - 23.0)**	**179100**
Northern	21.5	(19.8 - 23.3)	46200
Western	21.1	(19.3 - 22.8)	35600
Southern	21.2	(19.4 - 22.9)	51600
Eastern	21.1	(19.4 - 22.9)	45800
Country Regions	**21.3**	**(19.5 - 23.0)**	**62500**
Hills Mallee Southern	21.1	(19.4 - 22.9)	15600
Wakefield	21.1	(19.3 - 22.9)	12500
Mid North	21.0	(19.3 - 22.8)	4600
Riverland	21.3	(19.5 - 23.0)	6600
South East	21.4	(19.6 - 23.2)	9900
Eyre	21.3	(19.6 - 23.1)	5100
Northern & Far Western	21.7	(19.9 - 23.5)	8200
STATE	21.2	(19.5 - 23.0)	241600

In the north west region of Adelaide, the prevalence of COPD for males and females by age groups is shown in Figure 4.1.

Figure 4.1: Prevalence of COPD by sex and age group



4.4.2 Demographic profile of people reporting or diagnosed with and without COPD

Statistical analyses were conducted to determine which demographic characteristics best described people with diagnosed and self-reported COPD. People with COPD were statistically significantly more likely to be male, to be living in the Western suburbs of Adelaide, unemployed and to have an education level of trade, apprenticeship, certificate or diploma, and less likely to be aged between 50 and 59 years and to be retired or undertaking home duties.

Table 4.4: Univariate Odds Ratios for demographic variables associated with COPD

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	290/1223	23.7	1.00		
Female	243/1278	19.0	0.75	(0.62 - 0.91)	**0.004**
Age group					
18 to 29 years	151/670	22.5	1.00		
30 to 39 years	110/449	24.4	1.11	(0.84 - 1.47)	0.46
40 to 49 years	106/452	23.5	1.06	(0.79 - 1.40)	0.71
50 to 59 years	59/348	16.9	0.70	(0.50 - 0.97)	**0.04**
60 to 69 years	50/263	19.0	0.81	(0.56 - 1.15)	0.24
70 years and over	58/319	18.2	0.76	(0.54 - 1.07)	0.12
Area of residence					
Western suburbs	272/1017	26.8	1.00		
Northern suburbs	261/1484	17.6	0.59	(0.48 - 0.71)	**<0.001**
Highest education level obtained					
Secondary	205/1103	18.6	1.00		
Trade/Apprenticeship/Cert/Diploma	234/1005	23.2	1.33	(1.08 - 1.64)	**0.008**
Bachelor degree or higher	68/293	23.1	1.32	(0.97 - 1.80)	0.08
Gross household income					
Up to $20,000	120/582	20.7	1.00		
$20,001- 40,000	148/644	23.0	1.15	(0.87 - 1.50)	0.33
$40,001- 60,000	111/576	19.2	0.91	(0.69 - 1.22)	0.54
$60,001 and over	122/550	22.2	1.09	(0.82 - 1.45)	0.54
Not stated	33/150	21.7	1.06	(0.69 - 1.65)	0.78
Country of birth					
Australia	381/1738	21.9	1.00		
UK or Ireland	78/432	18.1	0.79	(0.60 - 1.03)	0.09
Europe, USSR, Baltic States	46/208	22.3	1.02	(0.72 - 1.44)	0.90
Asia / Other	18/109	16.7	0.71	(0.42 - 1.19)	0.20
Marital status					
Married or living with partner	321/1553	20.7	1.00		
Separated/Divorced	48/197	24.3	1.23	(0.87 - 1.74)	0.24
Widowed	24/140	16.8	0.78	(0.49 - 1.23)	0.28
Never married	130/593	21.9	1.08	(0.86 - 1.36)	0.53
Work status					
Full time employed	203/927	21.9	1.00		
Part time/Casual employed	102/417	24.4	1.15	(0.88 - 1.51)	0.32
Unemployed	39/122	32.1	1.68	(1.12 - 2.54)	**0.01**
Home duties/Retired	139/781	17.8	0.77	(0.61 - 0.98)	**0.04**
Student/Other	38/222	17.0	0.73	(0.50 - 1.07)	0.11

4.4.3 Self-reported risk factor profile of people reporting or diagnosed with COPD

Statistical analyses were conducted to determine which risk factor variables best described people with COPD (Table 4.5). People with COPD were statistically significantly more likely than people without COPD to be ex-smokers, to be light to heavy smokers and to be classified as intermediate to very high alcohol risk drinkers.

Table 4.5: Univariate Odds Ratios for self-reported risk factors associated with COPD

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	169/1141	14.8	1.00		
Ex-smoker	143/683	20.9	1.52	(1.19 - 1.94)	**0.001**
Light smoker	103/347	29.7	2.43	(1.83 - 3.22)	**<0.001**
Moderate smoker	68/192	35.7	3.19	(2.28 - 4.47)	**<0.001**
Heavy smoker	43/127	34.2	2.98	(2.00 - 4.45)	**<0.001**
Alcohol risk					
Non drinker, no risk	262/1303	20.1	1.00		
Low risk	206/1006	20.5	1.02	(0.83 - 1.25)	0.85
Intermediate to very high risk	52/166	31.6	1.83	(1.29 - 2.61)	**0.001**
Family history of diabetes					
No	364/1644	22.2	1.00		
Yes	169/857	19.7	0.86	(0.70 - 1.06)	0.15
Family history of heart disease					
No	266/1221	21.8	1.00		
Yes	267/1280	20.9	0.95	(0.78 - 1.15)	0.58
Family history of stroke					
No	342/1618	21.1	1.00		
Yes	192/883	21.7	1.03	(0.85 - 1.26)	0.74
Physical activity - *sufficient time* **(at least 150 minutes of walking, moderate or vigorous exercise per week)**					
No/Insufficient physical activity	263/1217	21.6	1.00		
Sufficient physical activity	264/1275	20.7	0.94	(0.78 - 1.14)	0.56

The risk factors listed in Table 4.5 and Table 4.6 are general health risk factors not necessarily determinants of COPD. Causal relationships between those risk factors and COPD are not implied.

4.4.4 Measured risk factor profile of people reporting or diagnosed with COPD

Statistical analyses were conducted to determine which biomedically measured risk factor variables best described people with COPD (Table 4.6). People with COPD were statistically significantly less likely than people without COPD to be overweight or obese, to have a high waist-hip ratio and to have high blood pressure, and less likely to have an allergic reaction to alternaria (mould).

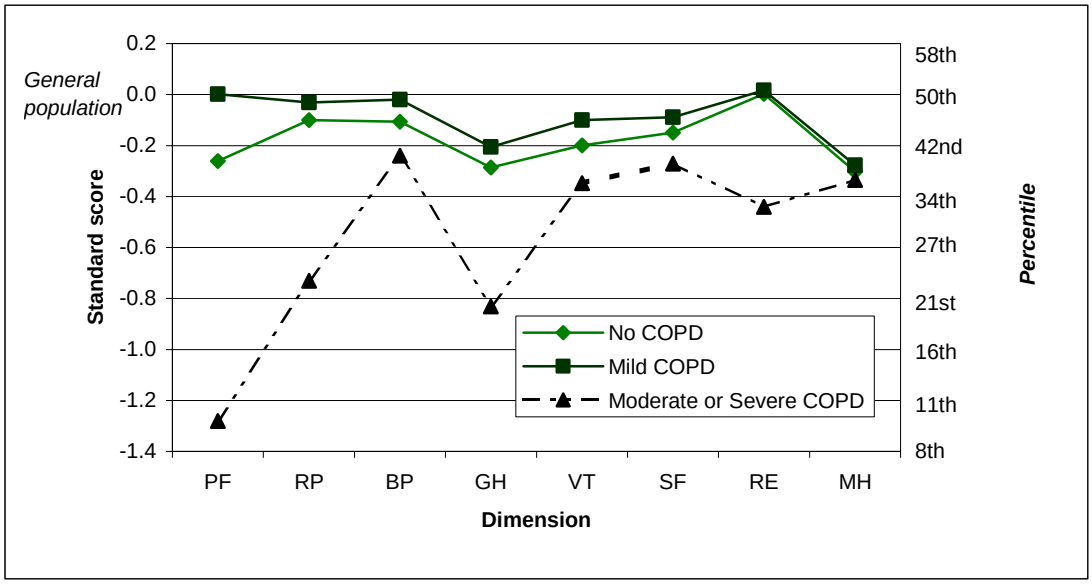
Table 4.6: Univariate Odds Ratios for measured risk factors associated with COPD

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	208/783	26.6	1.00		
Underweight	24/121	19.7	0.68	(0.42 - 1.09)	0.11
Overweight	186/883	21.1	0.74	(0.59 - 0.93)	**0.009**
Obese	115/713	16.1	0.53	(0.41 - 0.68)	**<0.001**
Waist:hip ratio (>1.0 men, >0.85 women)					
No	474/2082	22.8	1.00		
Yes	60/419	14.2	0.56	(0.42 - 0.75)	**<0.001**
High blood pressure (≥140/90mmHg)					
No	409/1807	22.7	1.00		
Yes	124/694	17.8	0.74	(0.59 - 0.93)	**0.01**
High total cholesterol (≥5.5mmol/L)					
No	322/1520	21.2	1.00		
Yes	195/914	21.3	1.00	(0.82 - 1.23)	0.96
Reaction to rye grass					
No	303/1405	21.5	1.00		
Yes	231/1095	21.1	0.97	(0.80 - 1.18)	0.77
Reaction to cat					
No	414/1910	21.7	1.00		
Yes	119/591	20.2	0.91	(0.73 - 1.15)	0.43
Reaction to house dust mites					
No	398/1808	22.0	1.00		
Yes	136/693	19.6	0.86	(0.69 - 1.07)	0.18
Reaction to alternaria (mould)					
No	453/2018	22.4	1.00		
Yes	80/483	16.7	0.69	(0.53 - 0.90)	**0.006**
Reaction to feather					
No	491/2274	21.6	1.00		
Yes	43/227	18.7	0.84	(0.59 - 1.19)	0.32
Reaction to cockroach					
No	413/1933	21.4	1.00		
Yes	121/568	21.2	0.99	(0.79 - 1.25)	0.94
Reaction to at least one of the six allergens					
No	219/1007	21.7	1.00		
Yes	315/1493	21.1	0.96	(0.79 - 1.17)	0.67

4.4.5 Quality of life profile of people with and without COPD

Figure 4.2 shows the standard scores of the SF-36 subscales for people with and without COPD. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was lower for both people with and without COPD in the north west region of Adelaide compared to the general South Australian population. Moderate or severe COPD had a severe effect on physical functioning, role physical and general health, and a moderate effect on role emotional.

Figure 4.2: SF-36 standard scores for people with and without COPD compared to the general South Australian population



4.4.6 Health service use of people with and without COPD

Statistical analyses were conducted to determine which health services in South Australia were more likely to be used in the last 12 months by people with COPD (Table 4.7). People with COPD were statistically significantly less likely than people without COPD to have used hospital accident and emergency department, eye specialist or ophthalmologist and podiatrist services in South Australia in the last 12 months.

Table 4.7: Proportion of people with and without COPD who used various health services used in South Australia in the last 12 months

	No COPD		COPD	
Variable	**n**	**%**	**n**	**%**
General Practitioner	1746	88.7	453	85.0
Community Health Centre	87	4.4	25	4.6
District Nurses or other Community Nurses	40	2.0	8	1.5
Psychologist/Psychiatrist	102	5.2	20	3.8
Day Surgery	220	11.2	54	10.1
Hospital – Accident & Emergency Department	260	13.2 ∧	49	9.2 ∨
Hospital – Clinic (Outpatient/Specialist/Allied Health	307	15.6	87	16.4
Eye Specialist/Ophthalmologist	492	25.0 ∧	107	20.1 ∨
Other Specialist Doctor (not in a hospital)	347	17.7	77	14.4
Physiotherapist	252	12.8	54	10.2
Chiropractor	236	12.0	69	12.9
Alternative Therapist eg Naturopath, Osteopath	99	5.0	25	4.7
Podiatrist	190	9.6 ∧	28	5.3 ∨
Dietician	54	2.8	7	1.3
Nurse Educator	17	0.9	4	0.8
Other Health Service	101	5.1	34	6.5

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

4.4.7 Chronic Lung Disease (CLD) Index, and use of antihistamines, Ventolin and other respiratory medications

Statistical analyses (Table 4.8) were conducted to determine how the Chronic Lung Disease (CLD) Index and use of antihistamines, Ventolin and other respiratory medications were related to COPD. People with COPD were statistically significantly less likely than people without COPD and to be taking any Ventolin or respiratory medication.

Table 4.8: Univariate Odds Ratios for the CLD Index and medication use associated with COPD

Variable	n	%	OR	(95% CI OR)	p value
CLD Index for severity of chronic lung disease					
Mild	473/2246	21.1	1.00		
Moderate	35/167	21.1	1.00	(0.68 - 1.47)	0.99
Severe	7/46	16.0	0.72	(0.32 - 1.59)	0.41
Taking any antihistamines					
No	499/2346	21.3	1.00		
Yes	32/144	22.3	1.06	(0.71 - 1.59)	0.77
Taken any Ventolin					
No	513/2344	21.9	1.00		
Yes	20/143	13.7	0.57	(0.35 - 0.92)	**0.02**
Taken any other respiratory medication					
No	516/2372	21.8	1.00		
Yes	9/108	8.6	0.34	(0.17 - 0.67)	**0.002**

4.5 Previously undiagnosed COPD

People with previously undiagnosed COPD were defined as having COPD according to the clinical results of the FEV1:FVC using the Quanjer et al (1993)[3] criteria, defined in 4.4.1, but who did not report having been told by a doctor that they had COPD (chronic bronchitis or emphysema).

The prevalence of previously undiagnosed COPD was found to be 19.7% (95% CI 18.3 - 21.4) of participants. Of the people who had COPD, 92.8% did not know they had it prior to participating in the study. For approximately every person with diagnosed COPD, there were almost 13 people with undiagnosed COPD. The proportion of diagnosed and undiagnosed COPD is shown in Table 4.9.

Table 4.9: Undiagnosed COPD (clinical assessment & self-reported)

	n	% of Total	% of COPD	Ratio
Diagnosed COPD	39	1.6	7.2	1
Undiagnosed COPD	498	19.7	92.8	13
No COPD	1968	78.6		
Total	2504	100.0	100.0	

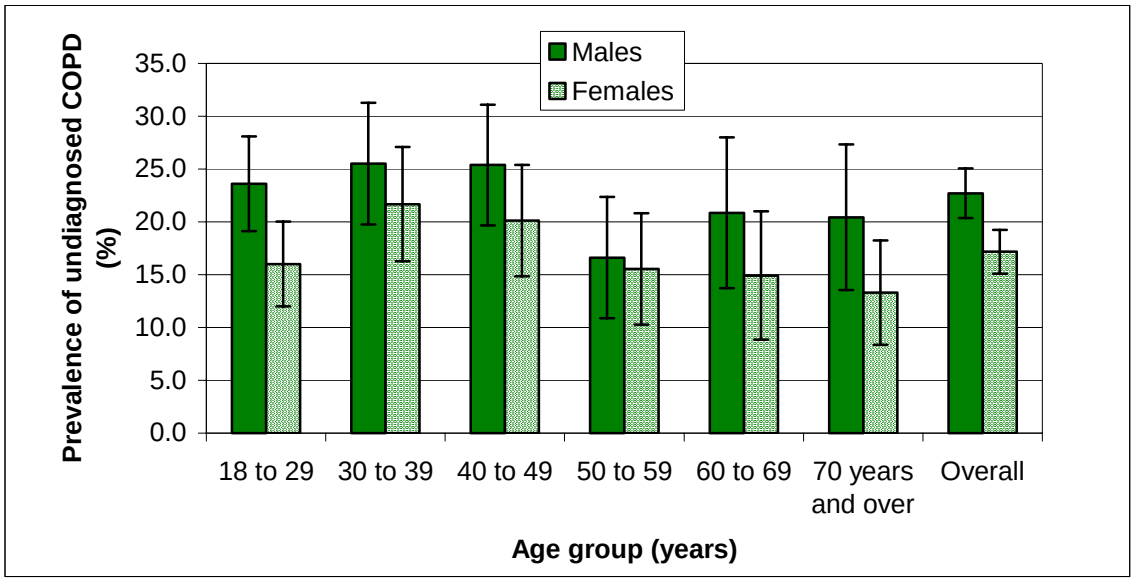
The prevalence rate of undiagnosed COPD and number of people with undiagnosed COPD were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 4.10).

Table 4.10: Estimated prevalence of previously undiagnosed COPD by region, age-sex adjusted to the 1999 Estimated Residential Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**19.8**	**(18.1 - 21.6)**	**167400**
Northern	20.2	(18.4 - 21.9)	43300
Western	19.7	(18 - 21.4)	33200
Southern	19.8	(18.1 - 21.5)	48200
Eastern	19.7	(18 - 21.4)	42700
Country Regions	**20.0**	**(18.2 - 21.7)**	**58600**
Hills Mallee Southern	19.8	(18.1 - 21.6)	14600
Wakefield	19.8	(18.1 - 21.5)	11800
Mid North	19.7	(18 - 21.4)	4300
Riverland	20.0	(18.2 - 21.7)	6200
South East	20.1	(18.3 - 21.8)	9200
Eyre	20.0	(18.3 - 21.8)	4800
Northern & Far Western	20.3	(18.6 - 22.1)	7700
STATE	19.9	(18.2 - 21.6)	226100

In the north west region of Adelaide, the prevalence of undiagnosed COPD for males and females by age groups is shown in Figure 4.3.

Figure 4.3: Prevalence of undiagnosed COPD by sex and age group



4.5.1 Demographic profile of people with previously undiagnosed COPD

Statistical analyses were conducted to determine which demographic characteristics best described people with undiagnosed COPD and people who reported having confirmed COPD. People with previously undiagnosed COPD were statistically significantly more likely to be in the younger age groups, to be living in the western suburbs, and to have an education level of trade, apprenticeship, certificate or diploma, and less likely to be undertaking home duties, retired, a student, or 'other'.

Table 4.11: Univariate Odds Ratios for demographic variables associated with previously undiagnosed COPD

Variable	n	%	OR	(95% CI OR)	p value
Sex					
Male	278/292	95.1	1.00		
Female	220/244	89.9	0.46	(0.23 - 0.90)	**0.02**
Age group					
18 to 29 years	134/152	87.9	1.00		
30 to 39 years	106/110	96.5	3.85	(1.24 - 11.97)	**0.02**
40 to 49 years	103/106	96.9	4.37	(1.31 - 14.6)	**0.02**
50 to 59 years	56/60	93.4	1.94	(0.63 - 5.98)	0.25
60 to 69 years	47/50	93.2	1.87	(0.57 - 6.20)	0.30
70 years and over	52/58	89.8	1.21	(0.45 - 3.22)	0.70
Area of residence					
Western suburbs	262/273	95.7	1.00		
Northern suburbs	236/263	89.7	0.39	(0.19 - 0.78)	**0.008**
Highest education level obtained					
Secondary	185/205	90.2	1.00		
Trade/Apprenticeship/Cert/Diploma	226/237	95.3	2.19	(1.03 - 4.65)	**0.04**
Bachelor degree or higher	67/68	98.4	-	-	-
Gross household income					
Up to $20,000	109/121	90.7	1.00		
$20,001- 40,000	137/149	92.0	1.18	(0.50 - 2.76)	0.71
$40,001- 60,000	103/111	93.0	1.36	(0.52 - 3.53)	0.53
$60,001 and over	122/123	98.9	-	-	-
Not stated	26/33	80.1	0.41	(0.14 - 1.19)	0.10
Country of birth					
Australia	356/384	92.7	1.00		
UK or Ireland	75/78	95.7	1.73	(0.55 - 5.46)	0.35
Europe, USSR, Baltic States	46/47	97.7	-	-	-
Asia / Other	18/18	100.0	-	-	-
Marital status					
Married or living with partner	307/322	95.4	1.00		
Separated/Divorced	45/48	94.0	0.75	(0.20 - 2.75)	0.67
Widowed	21/24	90.0	0.43	(0.10 - 1.83)	0.25
Never married	120/132	91.0	0.49	(0.22 - 1.07)	0.08
Work status					
Full time employed	200/204	97.9	1.00		
Part time/Casual employed	97/102	95.3	0.43	(0.12 - 1.62)	0.21
Unemployed	38/39	97.3	-	-	-
Home duties/Retired	125/141	89.0	0.17	(0.06 - 0.52)	**0.002**
Student/Other	31/38	82.2	0.10	(0.03 - 0.35)	**<0.001**

4.5.2 Self-reported risk factor profile of people with previously undiagnosed COPD

Statistical analyses were conducted to determine which risk factor variables best described people with previously undiagnosed COPD (Table 4.12).

Table 4.12: Univariate Odds Ratios for self-reported risk factors variables associated with previously undiagnosed COPD

Variable	n	%	OR	(95% CI OR)	p value
Smoking status					
Non smoker	165/172	95.5	1.00		
Ex-smoker	135/143	94.6	0.83	(0.30 - 2.29)	0.71
Current smoker	198/215	92.2	0.56	(0.23 - 1.33)	0.19
Alcohol risk					
Non drinker, no risk	246/266	92.7	1.00		
Low risk	194/206	94.2	1.28	(0.61 - 2.71)	0.52
Intermediate to very high risk	51/52	97.7			
Family history of diabetes					
No	338/366	92.2	1.00		
Yes	160/170	94.0	1.33	(0.64 - 2.79)	0.45
Family history of heart disease					
No	242/266	90.7	1.00		
Yes	256/270	94.8	1.89	(0.96 - 3.73)	0.07
Family history of stroke					
No	319/344	92.7	1.00		
Yes	179/193	92.8	1.01	(0.51 - 1.99)	0.98
Physical activity - *sufficient time* (at least 150 minutes of walking, moderate or vigorous exercise per week)					
No/In sufficient physical activity	247/265	93.5	1.00		
Sufficient physical activity	250/266	94.3	1.14	(0.56 - 2.32)	0.72

The risk factors listed in Table 4.5 and Table 4.6 are general health risk factors not necessarily determinants of undiagnosed COPD. Causal relationships between those risk factors and undiagnosed COPD are not implied.

4.5.3 Measured risk factor profile of people with previously undiagnosed COPD

Statistical analyses were conducted to determine which biomedically measured risk factor variables best described people with previously undiagnosed COPD (Table

4.13). People with previously undiagnosed COPD were statistically significantly more likely than people with diagnosed COPD to be overweight.

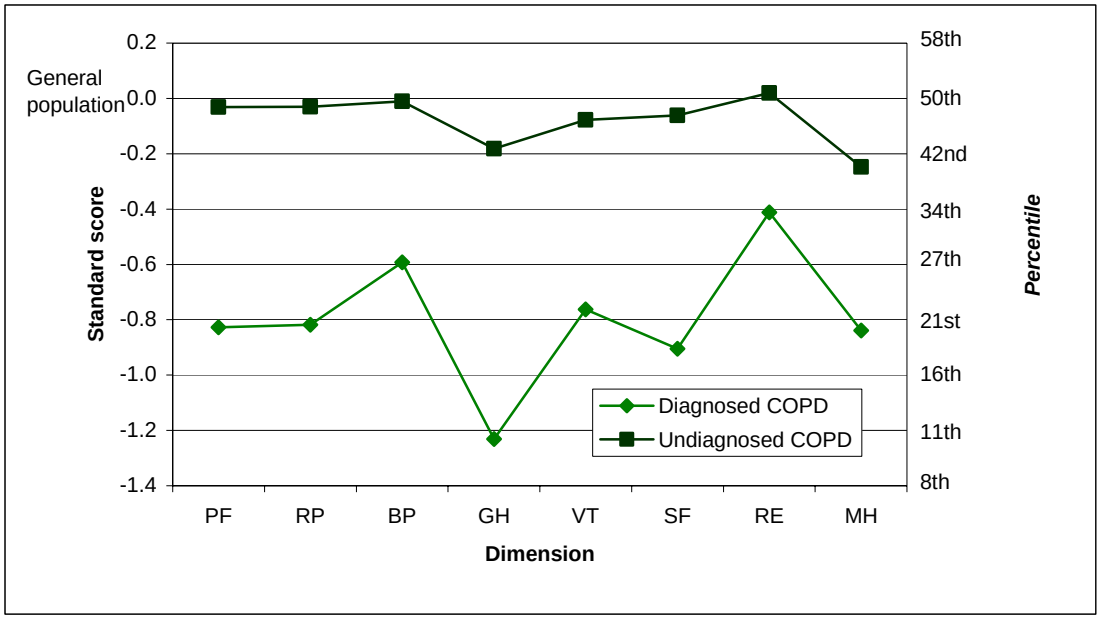
Table 4.13: Univariate Odds Ratios for measured risk factors variables associated with previously undiagnosed COPD

Variable	n	%	OR	(95% CI OR)	p value
Body Mass Index					
Acceptable	190/210	90.5	1.00		
Underweight	21/24	89.9	0.94	(0.23 - 3.87)	0.93
Overweight	181/187	96.9	3.30	(1.28 - 8.53)	**0.01**
Obese	106/116	90.8	1.03	(0.47 - 2.25)	0.94
Waist:hip ratio (>1.0 men, >0.85 women)					
No	445/61	87.1	1.00		
Yes	53/537	92.8	0.47	(0.21 - 1.08)	0.08
High blood pressure (≥140/90mmHg)					
No	383/125	91.6	1.00		
Yes	115/537	92.8	0.80	(0.38 - 1.67)	0.55
High total cholesterol (≥5.5mmol/L)					
No	302/324	93.2	1.00		
Yes	188/196	95.9	1.71	(0.75 - 3.93)	0.20
Reaction to rye grass					
No	281/303	92.6	1.00		
Yes	217/233	93.0	1.06	(0.55 - 2.06)	0.86
Reaction to cat					
No	384/416	92.3	1.00		
Yes	114/120	94.5	1.45	(0.61 - 3.42)	0.40
Reaction to house dust mites					
No	372/398	93.3	1.00		
Yes	126/138	91.1	0.73	(0.36 - 1.47)	0.38
Reaction to alternaria (mould)					
No	423/456	92.8	1.00		
Yes	75/80	92.7	0.98	(0.4 - 2.45)	0.97
Reaction to feather					
No	456/494	92.4	1.00		
Yes	42/43	97.5	-	-	-
Reaction to cockroach					
No	386/415	93.0	1.00		
Yes	112/122	91.8	0.84	(0.4 - 1.78)	0.65
Reaction to at least one of the six allergens					
No	201/219	91.9	1.00		
Yes	296/317	93.3	1.23	(0.64 - 2.38)	0.53

4.5.4 Quality of life profile of people with previously undiagnosed COPD

Figure 4.4 shows the standard scores of the SF-36 subscales for people who reported having confirmed COPD compared to those who did not report COPD but were diagnosed with COPD. People with diagnosed COPD scored lower than those with previously undiagnosed COPD on all subscales of the SF-36. Diagnosed COPD had a severe effect on physical functioning, role physical, general health, vitality, social functioning, role emotional and mental health, and a moderate effect on bodily pain.

Figure 4.4: SF-36 standard scores for people with diagnosed COPD and previously undiagnosed COPD compared to the general South Australian population



4.5.5 Health service use of people with previously undiagnosed COPD

Statistical analyses were conducted to determine which health services were more likely to be used by people with previously undiagnosed COPD (Table 4.14).

Table 4.14: Proportion of people with diagnosed and previously undiagnosed COPD who used various health services in South Australia in the last 12 months

	Diagnosed/self-reported COPD		Undiagnosed COPD	
Variable	**n**	**%**	**n**	**%**
General Practitioner	28	6.2	428	93.8
Community Health Centre	2	8.5	22	91.5
District Nurses or other Community Nurses	-	-	8	100.0
Psychologist/Psychiatrist	1	1.2	20	4.1
Day Surgery	6	11.1	49	88.9
Hospital - Accident & Emergency Department	4	7.9	47	92.1
Hospital – Clinic (Outpatient/Specialist/Allied Health	6	7.2	81	92.8
Eye Specialist/Ophthalmologist	7	6.0	102	94.0
Other Specialist Doctor (not in a hospital)	6	8.1	72	91.9
Physiotherapist	6	10.6	50	89.4
Chiropractor	3	3.7	67	96.3
Alternative Therapist eg Naturopath, Osteopath	-	-	25	100.0
Podiatrist	-	-	28	100.0
Dietician	1	16.9	7	83.1
Nurse Educator	1	26.1	3	73.9
Other Health Service	-	-	34	100.0

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

4.5.6 Chronic Lung Disease (CLD) Index, and use of antihistamines, Ventolin and other respiratory medications of people with previously undiagnosed COPD

Statistical analyses were conducted to determine how the CLD Index, and use of antihistamines, Ventolin and other respiratory medications were related to undiagnosed COPD. People with previously undiagnosed COPD were statistically significantly less likely than people without COPD to rate moderate or severe for the CLD index, and to be taking Ventolin, or any respiratory medication.

Table 4.15: Univariate Odds Ratios for the CLD Index and medication use associated with previously undiagnosed COPD

Variable	n	%	OR	(95% CI OR)	p value
CLD Index for severity of chronic lung disease					
Mild	453/475	95.3	1.00		
Moderate	30/37	82.3	0.23	(0.09 - 0.59)	**0.002**
Severe	4/7	48.5	0.05	(0.01 - 0.21)	**<0.001**
Taking any antihistamines					
No	467/500	93.4	1.00		
Yes	28/32	88.1	0.53	(0.17 - 1.62)	0.26
Taken any Ventolin					
No	486/515	94.3	1.00		
Yes	12/21	55.1	0.07	(0.03 - 0.19)	**<0.001**
Taken any other respiratory medication					
No	485/518	93.5	1.00		
Yes	6/11	57.7	0.09	(0.03 - 0.33)	**<0.001**

4.6 References

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2. Mathers C, Vos T, Stevenson C. *The Burden of Disease and Injury in Australia*. Australian Institute of Health and Welfare, Canberra, 1999.

3. Quanjer GJ, Tammeling JE, Cotes OF, Pederson RP, Yernault J-C. Lung volumes and forced ventilatory flows. *European Respiratory Journal,* 1993; 6 (Suppl. 16): 5-40.

4. Siafakas NM, Vermeire P, Pride NB, Paoletti P, Gibson J, Howard P, Yernault JC, Decramer M, Higenbottam T, Postma DS, Rees J. Optimal assessment and management of chronic obstructive pulmonary disease (COPD). *European Respiratory Journal*, 1995; 8: 1398-1420.

CHAPTER 5: RISK FACTORS FOR ILL HEALTH

5.1 Key Findings

- In this study, 26.6% of the participants were current smokers.
- The quality of life of current smokers was more impaired than people who do not smoke or who were ex-smokers. Current smoking had a severe effect on general health and mental health, and a moderate effect on vitality, social functioning and role-emotional.
- This study found that 6.6% of people were classified as intermediate to very high risk alcohol drinkers.
- Overall, the study estimated that 48.5% of adults living in the North Western suburbs of Adelaide had not done a sufficient amount of physical activity in the previous two weeks.
- The prevalence of people who were classified as overweight was 35.2% and the prevalence of obesity was 28.5%. These people were more likely to have used health services than those who were classified as underweight or normal.
- Waist hip ratio is an indication of abdominal obesity and 16.7% of the participants had a high waist hip ratio. They were more likely to have used health services than people who did not have a high waist hip ratio.
- The study estimated that 27.7% of the people living in the North Western suburbs of Adelaide had high blood pressure. The quality of life of people with high blood pressure was more impaired than people who do not have high blood pressure. High blood pressure had a severe effect on physical functioning and general health, and a moderate effect on role-physical, bodily functioning and vitality.
- The prevalence of people with high cholesterol was 36.7%. These people were more likely than people who did not have high cholesterol to be in the older age groups, to be born in Europe, USSR and the Baltic States, and they were less likely to have household income greater than $40,000 per annum and to have never married.
- Approximately 40% of participants had four or more of the self-reported and measured risk factors.

5.2 Policy implications and research recommendations

- Continuation of quit smoking campaigns is essential to reduce the prevalence of current smoking. That the prevalence was higher among young people, males, people living in the northern suburbs, those who were unemployed or casually or part time employed, and those who were never married, separated or divorced, provides specific targeting information for such campaigns.
- Smokers scored low on the mental dimensions of quality of life and were also more likely to have seen a psychologist or psychiatrist in the last year. Programs to improve the mental health of smokers may also be important in making quit attempts more successful.
- Young, male, single people were more likely to be intermediate to very high risk alcohol drinkers, providing support for alcohol campaigns that are targeted at this population.
- People who were not doing sufficient physical activity were more likely to be older females with lower education levels living in the Northern suburbs of Adelaide. They were also more likely to be impaired in terms of their quality of life. Encouraging these people to increase their level of physical activity, by making system changes rather than simply trying to change the behaviour of individuals, remains a priority.
- People who were overweight or obese make up over 60% of the North West Adelaide adult population. This has huge implications given that these people are at higher risk of developing chronic conditions such as cardiovascular disease and diabetes, use more health services and have a poorer quality of life than people who are underweight or normal weight. While males were more likely to be overweight, females were more likely to be obese, and obesity affects all ages, making targeting for prevention strategies difficult.
- People with a high waist hip ratio, although a smaller proportion than those who were classified as obese according to their body mass index (BMI), were more severely impaired in terms of their quality of life. Waist hip ratio, as a measure of fat distribution or central obesity, may be a more important indication of risk for cardiovascular disease and diabetes than overall obesity. Waist hip ratio also provided more specific targeting information (related to older age groups, lower education and lower incomes), and it is therefore important to continue to investigate this measure and its correlation with BMI.
- That almost one-third of adults had high blood pressure, using clinical measures rather than self-reported data, indicates that these people had high blood pressure that was either undiagnosed or not well controlled. High blood pressure is a risk factor for developing cardiovascular disease and diabetes-related complications and the targeting information provided should be used in the planning of programs to increase awareness of this fact.

5.3 Introduction

This chapter describes people with risk factors associated with chronic disease in terms of their demographic, quality of life, and health service use characteristics.

Chronic disease places a significant burden on the community in terms of health, social, economic and emotional costs. Risk factors further increase the likelihood of developing chronic disease and an understanding of the risk factors assists in reducing the social and economic impact of chronic disease on the community.

The risk factors reported in this chapter are current smokers, people who were classified as intermediate to very high alcohol risk drinkers, no or insufficient physical activity, people who were classified as overweight or obese, people classified as having a high hip waist ratio, and people with high blood pressure or high cholesterol.

5.4 Smoking

5.4.1 Prevalence

Smoking prevalence was calculated using data obtained from the questionnaire. The information was divided into non-smokers, ex-smokers and current smokers. The prevalence of smoking is shown in Table 5.1. Overall, 26.6% (95% CI 24.9 - 28.4) of study participants were current smokers.

Table 5.1: Smoking prevalence

	n	%
Non-smoker	1150	45.6
Ex-smoker	690	27.3
Current	672	26.6
Not stated	11	0.4
Total	2523	100.0

The level of smoking among current smokers can be further broken down into the level of smoking status based on the number of cigarettes smoked per day (Table 5.2). Light smokers were classified as smoking 1 to 15 cigarettes per day, moderate smokers 15 to 24 cigarettes per day, and heavy smokers 25 cigarettes or more per day.

Table 5.2: Level of smoking status

	n	%
Non-smoker	1150	45.6
Ex-smoker	690	27.3
Light smoker	351	13.9
Moderate smoker	193	7.7
Heavy smoker	128	5.1
Not stated	11	0.4
Total	2523	100.0

5.4.2 Demographic profile of current smokers

Statistical analyses (Table 5.3) were conducted to determine which demographic characteristics best described current smokers. People who smoke were statistically significantly more likely than people who do not smoke to be male, to be in the younger age groups, to be people living in the northern suburbs, to have a household income between $20,001 and $60,000 per annum, to be separated, divorced or never married, to be born in Australia, and to be employed full-time or part-time, or

unemployed, and less likely to be widowed, a student, undertaking home duties or retired or have an educational level of bachelor degree or higher.

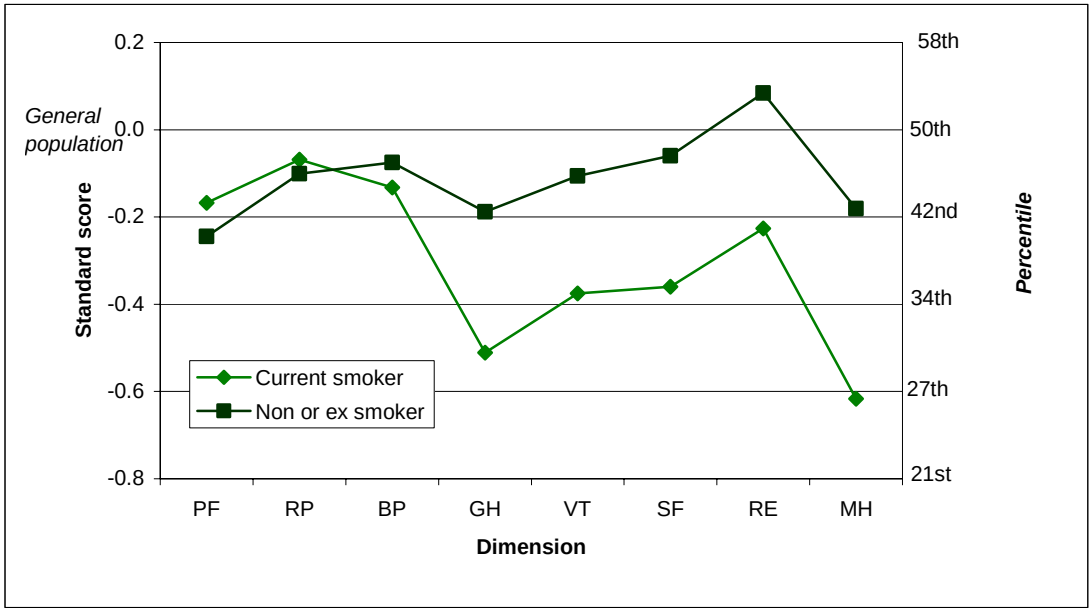
Table 5.3: Univariate Odds Ratios for demographic variables associated with those classified as current smokers

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	357/1236	28.9	1.00		
Female	314/1287	24.4	0.80	(0.67 – 0.96)	**0.01**
Age group					
18 to 29 years	262/675	38.7	1.00		
30 to 39 years	147/454	32.5	0.75	(0.58 – 0.97)	**0.03**
40 to 49 years	135/455	29.8	0.66	(0.51 – 0.86)	**0.002**
50 to 59 years	72/351	20.6	0.41	(0.30 – 0.55)	**<0.001**
60 to 69 years	29/268	10.7	0.19	(0.12 – 0.29)	**<0.001**
70 years and over	26/320	8.2	0.14	(0.09 – 0.22)	**<0.001**
Area of residence					
Western suburbs	245/1024	23.9	1.00		
Northern suburbs	427/1499	28.5	1.27	(1.05 – 1.53)	**0.01**
Highest education level obtained					
Secondary	304/1114	27.3	1.00		
Trade/Apprenticeship/ Cert/Diploma	298/1014	29.4	1.11	(0.91 – 1.34)	0.31
Bachelor degree or higher	47/294	16.1	0.51	(0.36 – 0.72)	**<0.001**
Gross household income					
Up to $20,000	126/591	21.3	1.00		
$20,001-40,000	212/652	32.5	1.77	(1.36 – 2.31)	**<0.001**
$40,001-60,000	166/577	28.8	1.49	(1.13 – 1.96)	**0.004**
More than $60,000	123/552	22.3	1.06	(0.79 – 1.41)	0.76
Not stated	45/151	29.8	1.71	(1.12 – 2.61)	**0.01**
Country of birth					
Australia	520/1754	29.6	1.00		
UK or Ireland	87/435	19.9	0.83	(0.63 – 1.09)	0.19
Europe, the USSR, Baltic States	47/211	22.2	0.68	(0.48 – 0.97)	**0.03**
Asia, Other	18/109	16.7	0.47	(0.27 – 0.80)	**0.004**
Marital status					
Married or living with partner	351/1562	22.5	1.00		
Separated/Divorced	62/201	30.9	1.57	(1.12 – 2.20)	**0.007**
Widowed	16/142	11.3	0.44	(0.25 – 0.77)	**0.003**
Never married	238/600	39.6	2.26	(1.84 – 2.78)	**<0.001**
Work status					
Full time employed	282/935	30.2	1.00		
Part time/Casual employed	155/419	36.9	1.36	(1.06 – 1.74)	**0.02**
Unemployed	67/125	54.1	2.71	(1.82 – 4.04)	**<0.001**
Home duties / retired	111/787	14.2	0.38	(0.30 – 0.49)	**<0.001**
Student / other	49/223	22.0	0.65	(0.46 – 0.92)	**0.02**

5.4.3 Quality of life profile of current smoker

Figure 5.1 shows the standard scores of the SF-36 subscales for people who do and do not smoke. For details on the calculation and the interpretation of standard scores, see Appendix 1. Smoking had a severe effect on general health and mental health, and a moderate effect on vitality, social functioning and role-emotional.

Figure 5.1: SF-36 standard scores for people who do and do not smoke compared to the general South Australian population



5.4.4 Health service use of current smokers

People who were current smokers were statistically significantly more likely than people who were not current smokers to have used psychologist/psychiatrist services in the last 12 months, and less likely to have used district nurses or other community nurses, day surgery, eye specialist/ophthalmologist, other specialist doctor (not in a hospital), physiotherapist and podiatrist services (Table 5.4).

Table 5.4: Proportion of people who do and do not smoke who used various health services in South Australia in the last 12 months

Variable	Non and Ex-smokers n	Non and Ex-smokers %	Current smoker n	Current smoker %
General Practitioner	1633	88.7	581	86.6
Community Health Centre	76	4.1	36	5.3
District Nurses or other Community Nurses	43	2.4 ∧	4	0.5 ∨
Psychologist/Psychiatrist	76	4.1 ∨	48	7.1 ∧
Day Surgery	221	12.0 ∧	59	8.7 ∨
Hospital – Accident & Emergency Department	228	12.4	88	13.1
Hospital – Clinic (Outpatient/Specialist/Allied Health)	306	16.7	90	13.4
Eye Specialist/Ophthalmologist	484	26.3 ∧	121	18.1 ∨
Other Specialist Doctor (not in a hospital)	337	18.3 ∧	90	13.4 ∨
Physiotherapist	246	13.3 ∧	66	9.9 ∨
Chiropractor	219	11.9	90	13.4
Alternative Therapist eg. Naturopath, Osteopath	95	5.1	31	4.6
Podiatrist	189	10.3 ∧	30	4.5 ∨
Dietician	43	2.3	20	3.0
Nurse Educator	18	1.0	4	0.7
Other Health Service	99	5.4	36	5.3

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.5 Alcohol consumption

5.5.1 Definition and prevalence

Prevalence of alcohol consumption was calculated using data obtained from the questionnaire. To ascertain their personal alcohol risk, respondents were asked the number of standard drinks they usually have on a weekly and daily basis. Alcohol risk was then calculated using this information to categorise respondents into non-drinkers, no risk drinkers, low risk drinkers, intermediate risk drinkers, high risk drinkers and very high risk drinkers. The information was divided into non drinkers, no alcohol risk; low alcohol risk; intermediate to very high alcohol risk.

These questions, and the classification formulae that allocated the responses into risk categories, were taken from the 1989 National Heart Foundation Risk Factor Prevalence study [1]. The categories of risk have been defined as follows:

Table 5.5: Categories of Risk Levels

	Number of drinks					
Frequency of drinking	**1-2**	**3-4**	**5-8**	**9-12**	**13-20**	**>20**
Less than once a week	B	B	B	C	D	E
1 or 2 days	B	B	B	C	D	E
3 or 4 days	B	B	C	D	E	F
5 or 6 days	B	C	D	E	F	F
Every day	B	C	D	E	F	F

The risk factor levels have been defined as follows:

Table 5.6: Alcohol risk levels

		Risk	
Category	**Description**	**Men**	**Women**
A	Non-drinkers	None	None
B	Average daily intake of less than 3 drinks	None	Low
C	Average daily intake of 4 drinks or 9-12 drinks in any day	Low	Intermediate
D	Average daily intake of 5-8 drinks or occasional excess	Intermediate	High
E	Average daily intake of 9-12 drinks or frequent or great occasional excessive intake	High	Very high
F	Average daily intake of over 12 drinks	Very high	Very high

The prevalence of alcohol consumption by risk level is shown in Table 5.7. Overall, 6.6% (95% CI 5.7 - 7.6) of study participants had an intermediate to very high alcohol risk.

Table 5.7: Alcohol consumption

	n	%
Non drinkers, no risk	1317	52.2
Low alcohol risk	1014	40.2
Intermediate alcohol risk	147	5.8
High to very high alcohol risk	19	0.8
Not stated	26	1.0
Total	2523	100.0

5.5.2 Demographic profile of people with intermediate to very high alcohol risk

People with intermediate to very high alcohol risk were statistically significantly more likely than those with no or low alcohol risk to have an income over $20,000, to have never been married, and less likely to be female, aged 30 years or over, have an education of bachelor degree or higher, born outside Australia, the United Kingdom or Ireland, and report work status as home duties or retired (Table 5.8).

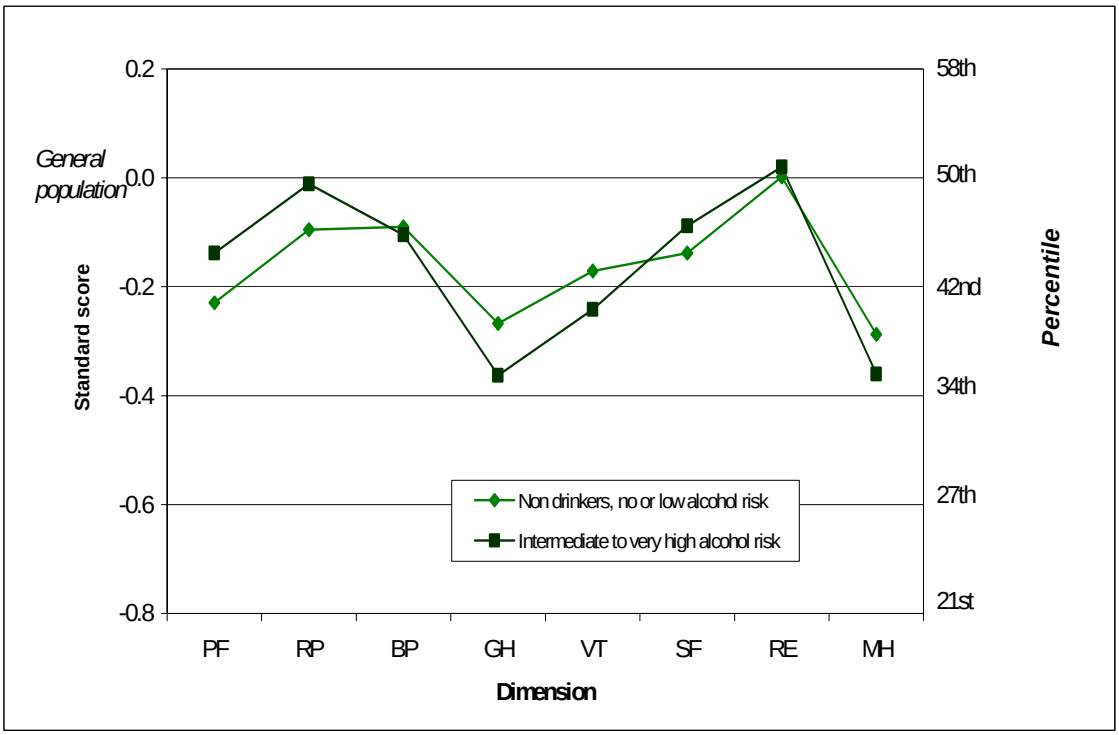
Table 5.8: Univariate Odds Ratios for demographic variables associated with those classified as having an intermediate to very high alcohol risk

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	98/1126	8.0	1.00		
Female	68/1271	5.4	0.65	(0.47 - 0.91)	**0.01**
Age group					
18 to 29 years	66/666	9.9	1.00		
30 to 39 years	25/453	5.6	0.53	(0.32 - 0.88)	**0.01**
40 to 49 years	35/451	7.8	0.76	(0.49 - 1.20)	0.3
50 to 59 years	16/344	4.8	0.44	(0.24 - 0.80)	**0.005**
60 to 69 years	12/268	4.5	0.43	(0.21 - 0.83)	**0.01**
70 years and over	11/316	3.5	0.33	(0.16 - 0.65)	**<0.001**
Area of residence					
Western suburbs	58/1016	5.7	1.00		
Northern suburbs	108/1481	7.3	1.30	(0.92 - 1.83)	0.1
Highest education level obtained					
Secondary	83/1103	7.6	1.00		
Trade/Apprenticeship/Cert/Diploma	61/1012	6.1	0.79	(0.55 - 1.12)	0.2
Bachelor degree or higher	12/294	4.1	0.52	(0.27 - 1.00)	**0.05**
Gross household income					
Up to $20,000	23/583	3.9	1.00		
$20,001-40,000	50/647	7.8	2.04	(1.20 - 3.49)	**0.007**
$40,001-60,000	43/576	7.5	1.96	(1.14 - 3.41)	**0.01**
More than $60,000	39/551	7.1	1.86	(1.06 - 3.26)	**0.03**
Not stated	10/140	7.4	1.87	(0.81 - 4.25)	0.2
Country of birth					
Australia	133/1738	7.6	1.00		
UK or Ireland	24/434	5.6	0.71	(0.44 - 1.13)	0.2
Europe, the USSR, Baltic States	4/211	2.0	0.23	(0.07 - 0.66)	**0.003**
Asia, Other	2/108	2.0	0.23	(0.04 - 0.95)	**0.04**
Marital status					
Married or living with partner	75/1551	4.8	1.00		
Separated/Divorced	15/199	7.7	1.61	(0.87 - 2.95)	0.1
Widowed	4/141	2.7	0.57	(0.18 - 1.66)	0.4
Never married	70/595	11.7	2.62	(1.84 - 3.74)	**<0.001**
Work status					
Full time employed	68/862	7.3	1.00		
Part time/Casual employed	36/412	8.8	1.22	(0.80 - 1.86)	0.4
Unemployed	14/111	10.9	1.56	(0.84 – 2.89)	0.2
Home duties/Retired	26/783	3.3	0.43	(0.27 – 0.69)	**<0.001**
Student/Other	16/223	7.0	0.96	(0.54 – 1.70)	0.9

5.5.3 Quality of life profile of people classified as having an intermediate to very high alcohol risk

Figure 5.2 shows the standard scores of the SF-36 subscales for people classified as having an intermediate to very high alcohol risk and those who are non-drinkers, or for those who have no or a low alcohol risk. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was similar for each subscale for both groups in the north west region of Adelaide compared to the general South Australian population.

Figure 5.2: SF-36 standard scores for people classified as having an intermediate to very high alcohol risk, and those who are non-drinkers, have no or a low alcohol risk compared to the general South Australian population



5.5.4 Health service use of people classified as having an intermediate to very high alcohol risk

Statistical analyses were conducted to determine which health services in South Australia were more likely to be used in the last 12 months by people classified as having an intermediate to very high alcohol risk (Table 5.9). People classified as having an intermediate to very high alcohol risk were statistically significantly less likely than non-drinkers, or those with no or a low alcohol risk to have used hospital outpatient clinic, other specialist doctor (not in a hospital) or physiotherapy services, in South Australia in the last 12 months.

Table 5.9: Proportion of people classified as having an intermediate to very high alcohol risk, and non-drinkers and those classified as having no or a low alcohol risk who used various health services used in South Australia in the last 12 months

	Non-drinkers, no or low alcohol risk		Intermediate to very high alcohol risk	
Variable	**n**	**%**	**n**	**%**
General Practitioner	2049	87.9	152	91.5
Community Health Centre	105	4.5	5	3.1
District Nurses or other Community Nurses	45	1.9	3	1.9
Psychologist/Psychiatrist	118	5.1	5	3.3
Day Surgery	262	11.2	15	9.0
Hospital – Accident & Emergency Department	287	12.3	22	13.1
Hospital – Clinic (Outpatient/Specialist/Allied Health)	378	16.2 ∧	12	7.2 ∨
Eye Specialist/Ophthalmologist	568	24.4	34	20.6
Other Specialist Doctor (not in a hospital)	407	17.5 ∧	16	9.7 ∨
Physiotherapist	302	13.0 ∧	9	5.5 ∨
Chiropractor	280	12.0	23	13.8
Alternative Therapist eg. Naturopath, Osteopath	121	5.2	4	2.7
Podiatrist	209	9.0 ∧	7	4.5 ∨
Dietician	60	2.6	2	1.1
Nurse Educator	23	1.0	-	-
Other Health Service	120	5.2	14	8.4

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.6 Physical activity

5.6.1 Definition and prevalence

Prevalence of physical activity was calculated using data obtained from the self-reported questionnaire. Sufficient physical activity was defined as at least 150 minutes per week of walking, moderate activity or vigorous activity [2]. The prevalence of sufficient physical activity is shown in Table 5.10. Overall, 48.5% (95% CI 46.6 - 50.5) of study participants were not doing sufficient physical activity or have not done any physical activity, and 51.2% (95% CI 49.2 - 53.1) were doing sufficient physical activity.

Table 5.10: Prevalence of sufficient physical activity

	n	%
No/Insufficient activity	1224	48.5
Sufficient activity	1291	51.2
Not stated	8	0.3
Total	2523	100.0

5.6.2 Demographic profile of people undertaking physical activity

People who were not doing sufficient physical activity were statistically significantly more likely to be female, older, widowed, and living in the northern suburbs, and less likely to have post-secondary education, an income of $60,000 or more, to be never married, and a student (Table 5.11).

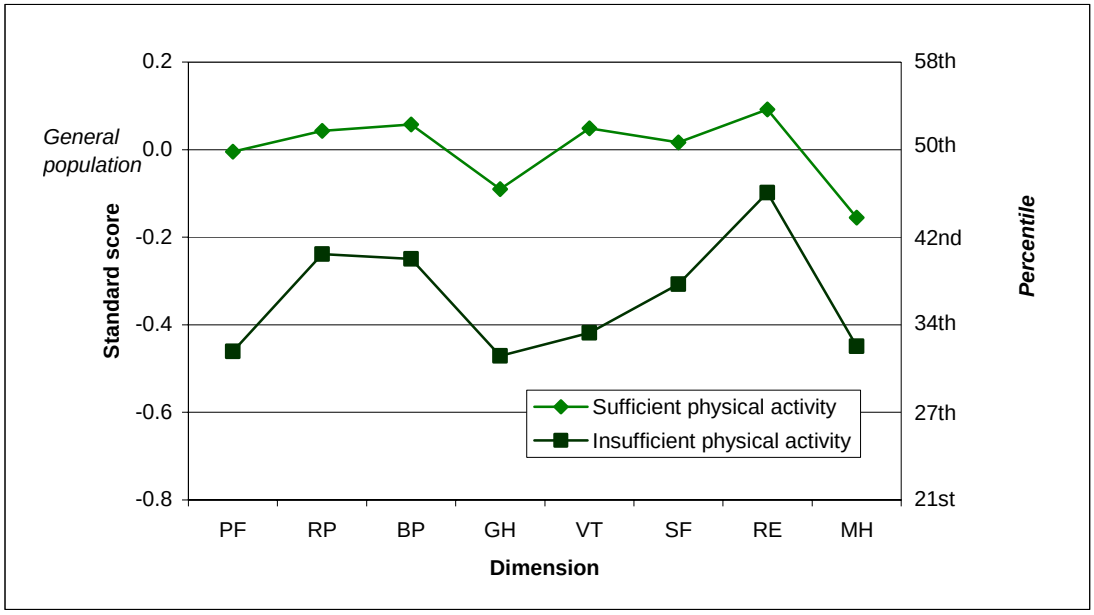
Table 5.11: Univariate Odds Ratios for demographic variables associated with not doing sufficient physical activity

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	546/1236	44.2	1.00		
Female	677/1287	52.6	1.40	(1.19 – 1.64)	**<0.001**
Age group					
18 to 29 years	282/675	41.7	1.00		
30 to 39 years	243/454	53.6	1.60	(1.25 – 2.05)	**<0.001**
40 to 49 years	225/455	49.5	1.36	(1.07 – 1.74)	**0.01**
50 to 59 years	173/351	49.4	1.36	(1.04 – 1.78)	**0.02**
60 to 69 years	121/268	45.1	1.15	(0.85 – 1.54)	0.4
70 years and over	179/320	55.9	1.77	(1.34 – 2.34)	**<0.001**
Area of residence					
Western suburbs	465/1024	45.4	1.00		
Northern suburbs	759/1499	50.6	1.23	(1.05 – 1.45)	**0.01**
Highest education level obtained					
Secondary	600/1114	53.9	1.00		
Trade/Apprenticeship/Cert/Diploma	477/1014	47.1	0.76	(0.64 – 0.91)	**0.002**
Bachelor degree or higher	98/294	33.3	0.43	(0.32 – 0.57)	**<0.001**
Gross household income					
Up to $20,000	298/591	50.5	1.00		
$20,001-40,000	350/652	53.7	1.14	(0.91 – 1.43)	0.3
$40,001-60,000	264/577	45.7	0.83	(0.65 – 1.05)	0.1
More than $60,000	221/552	40.1	0.66	(0.52 – 0.84)	**<0.001**
Not stated	91/151	60.0	1.47	(1.01 – 1.38)	**0.05**
Country of birth					
Australia	832/1754	47.4	1.00		
UK or Ireland	214/435	49.2	1.07	(0.87 – 1.33)	0.6
Europe, the USSR, Baltic States	110/211	52.4	1.22	(0.91 – 1.64)	0.2
Asia, Other	62/109	56.7	1.46	(0.97 – 2.20)	0.07
Marital status					
Married or living with partner	796/1562	51.0	1.00		
Separated/Divorced	101/201	50.4	0.98	(0.72 – 1.33)	0.9
Widowed	85/142	60.1	1.44	(1.00 – 2.07)	**0.05**
Never married	236/600	39.3	0.62	(0.51 – 0.76)	**<0.001**
Work status					
Full time employed	456/935	48.8	1.00		
Part time/Casual employed	190/419	45.3	0.87	(0.69 – 1.09)	0.3
Unemployed	56/125	44.6	0.84	(0.58 – 1.23)	0.5
Home duties/Retired	413/789	52.3	1.15	(0.95 – 1.39)	0.2
Student/Other	91/223	41.0	0.73	(0.54 – 0.98)	**0.04**

5.6.3 Quality of life profile of people who do not perform sufficient physical activity

Figure 5.3 shows the standard scores of the SF-36 subscales for people who do and do not perform sufficient physical activity. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was lower for people in the north west region of Adelaide who had not done sufficient physical activity compared to the general South Australian population. Insufficient physical activity had a moderate effect on physical functioning, general health, vitality, and mental health.

Figure 5.3: SF-36 standard scores for people who do and do not perform sufficient physical activity compared to the general South Australian population



5.6.4 Health service use of people who do not perform sufficient physical activity

People who had not done sufficient physical activity were statistically significantly more likely than people who had done sufficient physical activity to have used dietician services in the last 12 months (Table 5.12).

Table 5.12: Proportion of people who do and do not perform sufficient physical activity who used various health services in South Australia in the last 12 months

	Sufficient physical activity		Insufficient physical activity	
Variable	**n**	**%**	**n**	**%**
General Practitioner	1128	86.8	1089	89.0
Community Health Centre	53	4.1	59	4.8
District Nurses or other Community Nurses	23	1.7	25	2.1
Psychologist/Psychiatrist	54	4.2	70	5.7
Day Surgery	142	10.9	138	11.3
Hospital – Accident & Emergency Department	161	12.4	155	12.6
Hospital – Clinic (Outpatient/Specialist/Allied Health)	206	15.8	191	15.6
Eye Specialist/Ophthalmologist	294	25.5	294	22.6
Other Specialist Doctor (not in a hospital)	212	16.3	215	17.6
Physiotherapist	168	12.9	144	11.8
Chiropractor	167	12.8	142	11.6
Alternative Therapist eg. Naturopath, Osteopath	65	5.0	61	5.0
Podiatrist	112	8.6	107	8.7
Dietician	24	1.8 ∨	40	3.3 ∧
Nurse Educator	13	1.0	10	0.8
Other Health Service	67	5.1	69	5.6

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.7 Body mass index

5.7.1 Definition and prevalence

Body mass index (BMI) was calculated using height and weight measurements. Measurements were taken in the clinic using calibrated instruments and standard methods. The formula for calculation of BMI is as follows [1]:

$$\text{weight (kg)} / \text{height (m)}^2$$

The criteria for classifying BMI are as follows:

Table 5.13: BMI Criteria

Descriptive term	BMI
Underweight	Less than 20
Acceptable weight	20 to 25 inclusive
Overweight	greater than 25 and up to and including 30
Obese	greater than 30

The prevalence of overweight and obesity according to body mass index are shown in Table 5.14. Overall, 35.2% (95% CI 33.3 - 37.1) of study participants were overweight, and 28.5% (95% CI 26.8 - 30.4) of study participants were obese.

Table 5.14: Prevalence of overweight and obesity according to body mass index

	n	%
Underweight	126	5.0
Acceptable	787	31.2
Overweight	888	35.2
Obese	720	28.5
Not stated	2	0.1
Total	2523	100.0

In comparison, the prevalence estimates of overweight and obese (self-reported height and weight) obtained from South Australian population surveys [3] (n=11,977) were lower, with 33.1% of respondents were classified as overweight and 17.0% classified as obese. In addition, the population survey determined 7.1% of the respondents were classified as underweight and 42.8% had acceptable weight.

The prevalence rate of overweight/obesity and number of adults who were overweight or obese were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 5.15).

Table 5.15: Estimated prevalence of overweight/obesity by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**64.7**	**(62.6 – 66.7)**	**545900**
Northern	63.9	(61.9 – 66.0)	137100
Western	65.2	(63.1 – 67.2)	110000
Southern	65.2	(63.2 – 67.3)	158900
Eastern	64.5	(62.4 – 66.5)	139900
Country Regions	**66.2**	**(64.2 – 68.3)**	**194600**
Hills Mallee Southern	66.6	(64.6 – 68.7)	49200
Wakefield	67.4	(65.3 – 69.4)	40000
Mid North	66.9	(64.9 – 68.9)	14500
Riverland	66.5	(64.5 – 68.6)	20600
South East	65.4	(63.3 – 67.4)	30100
Eyre	66.2	(64.2 – 68.2)	15900
Northern & Far Western	64.2	(62.1 – 66.2)	24400
STATE	65.1	(63.0 – 67.1)	740500

5.7.2 Demographic profile of people who are overweight and obese according to body mass index

People who were overweight were statistically significantly more likely to be older, and from the United Kingdom or Ireland, and less likely to be female, never married, and to report work status as part time or casual employment, unemployed, or a student (Table 5.16).

Table 5.16: Univariate Odds Ratios for demographic variables associated with those classified as overweight

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	542/1236	43.9	1.00		
Female	346/1285	26.9	0.47	(0.40 – 0.56)	**<0.001**
Age group					
18 to 29 years	150/675	22.2	1.00		
30 to 39 years	147/452	32.4	1.69	(1.28 - 2.22)	**<0.001**
40 to 49 years	178/455	39.3	2.26	(1.72 – 2.96)	**<0.001**
50 to 59 years	140/350	39.9	2.32	(1.74 – 3.10)	**<0.001**
60 to 69 years	126/268	47.1	3.11	(2.27 – 4.24)	**<0.001**
70 years and over	147/320	45.8	2.97	(2.21 – 4.00)	**<0.001**
Area of residence					
Western suburbs	373/1024	36.4	1.00		
Northern suburbs	515/1497	34.4	0.92	(0.77 – 1.08)	0.3
Highest education level obtained					
Secondary	378/1114	34.0	1.00		
Trade/Apprenticeship/Cert/Diploma	380/1012	37.6	1.17	(0.98 – 1.40)	0.09
Bachelor degree or higher	102/294	34.6	1.03	(0.78 – 1.37)	0.9
Gross household income					
Up to $20,000	210/591	35.5	1.00		
$20,001-40,000	240/650	37.0	1.06	(0.84 – 1.35)	0.7
$40,001-60,000	194/577	33.6	0.92	(0.72 – 1.18)	0.5
More than $60,000	187/551	33.9	0.93	(0.72 – 1.20)	0.6
Not stated	57/151	37.7	1.10	(0.75– 1.62)	0.7
Country of birth					
Australia	583/1752	33.3	1.00		
UK or Ireland	186/435	42.7	1.50	(1.20 – 1.87)	**<0.001**
Europe, the USSR, Baltic States	84/211	39.7	1.33	(0.98 – 1.80)	0.07
Asia, Other	31/109	28.8	0.81	(0.51 – 1.26)	0.4
Marital status					
Married or living with partner	606/1561	38.8	1.00		
Separated/Divorced	76/201	37.7	0.96	(0.70 – 1.31)	0.8
Widowed	58/142	40.6	1.09	(0.76 – 1.57)	0.7
Never married	138/599	23.0	0.47	(0.38 – 0.59)	**<0.001**
Work status					
Full time employed	377/932	40.4	1.00		
Part time/Casual employed	103/419	24.5	0.48	(0.37 – 0.62)	**<0.001**
Unemployed	29/125	23.0	0.44	(0.29 – 0.68)	**<0.001**
Home duties/Retired	297/789	37.6	0.89	(0.73 – 1.08)	0.2
Student/Other	67/223	30.1	0.64	(0.46 – 0.87)	**0.005**

People who were obese were statistically significantly more likely to be female, older, living in the northern region of Adelaide, born in Europe, USSR or Baltic States, and to report work status as home duties or retired, and less likely to have a bachelor degree or higher, income between $20,001 and $40,000 or greater than $60,000, be born in Asia or other country, and never married (Table 5.17).

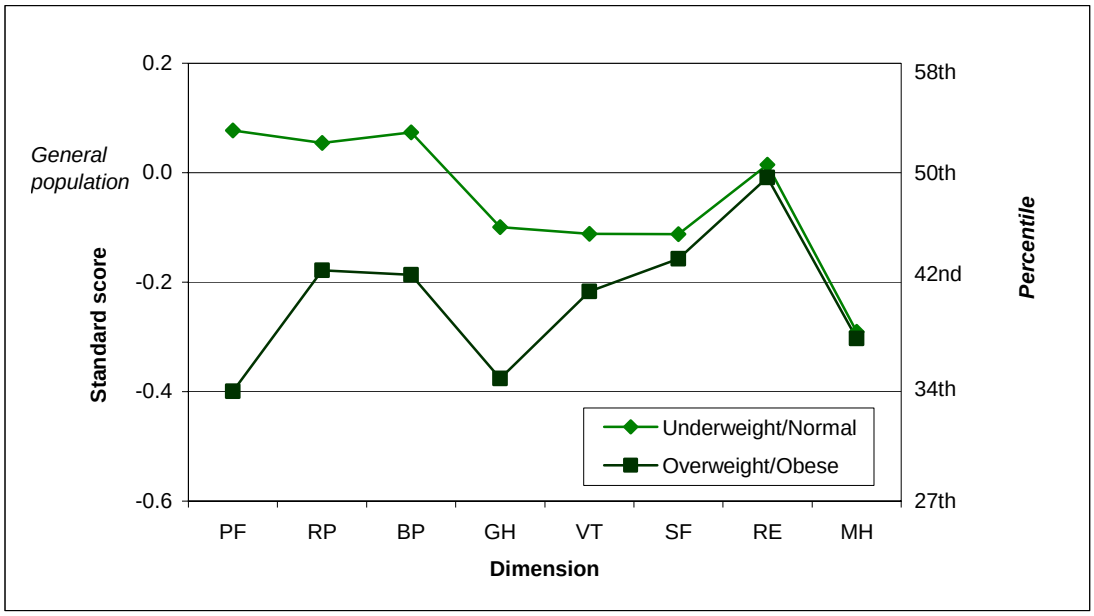
Table 5.17: Univariate Odds Ratios for demographic variables associated with those classified as obese

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	317/1236	25.6	1.00		
Female	403/1285	31.4	1.32	(1.11 – 1.58)	**0.002**
Age group					
18 to 29 years	142/675	21.0	1.00		
30 to 39 years	119/452	26.4	1.34	(1.01 – 1.79)	**0.04**
40 to 49 years	145/350	31.8	1.76	(1.33 –2.33)	**<0.001**
50 to 59 years	132/268	37.7	2.28	(1.70 – 3.06)	**<0.001**
60 to 69 years	93/320	34.5	1.99	(1.44 – 2.75)	**<0.001**
70 years and over	89/320	27.9	1.45	(1.05 – 1.99)	**0.02**
Area of residence					
Western suburbs	225/1024	22.0	1.00		
Northern suburbs	494/1497	33.0	1.75	(1.45 – 2.11)	**<0.001**
Highest education level obtained					
Secondary	345/1114	30.9	1.00		
Trade/Apprenticeship/Cert/Diploma	283/1012	28.0	0.87	(0.72 – 1.05)	0.2
Bachelor degree or higher	61/294	20.7	0.58	(0.42 – 0.80)	**<0.001**
Gross household income					
Up to $20,000	195/591	32.9	1.00		
$20,001-40,000	174/650	26.8	0.74	(0.58 – 0.95)	**0.02**
$40,001-60,000	184/577	31.9	0.95	(0.74 – 1.22)	0.7
More than $60,000	119/551	21.6	0.56	(0.43 – 0.74)	**<0.001**
Not stated	48/151	31.4	0.94	(0.63 – 1.40)	0.8
Country of birth					
Australia	497/1752	28.4	1.00		
UK or Ireland	124/435	28.6	1.01	(0.79 – 1.28)	1.00
Europe, USSR, Baltic States	74/211	35.3	1.37	(1.00 – 1.88)	**0.05**
Asia, Other	15/109	14.2	0.41	(0.22 – 0.73)	**0.002**
Marital status					
Married or living with partner	499/1561	32.0	1.00		
Separated/Divorced	65/201	32.4	1.02	(0.74 – 1.42)	0.9
Widowed	41/142	29.2	0.86	(0.58 – 1.28)	0.5
Never married	107/599	17.9	0.46	(0.36 – 0.59)	**<0.001**
Work status					
Full time employed	249/932	26.7	1.00		
Part time/Casual employed	101/419	24.1	0.87	(0.66 – 1.13)	0.3
Unemployed	40/125	32.3	1.30	(0.87 – 1.95)	0.2
Home duties/Retired	275/789	34.8	1.46	(1.19 – 1.80)	**<0.001**
Student/Other	45/223	20.4	0.70	(0.49 – 1.00)	0.05

5.7.3 Quality of life profile of people who are overweight or obese

Figure 5.4 shows the standard scores of the SF-36 subscales for people who are overweight or obese. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was lower for people in the north west region of Adelaide who were overweight or obese compared to the general South Australian population. Overweight or obesity had a moderate effect on physical functioning, and a mild effect on general health, vitality, and mental health.

Figure 5.4: SF-36 standard scores for people who are overweight or obese compared to the general South Australian population



5.7.4 Health service use of people who are overweight or obese

People who were overweight or obese were statistically significantly more likely than people who were underweight or normal weight to have used general practitioner, day surgery, hospital clinic, eye specialist or ophthalmologist, other specialist doctor, podiatrist, and dietician services in the last 12 months (Table 5.18).

Table 5.18: Proportion of people who were overweight or obese who used various health services in South Australia in the last 12 months

Variable	Normal/Underweight		Overweight/Obese	
	n	%	n	%
General Practitioner	784	85.7 ∨	1433	89.1 ∧
Community Health Centre	40	4.4	72	4.5
District Nurses or other Community Nurses	17	1.9	31	1.9
Psychologist/Psychiatrist	36	3.9	88	5.5
Day Surgery	80	8.8 ∨	199	12.4 ∧
Hospital – Accident & Emergency Department	118	12.9	197	12.3
Hospital – Clinic (Outpatient/Specialist/Allied Health)	117	12.8 ∨	280	17.4 ∧
Eye Specialist/Ophthalmologist	190	20.8 ∨	416	25.9 ∧
Other Specialist Doctor (not in a hospital)	134	14.6 ∨	293	18.2 ∧
Physiotherapist	107	11.7	205	12.8
Chiropractor	110	12.0	199	12.4
Alternative Therapist eg. Naturopath, Osteopath	55	6.0	71	4.4
Podiatrist	63	6.9 ∨	156	9.7 ∧
Dietician	9	0.9 ∨	55	3.4 ∧
Nurse Educator	4	0.5	18	1.1
Other Health Service	63	6.9 ∧	72	4.5 ∨

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.8 Waist hip ratio

5.8.1 Prevalence and definition

Waist hip ratio was calculated from measurements undertaken in the clinic of waist and hip circumference using a standard measuring tape. People were defined as having a high waist hip ratio, an indication of android obesity, if their waist hip ratio (WHR) was greater than 1.0 for men and greater than 0.85 for women [4]. Whereas BMI is a summary of overall height and weight, or total adiposity, WHR provides a measure of fat distribution. An android or centralised pattern of fat distribution, where excess body fat is distributed in the abdominal region rather than on the hips and thighs, plays an important role in determining risk of cardiovascular disease and diabetes, particularly in men[4,8].

The prevalence of high waist hip ratio is shown in Table 5.19.

Table 5.19: Prevalence of high waist hip ratio

	n	%
Waist hip ratio less than or equal to 1.0 in men and 0.85 in women	2101	83.3
Waist hip ratio greater than 1.0 in men and 0.85 in women	422	16.7
Total	2523	100.0

The prevalence rate of high waist hip ratio and number of people who had a high waist hip ratio were estimated for the regions and South Australia overall by applying the age, sex specific rates to the population distribution (Table 5.20).

Table 5.20: Estimated prevalence of high waist hip ratio by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**17.4**	**(15.8 – 19.0)**	**146900**
Northern	16.1	(14.5 – 17.7)	34600
Western	18.0	(16.3 – 19.6)	30300
Southern	17.9	(16.2 – 19.5)	43500
Eastern	17.7	(16.1 – 19.3)	38400
Country Regions	**17.5**	**(15.9 – 19.1)**	**51400**
Hills Mallee Southern	18.0	(16.4 – 19.7)	13300
Wakefield	18.3	(16.7 – 20.0)	10900
Mid North	18.4	(16.7 – 20.0)	4000
Riverland	17.5	(15.9 – 19.2)	5400
South East	17.0	(15.4 – 18.6)	7800
Eyre	17.3	(15.6 – 18.9)	4100
Northern & Far Western	15.4	(13.9 – 17.0)	5900
STATE	17.4	(15.8 – 19.1)	198300

5.8.2 Demographic profile of people with a high waist hip ratio

People with a high waist hip ratio were statistically significantly more likely to be female, older, born in the United Kingdom or Ireland, widowed, and have a work status of part time or casual employment, undertaking home duties, or retired, and less likely to be never married, have post-secondary education, and income between $20,000 and $60,000 (Table 5.21).

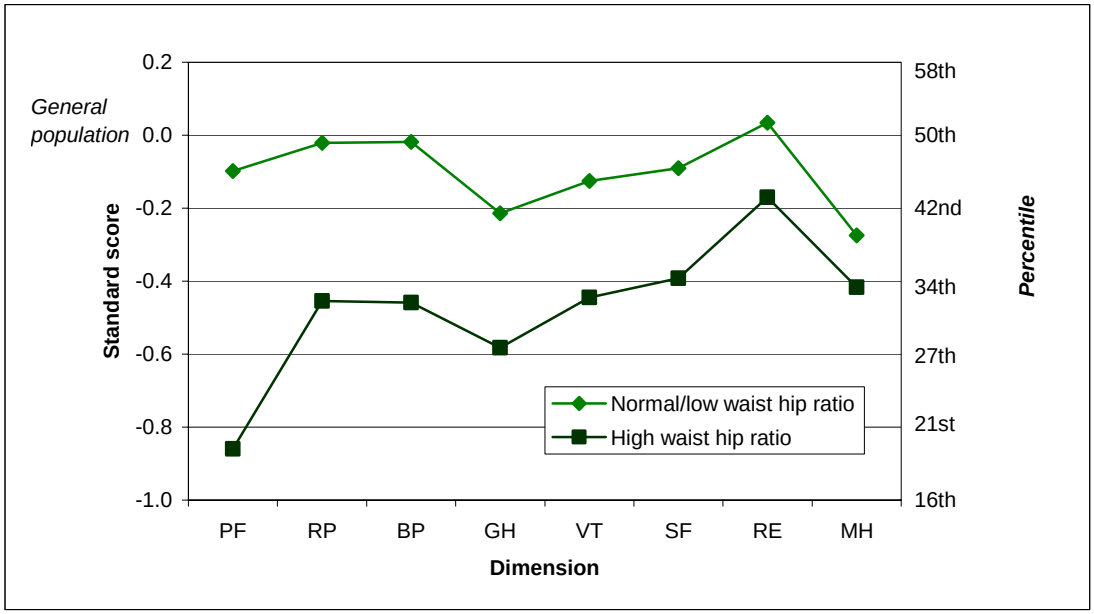
Table 5.21: Univariate Odds Ratios for demographic variables associated with high waist hip ratio

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	90/1236	7.3	1.00		
Female	332/1287	25.8	4.42	(3.42 – 5.71)	**<0.001**
Age group					
18 to 29 years	39/675	5.8	1.00		
30 to 39 years	36/454	8.0	1.41	(0.86 – 2.31)	0.2
40 to 49 years	86/455	19.0	3.81	(2.51 – 5.80)	**<0.001**
50 to 59 years	88/351	25.0	5.46	(3.58 – 8.34)	**<0.001**
60 to 69 years	69/268	25.7	5.65	(3.63 – 8.83)	**<0.001**
70 years and over	103/320	32.1	7.74	(5.10 – 11.78)	**<0.001**
Highest education level obtained					
Secondary	234/1114	21.0	1.00		
Trade/Apprenticeship/Cert/Diploma	145/1014	14.3	0.63	(0.50 – 0.79)	**<0.001**
Bachelor degree or higher	26/294	8.9	0.36	(0.23 – 0.57)	**<0.001**
Gross household income					
Up to $20,000	154/591	26.1	1.00		
$20,001-40,000	104/652	15.9	0.54	(0.40 – 0.72)	**<0.001**
$40,001-60,000	77/577	13.3	0.44	(0.32 – 0.60)	**<0.001**
More than $60,000	51/552	9.2	0.29	(0.20 – 0.41)	**<0.001**
Not stated	37/151	24.5	0.92	(0.60 – 1.42)	0.8
Country of birth					
Australia	269/1754	15.3	1.00		
UK or Ireland	91/435	20.8	1.46	(1.11 – 1.92)	**0.006**
Europe, USSR, Baltic States	41/211	19.5	1.33	(0.91 – 1.95)	0.2
Asia , Other	17/109	15.2	1.02	(0.58 – 1.78)	0.9
Marital status					
Married or living with partner	278/1562	17.8	1.00		
Separated/Divorced	44/201	22.0	1.30	(0.90 – 1.89)	0.2
Widowed	56/142	39.2	3.01	(2.06 – 4.38)	**<0.001**
Never married	42/600	6.9	0.35	(0.24 – 0.49)	**<0.001**
Work status					
Full time employed	87/935	9.3	1.00		
Part time/Casual employed	63/419	15.0	1.73	(1.22 – 2.45)	**0.002**
Unemployed	16/125	12.7	1.42	(0.80 – 2.52)	0.2
Home duties/Retired	221/789	28.1	3.82	(2.92 – 5.01)	**<0.001**
Student/Other	26/223	11.5	1.27	(0.80 – 2.03)	0.3

5.8.3 Quality of life profile of people with a high waist hip ratio

Figure 5.5 shows the standard scores of the SF-36 subscales for people with a high waist hip ratio. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was lower for people with a high waist hip ratio in the north west region of Adelaide compared to the general South Australian population. A high waist hip ratio had a severe effect on physical functioning, and a moderate effect on role-physical, bodily pain, general health, and vitality.

Figure 5.5: SF-36 standard scores for people with and without a high waist hip ratio compared to the general South Australian population



5.8.4 Health service use of people with a high waist hip ratio

People with a high waist hip ratio were statistically significantly more likely than people with a normal or low waist hip ratio to have used general practitioner, community health centre, day surgery, hospital accident and emergency, hospital clinic, eye specialist or ophthalmologist, other specialist doctor, physiotherapist, podiatrist, dietician and nurse educator services in the last 12 months (Table 5.22).

Table 5.22: Proportion of people with and without a high waist hip ratio who used various health services in South Australia in the last 12 months

Variable	Normal/low waist hip ratio		High waist hip ratio	
	n	%	n	%
General Practitioner	1831	87.1 ∨	387	91.6 ∧
Community Health Centre	84	4.0 ∨	28	6.6 ∧
District Nurses or other Community Nurses	40	1.9	8	1.9
Psychologist/Psychiatrist	100	4.8	24	5.6
Day Surgery	217	10.3 ∨	62	14.7 ∧
Hospital – Accident & Emergency Department	239	11.4 ∨	77	18.2 ∧
Hospital – Clinic (Outpatient/Specialist/Allied Health)	295	14.0 ∨	102	24.2 ∧
Eye Specialist/Ophthalmologist	473	22.5 ∨	134	31.7 ∧
Other Specialist Doctor (not in a hospital)	341	16.2 ∨	86	20.3 ∧
Physiotherapist	246	11.7 ∨	66	15.6 ∧
Chiropractor	266	12.7	43	10.2
Alternative Therapist eg. Naturopath, Osteopath	108	5.1	17	4.1
Podiatrist	149	7.1 ∨	70	16.6 ∧
Dietician	44	2.1 ∨	20	4.7 ∧
Nurse Educator	14	0.6 ∨	9	2.1 ∧
Other Health Service	119	5.7	16	3.8

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.9 Blood Pressure

5.9.1 Definition and prevalence

Blood pressure was measured in the clinic using a standard, calibrated blood pressure sphygmomanometer. Two blood pressure measurements were recorded, five to ten minutes apart, while the participant was relaxed and seated. The average of these two recorded measures was used in the analyses.

High blood pressure was defined as systolic blood pressure greater than or equal to 140mmHg and/or diastolic blood pressure greater than or equal to 90 mmHg [1,5]. The prevalence of hypertension according to clinical assessment is shown in Table 5.23. Overall, 27.7% (95% CI 26.0 - 29.5) of study participants had high blood pressure.

Table 5.23: Hypertension (high blood pressure)

	n	%
Normal	1824	72.3
High blood pressure (mmHg)	699	27.7
Total	2523	100.0

In comparison, the prevalence estimates of self-reported high blood pressure obtained from South Australian population surveys [3] (n=11,977) were lower, with 26.4% of respondents reporting that they were ever told they have high blood pressure and 6.9% reporting a high blood pressure reading within the last 12 months.

The prevalence rate of high blood pressure and number of people with high blood pressure in South Australia and the regions were estimated by applying the age, sex specific rates to the population distribution (Table 5.24).

Table 5.24: Estimated prevalence of high blood pressure by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**28.8**	**(26.8 - 30.7)**	**242800**
Northern	26.2	(24.3 - 28.1)	56200
Western	30.5	(28.5 - 32.5)	51500
Southern	29.4	(27.4 - 31.4)	71700
Eastern	29.3	(27.3 - 31.2)	63500
Country Regions	**30.0**	**(28.0 - 31.9)**	**88000**
Hills Mallee Southern	30.7	(28.7 - 32.7)	22700
Wakefield	31.6	(29.6 - 33.6)	18800
Mid North	31.3	(29.3 - 33.3)	6800
Riverland	30.3	(28.3 - 32.3)	9400
South East	28.8	(26.8 - 30.7)	13300
Eyre	29.7	(27.8 - 31.7)	7100
Northern & Far Western	26.4	(24.5 - 28.3)	10000
STATE	29.1	(27.1 - 31.0)	330900

5.9.2 Demographic profile of people with and without high blood pressure

Statistical analyses (Table 5.25) were conducted to determine which demographic characteristics best described people with high blood pressure. People who had high blood pressure were statistically significantly more likely than people without high blood pressure to be male, to be in the older age groups, to be living in the northern suburbs, to have household income less than $20,000 per annum, to be widowed, to be born in Northern, Western and Eastern Europe, USSR and the Baltic States, the United Kingdom or Ireland, and to be retired or undertaking home duties. They were less likely to be never married or have an educational level of bachelor degree or higher.

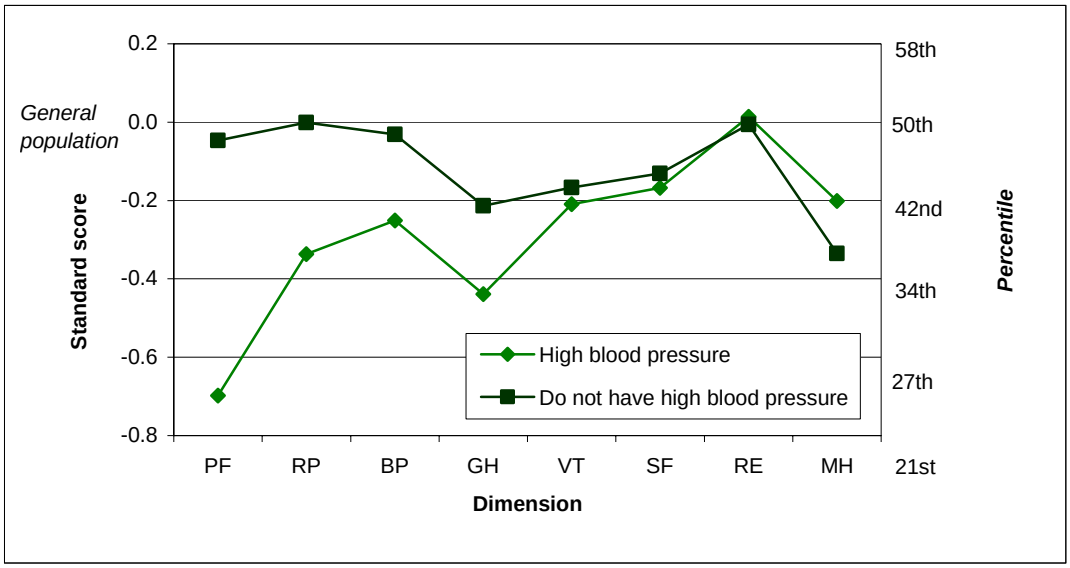
Table 5.25: Univariate Odds Ratios for demographic variables associated with high blood pressure

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	373/1236	30.2	1.00		
Female	326/1287	25.3	0.78	(0.66 – 0.94)	**0.007**
Age group					
18 to 29 years	49/675	7.3	1.00		
30 to 39 years	67/454	14.8	2.21	(1.47 – 3.33)	**<0.001**
40 to 49 years	114/455	16.3	4.27	(2.94 – 6.22)	**<0.001**
50 to 59 years	133/351	19.0	7.79	(5.35 – 11.38)	**<0.001**
60 to 69 years	126/268	47.0	11.34	(7.65 – 16.83)	**<0.001**
70 years and over	210/320	65.7	24.39	(16.56 – 36.0)	**<0.001**
Area of residence					
Western suburbs	253/1024	24.7	1.00		
Northern suburbs	446/1499	29.8	1.29	(1.07 – 1.55)	**0.005**
Highest education level obtained					
Secondary	346/1114	31.0	1.00		
Trade/Apprenticeship/ Cert/Diploma	296/1014	29.2	0.92	(0.76 – 1.11)	0.38
Bachelor degree or higher	32/294	10.8	0.27	(0.18 – 0.41)	**<0.001**
Gross household income					
Up to $20,000	248/591	41.9	1.00		
$20,001-40,000	183/652	28.1	0.54	(0.42 – 0.69)	**<0.001**
$40,001-60,000	121/577	21.0	0.37	(0.28 – 0.48)	**<0.001**
More than $60,000	91/552	16.5	0.27	(0.21 – 0.36)	**<0.001**
Not stated	56/151	36.7	0.81	(0.55 – 1.18)	0.29
Country of birth					
Australia	436/1754	24.9	1.00		
UK or Ireland	155/435	35.6	1.67	(1.33 – 2.11)	**<0.001**
Southern Europe	31/98	31.5	1.40	(0.88 – 2.21)	0.17
Northern & Western Europe	33/64	50.9	3.22	(1.89 – 5.47)	**<0.001**
Eastern Europe, USSR, Baltic States	20/49	41.2	2.08	(1.12 – 3.85)	**0.02**
Asia	8/63	13.2	0.45	(0.20 – 0.99)	**0.05**
Marital status					
Married or living with partner	476/1562	30.5	1.00		
Separated/Divorced	63/201	31.4	1.04	(0.75 – 1.45)	0.87
Widowed	92/142	64.7	4.19	(2.88 – 6.11)	**<0.001**
Never married	60/600	10.0	0.25	(0.19 – 0.34)	**<0.001**
Work status					
Full time employed	196/935	21.0	1.00		
Part time/Casual employed	72/419	17.1	0.78	(0.57 – 1.06)	0.12
Unemployed	19/125	15.0	0.68	(0.39 – 1.16)	0.17
Home duties / retired	363/789	46.0	3.21	(2.60 – 3.96)	**<0.001**
Student / other	35/223	15.6	0.70	(0.47 – 1.04)	0.07

5.9.3 Quality of life profile of people with high blood pressure

Figure 5.6 shows the standard scores of the SF-36 subscales for people who do and do not have high blood pressure. For details on the calculation and the interpretation of standard scores, see Appendix 1. High blood pressure had a severe effect on physical functioning and general health, and a moderate effect on role-physical, bodily functioning and vitality.

Figure 5.6: SF-36 standard scores for people who do and do not have high blood pressure compared to the general South Australian population



5.9.4 Health service use of people with high blood pressure

People who had high blood pressure were statistically significantly more likely than people who did not have high blood pressure to have used general practitioner, community health centre, day surgery, hospital clinic or outpatients, eye specialist/ophthalmologist, podiatrist and nurse educator services in the last 12 months, and less likely to have used psychologist, psychiatrist or alternative therapist services (Table 5.26).

Table 5.26: Proportion of people who do and do not have high blood pressure who used various health services in South Australia in the last 12 months

Variable	Normal/low blood pressure		High blood pressure	
	n	%	n	%
General Practitioner	1590	87.2 ∨	627	89.7 ∧
Community Health Centre	69	3.8 ∨	43	6.1 ∧
District Nurses or other Community Nurses	37	2.1	11	1.5
Psychologist/Psychiatrist	102	5.6 ∧	22	3.1 ∨
Day Surgery	185	10.2 ∨	94	13.5 ∧
Hospital – Accident & Emergency Department	233	12.8	82	11.7
Hospital – Clinic (Outpatient/Specialist/Allied Health)	270	14.8 ∨	126	18.1 ∧
Eye Specialist/Ophthalmologist	388	21.3 ∨	218	31.2 ∧
Other Specialist Doctor (not in a hospital)	302	16.5	125	17.9
Physiotherapist	238	13.0	74	10.6
Chiropractor	240	13.1 ∧	69	9.9 ∨
Alternative Therapist eg. Naturopath, Osteopath	105	5.8 ∧	20	2.9 ∨
Podiatrist	121	6.6 ∨	98	14.0 ∧
Dietician	45	2.5	19	2.7
Nurse Educator	11	0.6 ∨	11	1.6 ∧
Other Health Service	115	6.3 ∧	20	2.9 ∨

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.10 Cholesterol

5.10.1 Definition and prevalence

Cholesterol levels were assessed with a fasted blood sample. The two components making up the definition of high cholesterol are the total blood cholesterol (TBC) being greater than or equal to 5.5 mmol/L [6] or the ratio of low density lipids (LDL) to high density lipids (HDL) being greater than 5 [7].

The prevalence of high cholesterol according to clinical assessment using the definition of total blood cholesterol greater than or equal to 5.5 mmol/L is shown in Table 5.27.

Table 5.27: High total cholesterol ≥ 5.5 mmol/L (Clinical assessment)

	n	%
No	1533	60.8
Yes	922	36.5
Not stated	68	2.7
Total	2523	100.0

The prevalence of high cholesterol according to clinical assessment using the definition of the ratio of LDL:HDL greater than 5 is shown in Table 5.28.

Table 5.28: High cholesterol LDL:HDL > 5 (Clinical assessment)

	n	%
No	2360	93.8
Yes	37	1.5
Not stated	119	4.7
Total	2523	100.0

The prevalence of high cholesterol according to both definitions is shown in Table 5.29.

Table 5.29: The prevalence of high cholesterol levels according to both definitions

	n	%
No	1514	60.0
Yes (total cholesterol ≥ 5.5 mmol/L only)	890	35.3
Yes (LDL:HDL > 5 only)	5	0.2
Yes (total cholesterol ≥ 5.5 mmol/L and LDL:HDL > 5)	32	1.3
Not stated	82	3.3
Total	2523	100.0

Thus the overall prevalence of high cholesterol according to both definitions is presented below (Table 5.30). Overall, 36.7% (95% CI 34.9 – 38.7) of study participants had high cholesterol.

Table 5.30: Overall prevalence of high cholesterol

	n	%
No	1514	60.0
Yes (total cholesterol ≥ 5.5 mmol/L; LDL:HDL > 5; or both)	927	36.7
Not stated	82	3.3
Total	2523	100.0

In comparison, the prevalence estimates of self-reported high cholesterol obtained from South Australian population surveys [3] (n=11,977) were lower, with 18% of respondents reporting that they were ever told they have high cholesterol and 15.2% reporting a high cholesterol reading within the last 12 months.

Total blood cholesterol levels above 5.5 mmol/L are an indication of an increased risk of developing coronary heart disease [6], therefore the total blood cholesterol definition detailed in Table 5.27 was used for further analysis, with the “not stated” results excluded.

The prevalence rate of high cholesterol and number of people with high cholesterol in South Australia and the regions were estimated by applying the age, sex specific rates to the population distribution (Table 5.31).

Table 5.31: Estimated prevalence of high cholesterol by region, age-sex adjusted to the 1999 Estimated Resident Population

	%	Estimated (95% CI)	Approximate n
Metropolitan Regions	**37.7**	**(35.6 – 39.8)**	**317900**
Northern	37.1	(35.0 - 39.1)	79500
Western	38.0	(35.9 - 40.1)	64100
Southern	38.1	(36.0 - 40.2)	92900
Eastern	37.5	(35.5 – 39.6)	81400
Country Regions	**38.7**	**(36.6 – 40.8)**	**113700**
Hills Mallee Southern	39.1	(37.0 - 41.2)	28800
Wakefield	39.6	(37.5 – 41.7)	23500
Mid North	39.3	(37.2 – 41.4)	8500
Riverland	38.8	(36.7 - 40.9)	12000
South East	38.0	(35.9 - 40.1)	17500
Eyre	38.6	(36.5 – 40.7)	9300
Northern & Far Western	36.9	(34.8 - 39.0)	14000
STATE	37.9	(35.9 - 40.0)	431600

5.10.2 Demographic profile of people with and without high cholesterol

Statistical analyses (Table 5.32) were conducted to determine which demographic characteristics best described people with high cholesterol. People with high cholesterol were statistically significantly more likely than people who do not have high cholesterol to be in the older age groups, to be born in Europe, USSR and the Baltic States, and to be unemployed or undertaking home duties, and they were less likely to be a student, have household income greater than $40,000 per annum and to have never married.

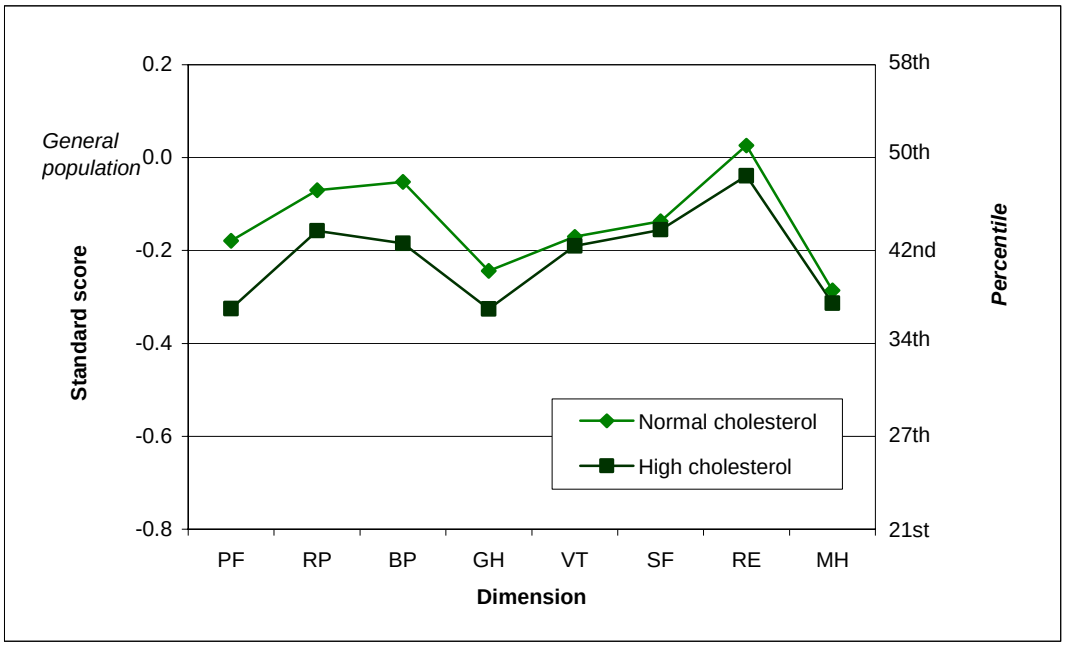
Table 5.32: Univariate Odds Ratios for demographic variables associated with high cholesterol

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	440/1236	35.6	1.00		
Female	487/1287	37.8	1.09	(0.93 – 1.29)	0.3
Age group					
18 to 29 years	129/675	19.1	1.00		
30 to 39 years	152/454	33.5	2.07	(1.57 – 2.73)	**<0.001**
40 to 49 years	188/455	41.3	2.81	(2.15 – 3.68)	**<0.001**
50 to 59 years	191/351	54.4	4.81	(3.61 – 6.41)	**<0.001**
60 to 69 years	128/268	47.7	3.68	(2.70 – 5.02)	**<0.001**
70 years and over	139/320	43.5	3.13	(2.33 – 4.21)	**<0.001**
Area of residence					
Western suburbs	397/1024	38.8	1.00		
Northern suburbs	529/1499	35.3	0.88	(0.75 – 1.04)	0.1
Highest education level obtained					
Secondary	424/1114	38.1	1.00		
Trade/Apprenticeship/Cert/Diploma	378/1014	37.3	0.96	(0.81 – 1.15)	0.7
Bachelor degree or higher	97/294	33.1	0.83	(0.63 – 1.10)	0.2
Gross household income					
Up to $20,000	233/591	39.4	1.00		
$20,001-40,000	263/652	40.4	1.04	(0.83 – 1.31)	0.7
$40,001-60,000	193/577	33.5	0.78	(0.61 – 1.00)	**0.05**
More than $60,000	184/552	33.4	0.77	(0.61 – 0.98)	**0.03**
Not stated	53/151	34.8	0.84	(0.57 – 1.22)	0.3
Country of birth					
Australia	625/1754	35.6	1.00		
UK or Ireland	166/435	38.2	1.11	(0.89 – 1.38)	0.4
Europe, USSR, Baltic States	94/211	44.7	1.40	(1.05 – 1.87)	**0.02**
Asia, Other	32/109	29.9	0.80	(0.52 – 1.23)	0.3
Marital status					
Married or living with partner	622/1562	39.8	1.00		
Separated/Divorced	87/201	43.3	1.12	(0.83 – 1.51)	0.5
Widowed	64/142	45.1	1.22	(0.86 – 1.73)	0.3
Never married	148/600	24.7	0.51	(0.41 – 0.63)	**<0.001**
Work status					
Full time employed	325/935	34.8	1.00		
Part time/Casual employed	134/419	32.1	0.87	(0.68 – 1.11)	0.3
Unemployed	42/125	33.6	0.97	(0.65 – 1.45)	0.9
Home duties	155/347	44.8	1.49	(1.16 – 1.92)	**0.002**
Retired	188/442	42.6	1.34	(1.06 – 1.69)	**0.01**
Student	33/153	21.6	0.52	(0.35 – 0.79)	**0.002**
Other	28/70	39.5	1.20	(0.73 – 1.97)	0.5

5.10.3 Quality of life profile of people with high cholesterol

Figure 5.7 shows the standard scores of the SF-36 subscales for people with and without high cholesterol. For details on the calculation and the interpretation of standard scores, see Appendix 1. Quality of life was marginally lower for people with high cholesterol than for people with normal cholesterol in the north west region of Adelaide compared to the general South Australian population.

Figure 5.7: SF-36 standard scores for people with high cholesterol compared to the general South Australian population



5.10.4 Health service use of people with high cholesterol

Statistical analyses were conducted to determine which health services in South Australia were more likely to be used in the last 12 months by high cholesterol (Table 5.33). People with high cholesterol were statistically significantly more likely than people without high cholesterol to have used eye specialist or ophthalmologist services in the last 12 months.

Table 5.33: Proportion of people with high cholesterol who used various health services used in South Australia in the last 12 months

	Normal cholesterol		High cholesterol	
Variable	**n**	**%**	**n**	**%**
General Practitioner	1328	87.7	820	88.5
Community Health Centre	64	4.2	47	5.1
District Nurses or other Community Nurses	25	1.6	24	2.5
Psychologist/Psychiatrist	70	4.6	47	5.1
Day Surgery	1339	88.5	821	88.6
Hospital – Accident & Emergency Department	196	12.9	112	12.1
Hospital – Clinic (Outpatient/Specialist/Allied Health)	239	15.8	146	15.7
Eye Specialist/Ophthalmologist	340	22.4 ∨	244	26.4 ∧
Other Specialist Doctor (not in a hospital)	254	16.8	162	17.4
Physiotherapist	198	13.1	112	12.1
Chiropractor	193	12.7	111	12.0
Alternative Therapist eg. Naturopath, Osteopath	70	4.6	49	5.3
Podiatrist	131	8.7	83	9.0
Dietician	42	2.8	20	2.1
Nurse Educator	13	0.8	10	1.1
Other Health Service	93	6.2	37	4.0

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.11 Family history

5.11.1 Definition and prevalence

To ascertain whether there was a family history of diabetes, heart disease or stroke, clinic attendees were asked in the questionnaire if any of their first degree relatives (mother, father, sister, brother, grandmother, grandfather or other) has or has ever had diabetes, heart disease (eg heart disease or heart failure) or a stroke.

The prevalence of a family history of diabetes, heart disease and stroke is shown in Table 5.34.

Table 5.34: Family history of diabetes, heart disease and stroke in a first degree relative

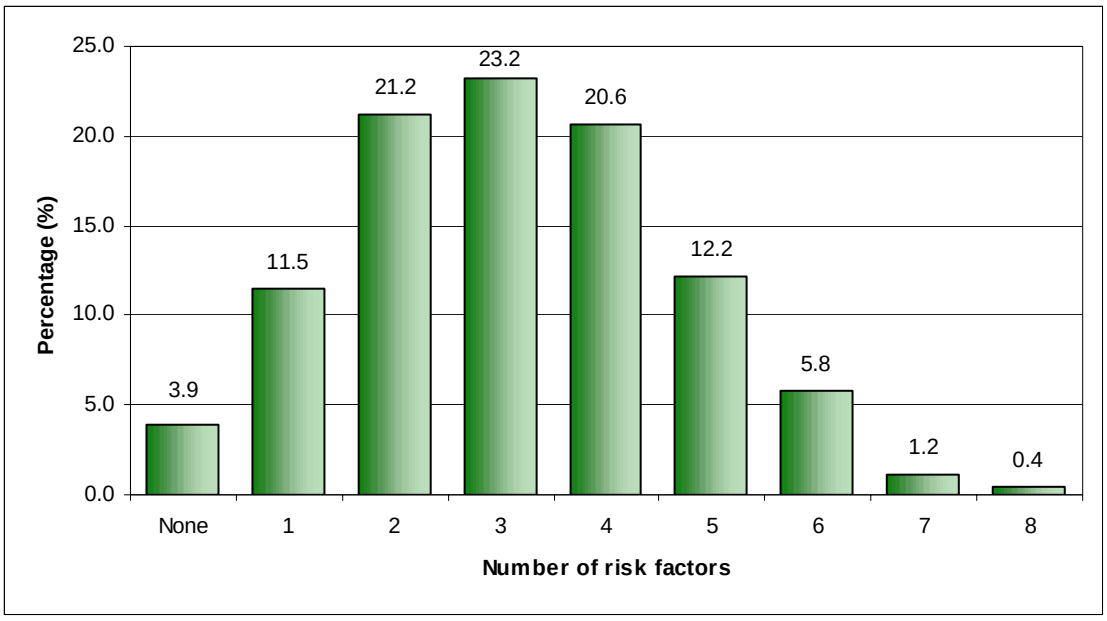
	n	%
Diabetes		
No family history	1657	65.7
Family history	866	34.3
Heart disease		
No family history	1231	48.8
Family history	1292	51.2
Stroke		
No family history	1632	64.7
Family history	891	35.3
Total	2523	100.0

5.12 Multiple risk factors

Examining the number of risk factors is important because the likelihood of developing chronic disease increases with increasing number of risk factors. Multiple risk factors were derived by accumulating the nine risk factors that were measured or self-reported in the study. The risk factors are current smokers, people who were classified as intermediate to very high alcohol risk drinkers, no or insufficient physical activity, people who were classified as overweight or obese, people classified as having a high waist hip ratio, people with a family history of heart disease, diabetes and stroke, and people with high blood pressure or high cholesterol.

The proportion of people who had no risk factors or one to eight risk factors for development of cardiovascular diseases is shown in Figure 5.8. Approximately, 40% of the people living in the North Western suburbs of Adelaide had at least four risk factors for development of cardiovascular disease.

Figure 5.8: Number of risk factors for development of chronic diseases



5.12.1 Demographic profile of people four or more risk factors

Statistical analyses (Table 5.35) were conducted to determine which demographic characteristics best described people with four or more risk factors. People who had four or more risk factors were statistically significantly more likely than people with

three or less risk factors to be female, to be in the older age groups, to be living in the northern suburbs, to be widowed, and to be retired or undertaking home duties. They were less likely to have an educational level of bachelor degree or higher, to have household income more than $40,000 per annum, to be born in Asia or 'other', to be never married, and to be a student or 'other'.

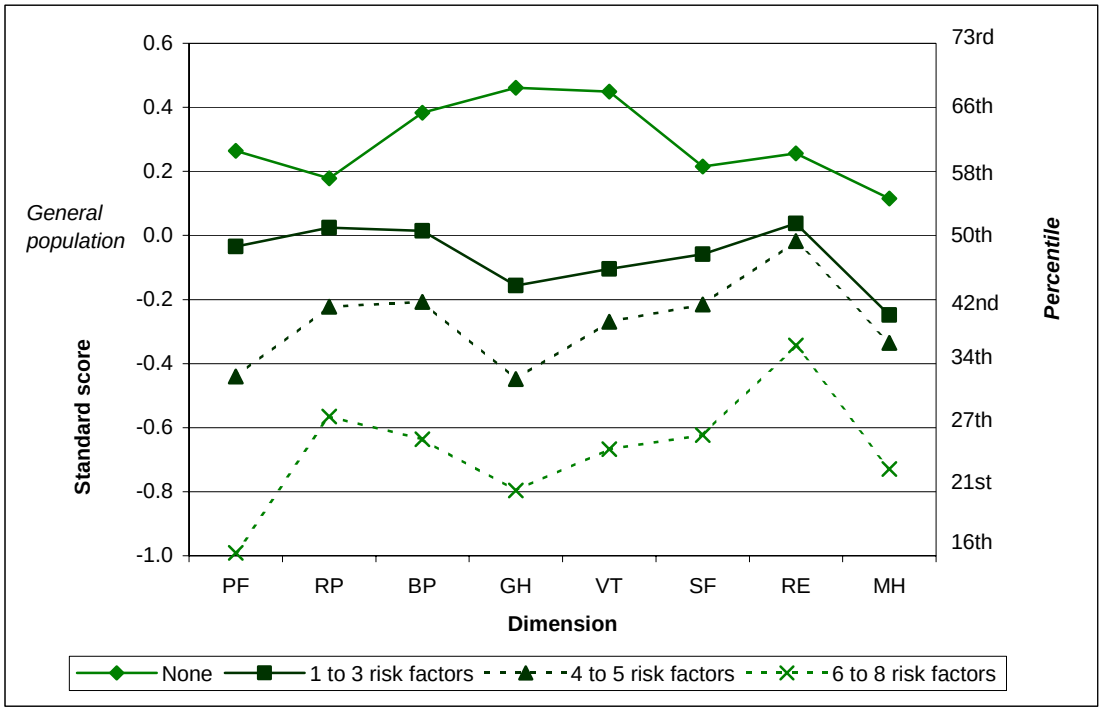
Table 5.35: Univariate Odds Ratios for demographic variables associated with four or more risk factors

Variable	n	%	OR	(95% CI)	p value
Sex					
Male	465/1236	37.6	1.00		
Female	547/1287	42.5	1.23	(1.05 - 1.44)	**0.01**
Age group					
18 to 29 years	162/675	24.0	1.00		
30 to 39 years	137/454	30.3	1.38	(1.05 - 1.80)	**0.02**
40 to 49 years	198/455	43.6	2.46	(1.90 - 3.17)	**<0.001**
50 to 59 years	195/351	55.5	3.95	(3.00 - 5.20)	**<0.001**
60 to 69 years	136/268	50.6	3.25	(2.41 - 4.37)	**<0.001**
70 years and over	184/320	57.6	4.30	(3.24 - 5.71)	**<0.001**
Area of residence					
Western suburbs	364/1024	35.6	1.00		
Northern suburbs	648/1499	43.2	1.38	(1.17 - 1.62)	**<0.001**
Highest education level obtained					
Secondary	495/1114	44.5	1.00		
Trade/Apprenticeship/Cert/Diploma	416/1014	41.0	0.87	(0.73 - 1.03)	0.11
Bachelor degree or higher	69/294	23.4	0.38	(0.28 - 0.51)	**<0.001**
Gross household income					
Up to $20,000	273/591	46.3	1.00		
$20,001-40,000	277/652	42.5	0.86	(0.69 - 1.07)	0.18
$40,001-60,000	208/577	36.1	0.66	(0.52 - 0.83)	**<0.001**
More than $60,000	180/552	32.6	0.56	(0.44 - 0.72)	**<0.001**
Not stated	73/151	48.3	1.08	(0.76 - 1.55)	0.66
Country of birth					
Australia	704/1754	40.1	1.00		
UK or Ireland	191/435	43.9	1.17	(0.94 - 1.44)	0.15
Europe, USSR, Baltic States	88/211	41.5	1.06	(0.79 - 1.42)	0.69
Asia, Other	24/109	21.9	0.42	(0.26 - 0.67)	**<0.001**
Marital status					
Married or living with partner	645/1562	41.3	1.00		
Separated/Divorced	95/201	47.2	1.27	(0.95 - 1.70)	0.11
Widowed	96/142	67.6	2.96	(2.05 - 4.26)	**<0.001**
Never married	173/600	28.7	0.57	(0.47 - 0.70)	**<0.001**
Work status					
Full time employed	354/935	37.9	1.00		
Part time/Casual employed	147/419	35.0	0.88	(0.70 - 1.12)	0.32
Unemployed	46/125	37.3	0.97	(0.66 - 1.43)	0.90
Home duties/Retired	388/789	49.2	1.59	(1.31 - 1.93)	**<0.001**
Student/Other	59/223	26.3	0.59	(0.42 - 0.81)	**0.001**

5.12.2 Quality of life profile of people with multiple risk factors

Figure 5.7 shows the standard scores of the SF-36 subscales for people with multiple risk factors. For details on the calculation and the interpretation of standard scores, see Appendix 1. For all dimensions, quality of life was increasingly impaired with increasing number of risk factors.

Figure 5.9: SF-36 standard scores for people with no, one to three, four to five and six or more risk factors compared to the general South Australian population



5.12.3 Health service use of people with four or more risk factors

Statistical analyses were conducted to determine which health services in South Australia were more likely to be used in the last 12 months by four or more risk factors (Table 5.36). People with four or more risk factors were statistically significantly more likely than people with no risk factors or one to three risk factors, to have used general practitioner, community health centres, hospital outpatient clinic, eye specialist or ophthalmologist, other specialist doctor (not in a hospital), podiatrist and dietician services in South Australia in the last 12 months.

Table 5.36: Proportion of people with four or more risk factors who used various health services used in South Australia in the last 12 months

	No risk factors or one to three risk factors		Four or more risk factors	
Variable	**n**	**%**	**n**	**%**
General Practitioner	1300	86.1 ∨	917	90.6 ∧
Community Health Centre	53	3.5 ∨	59	5.8 ∧
District Nurses or other Community Nurses	31	2.0	17	1.7
Psychologist/Psychiatrist	70	4.6	54	5.3
Day Surgery	160	10.6	119	11.8
Hospital – Accident & Emergency Department	182	12.0	134	13.2
Hospital – Clinic (Outpatient/Specialist/Allied Health)	203	13.5 ∨	193	19.1 ∧
Eye Specialist/Ophthalmologist	321	21.3 ∨	285	28.1 ∧
Other Specialist Doctor (not in a hospital)	235	15.6 ∨	192	19.0 ∧
Physiotherapist	186	12.3	126	12.4
Chiropractor	189	12.5	120	11.9
Alternative Therapist eg. Naturopath, Osteopath	81	5.4	44	4.4
Podiatrist	103	6.8 ∨	116	11.5 ∧
Dietician	30	2.0 ∨	34	3.3 ∧
Nurse Educator	13	0.9	10	1.0
Other Health Service	95	6.3 ∧	40	3.9 ∨

∧ ∨ Statistically significantly higher or lower than comparison group ($p<0.05$)

5.13 References

1. National Heart Foundation of Australia. *Risk Factor Prevalence Study. Survey No. 3 - 1989*. 1989.
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APPENDIX 1: STUDY METHODOLOGY

Study design

CATI Recruitment of sample

All households in the north western area of Adelaide with a telephone connected and the telephone number listed in the Electronic White Pages (EWP) were eligible for selection in the North West Adelaide Health Study. The sample was stratified into the two health regions: Western Adelaide and Northern Adelaide.

Within each household, the person who had their birthday last, and was 18 years or older, was selected for interview and invited to attend the clinic.

Introductory letter

A letter introducing the study and an information brochure was sent to the household of each selected telephone number. The letter and brochure informed people of the purpose of the survey and indicated that they could expect to be contacted by telephone. People who previously refused or agreed to participate in the study but could not attend were sent another letter about the study.

Initial Interview Questions

The issues covered in the recruitment questionnaire were:

- Self reported health conditions
- Mental health
- Smoking status
- Reason for not wanting to participate in the study
- Demographic questions.

Pilot Testing

The questionnaire and study were pilot tested in December 1999 (n=100). The original questionnaire was amended on the basis of the information obtained.

Data collection

Recruitment was undertaken from February 2000 to November 2000. Telephone calls were made in the evening between 4:00 pm to 8:00 pm on Mondays, Tuesdays, and Wednesdays; between 11:00 am to 3:00 pm on Saturdays and 2:00 pm to 7:00 pm on Sundays. On some occasions, calls were made on Mondays, Tuesdays and Wednesdays from 11:00 am to 2:00 pm. Professional interviewers conducted the interviews and were supervised by Centre for Population Studies in Epidemiology (CPSE) personnel.

On contacting the household, the interviewer first identified themselves and the purpose of the study. The interviews were conducted in English.

The QPL (Questionnaire Programming Language) system was used to conduct the interviews. This is a "freeware" package that provides a way of efficiently and reliably automating survey data by allowing immediate entry of data from the interviewer's questionnaire screen to the computer database. The advantage of this system is that it correctly sequences questions as specific answers are given. In addition, it enforces a range of checks on each response with most questions having a set of pre-determined response categories. The QPL programme allows open-ended responses to be transcribed exactly by the interviewer.

Clinic appointments

Information folder

An information folder was sent out to all respondents who agreed to attend the clinic. The folder included:

- A letter clarifying the date of the appointment
- A questionnaire for self-completion
- An information sheet
- A map of the clinic.

Information for participants

Participants were notified of the study website (www.nwadelaidehealthstudy.org) where they could access information and results from the study as they arose. In addition, an email address (enquiry@nwadelaidehealthstudy.org) and a 1800 telephone number were available for use by participants for any questions they had.

Regular newsletters and birthday cards are sent to participants to provide them with up-to-date information about the study and encourage them to notify the study coordinator with any changes of address or other details. Strategies such as providing participants with this information are intended to maximise retention in the study for any future follow-up studies to examine changes in their health and disease status.

Information collected at the clinic / clinic procedures

Respondents were given the option of attending a clinic at either The Queen Elizabeth Hospital or the Lyell McEwin Hospital. Most of the clinic appointments were in the mornings however afternoon times were available. Up to one hour was set aside for each person attending the clinic.

Completed questionnaires that were sent to respondents in the information pack were collected at the clinic. The clinics tests conducted were:

- Blood pressure measurement
- Height and weight measurement
- Waist and hip measurement
- Fasting blood sample (for glucose, lipid profile, and glycated haemoglobin)
- Allergy skin test (to rye grass, cat, house dust mite, alternaria (mould), feather, and cockroach)
- Lung function tests (spirometry followed by Ventolin inhalation and retesting).

The results of the clinic tests were transcribed on the Clinic Running Sheet.

Response rates

The response rate at preliminary interview was 74%. Initially a sample of n=6200 was drawn. Of these n=1249 were ineligible due to non-connected numbers, non-residential numbers, and fax/modem connections. From the eligible sample of n=4951, response rates were calculated as shown in Table A. 1.

Table A. 1: Response rates

	n	%	%
Initial sample	6200		
Sample loss	1249	20.1	
Not in area	99		16.5
Not connected	885		70.9
Business phone	84		6.7
All household members <18 years	4		0.3
Modem/fax	15		1.2
Ineligible (pregnant/too old)	55		4.4
Eligible sample	4951	79.9	
Non-contact after 6 attempts	160		3.2
Refused – clinic & questions	1301		26.3
Interviewed	3650	73.7	
Refused – clinic	967		19.5
Attend the clinic	2523	51.0	

In all, n=2580 people attended the clinics. However, n=57 were not included in the final database because the north west boundary was modified during the study in June. This left n=2523 people who attended the clinic whose data was then analysed.

Overall, n=3422 people gave demographic information at the recruitment stage. This includes people who attended the clinic, people who indicated they would but did not attend, and people who refused to attend the clinic but were willing to answer interview questions. From this, the response rate of those interviewed who finally attended the clinic increased to 69.1%. A further n=23 people were excluded because they did not give their age.

Data processing

Raw data from the QPL system were imported into SPSS for Windows format. Data were then analysed using SPSS Version 10.

Weighting

The data presented in this report were weighted by region (western, northern health regions) age groups, sex and probability of selection in the household to the Australian Bureau of Statistics 1999 Estimated Residential Population.

Weighting is used to correct for the disproportionality of the sample with respect to the population of interest. The weights reflect unequal sample inclusion probabilities and compensate for differential non-response.

Data Analysis

Frequencies were performed to obtain prevalence estimates for each health condition and risk factor. Univariate odds ratios were conducted to determine the demographic and risk factor variables that best described people with each health condition and to determine the differences in health service use between people with and without various health conditions and risk factors.

Quality of life (SF-36)

People with and without various health conditions and risk factors were compared on their self-reported health status using the eight dimensions of the SF-36, namely physical functioning (PF), role-physical (RP), bodily pain (BP), general health (GH), vitality (VT), social functioning (SF), role-emotional (RE), and mental health (MH). Standard quality of life scores for people with and without various health conditions and risk factors were calculated for each SF-36 dimension by dividing the differences between the quality of life scores and the norm of the general population by the standard deviation of the general population[1]. The standard score for the general population was set at zero. SF-36 scores for the general South Australian population were obtained from the 1998 South Australian Health Omnibus Survey.

In interpreting the differences in standard scores between groups, an effect size of 0.2, or one fifth of a standard deviation, is described as small, an effect size of 0.5 as moderate and an effect size of 0.8 as large[2].

References

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APPENDIX 2: PROFILE OF STUDY PARTICIPANTS

Demographic profile of participants

The demographic characteristics of the study participants are listed in Table B. 1.

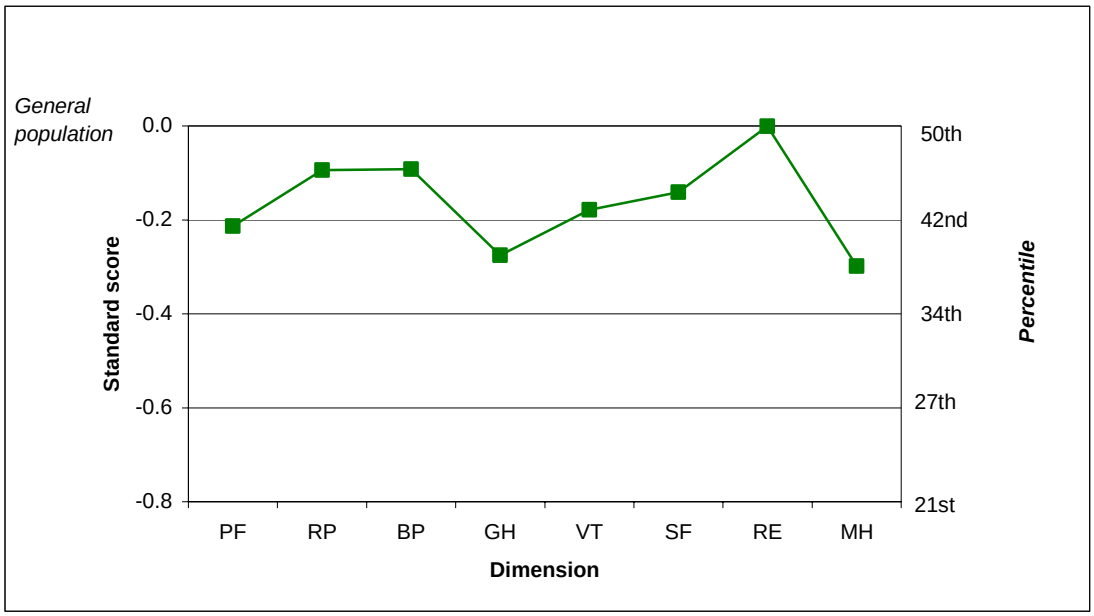
Table B. 1: Demographic characteristics of study participants

Variable	n	%
Sex		
Male	1236	49.0
Female	1287	51.0
Age group		
18 to 29 years	675	26.8
30 to 39 years	454	18.0
40 to 49 years	455	18.0
50 to 59 years	351	13.9
60 to 69 years	268	10.6
70 years and over	320	12.7
Area of residence		
Western suburbs	1024	40.6
Northern suburbs	1499	59.4
Highest education level obtained		
Secondary	1114	44.2
Trade/Apprenticeship/Cert/Diploma	1014	40.2
Bachelor degree or higher	294	11.7
Not stated	100	4.0
Gross household income		
Up to $20,000	591	23.4
$20,001-40,000	652	25.8
$40,001-60,000	577	22.9
More than $60,000	552	21.9
Not stated	151	6.0
Country of birth		
Australia	1754	69.5
UK or Ireland	435	17.2
Europe, USSR, Baltic States	211	8.4
Asia, Other	109	4.3
Not stated	14	0.6
Marital status		
Married or living with partner	1562	61.9
Separated/Divorced	201	7.9
Widowed	142	5.6
Never married	600	23.8
Not stated		
Work status		
Full time employed	935	37.0
Part time/Casual employed	419	16.6
Unemployed	125	4.9
Home duties/Retired	789	31.3
Student/Other	223	8.8
Not stated	33	1.3
Total	2523	100.0

Quality of life

Figure B. 1 shows the standard scores of the SF-36 subscales for study participants. For details on the calculation and the interpretation of standard scores, see Appendix 1. Except for the role-emotional subscale, quality of life was lower for study participants when compared to the general South Australian population.

Figure B. 1: SF-36 standard scores for study participants compared to the general South Australian population



Health services

Health service use

The proportion of study participants who used various health services in the past 12 months is described in Table B. 2.

Table B. 2: Proportion of study participants who used various health services in South Australia in the last 12 months

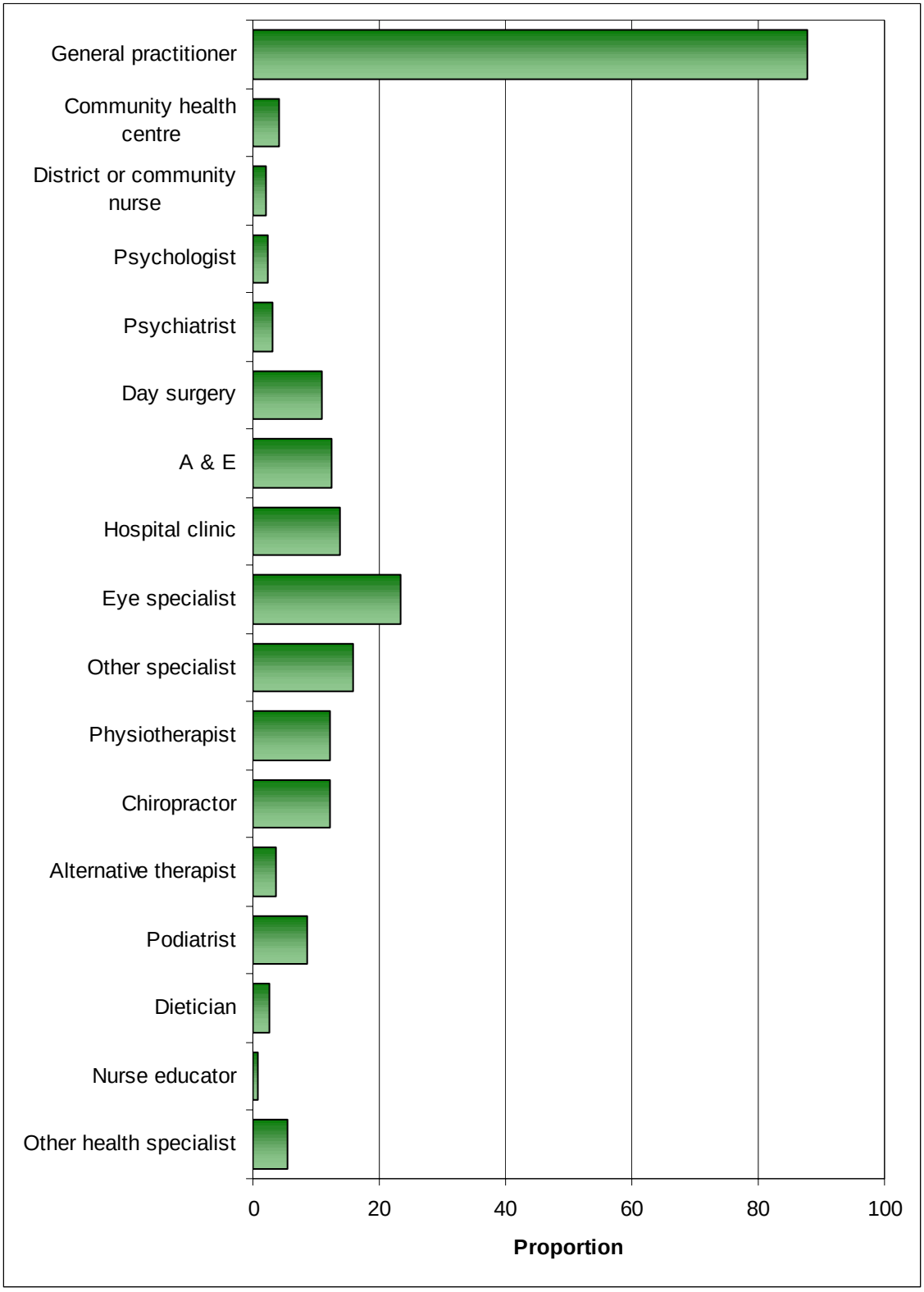
	n	%
Use of general practitioner		
No	300	11.9
General practitioner	2216	87.8
Not stated	8	0.3
Use of community health centre		
No	2410	95.5
Community health centre	106	4.2
Not stated	8	0.3
Use of district nurses		
No	2468	97.8
District or community nurse	48	1.9
Not stated	8	0.3
Use of psychologist		
No	2455	97.3
Psychologist	60	2.4
Not stated	8	0.3
Use of psychiatrist		
No	2439	96.7
Psychiatrist	77	3.1
Not stated	8	0.3
Use of day surgery		
No	2237	88.7
Day surgery	278	11.0
Not stated	8	0.3
Use of Accident & Emergency department		
No	2200	87.2
Accident & Emergency	316	12.5
Not stated	8	0.3
Use of hospital clinics (outpatient/specialist/allied health)		
No	2166	85.9
Clinic use	349	13.8
Not stated	8	0.3
Total	2523	100.0

Table B. 2: Proportion of study participants who used various health services in South Australia in the last 12 months (cont)

	n	%
Use of eye specialists		
No	1922	76.2
Eye specialists	594	23.5
Not stated	8	0.3
Use of other specialist (not in a hospital)		
No	2118	83.9
Other specialist	398	15.8
Not stated	8	0.3
Use of physiotherapist		
No	2206	83.9
Physiotherapist	398	15.8
Not stated	8	0.3
Use of chiropractor		
No	2207	87.5
Chiropractor	309	12.2
Not stated	8	0.3
Use of alternative therapists		
No	2422	96.0
Alternative therapists	94	3.7
Not stated	8	0.3
Use of podiatrist		
No	2297	91.1
Podiatrist	218	8.6
Not stated	8	0.3
Use of dietician		
No	2453	97.2
Dietician	62	2.5
Not stated	8	0.3
Use of nurse educator		
No	2493	98.8
Nurse educator	23	0.9
Not stated	8	0.3
Use of other health services		
No	2380	94.3
Other health services	135	5.4
Not stated	8	0.3
Total	2523	100.0

The graph below provides a summary of the use of health services in the last 12 months.

Figure B. 2: Summary of use of health services over 12 months



Average number of treatments per health service

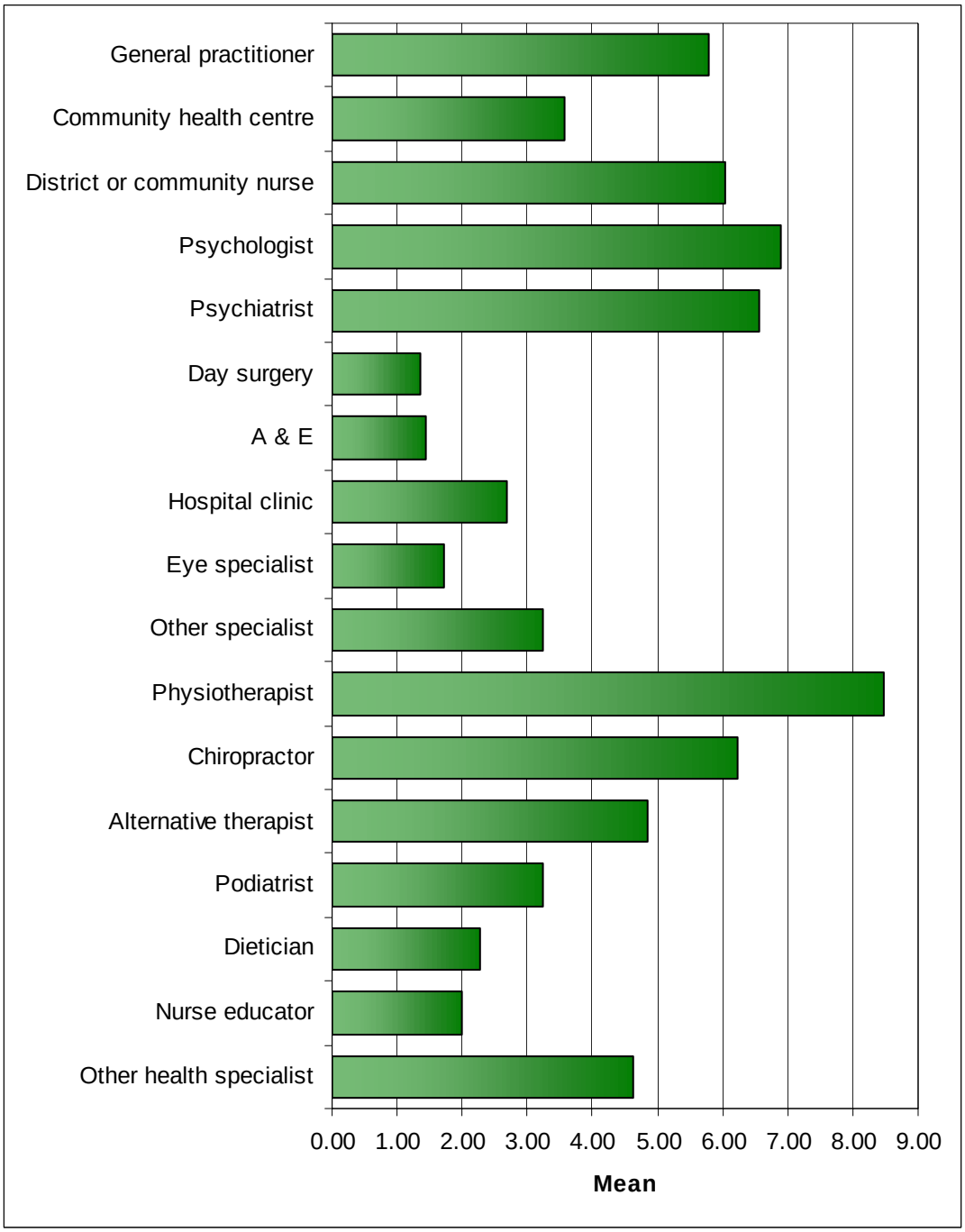
The average number of treatments or visits for each health service in the last 12 months is presented in Table B. 3.

Table B. 3: Average number of treatments or visits for each health service used in the last 12 months

Variable	Mean	Minimum	Maximum	SD
Use of general practitioner services	5.80	1	126	7.04
Use of community health services	3.56	1	52	5.60
Use of district or other community nurses	6.04	1	156	17.95
Use of psychologist	6.90	1	30	7.42
Use of psychiatrist	6.56	1	45	7.28
Use of day surgery	1.37	1	6	0.79
Use of Accident & Emergency	1.45	1	12	1.10
Use of hospital clinics	2.69	1	50	3.25
Use of eye specialist	1.78	1	34	2.08
Use of other specialists	3.23	1	50	4.11
Use of physiotherapist	8.46	1	104	10.34
Use of chiropractor	6.22	1	50	6.53
Use of alternative therapist	4.84	1	80	7.28
Use of podiatrist	3.25	1	15	2.69
Use of dietician	2.27	1	48	2.25
Use of nurse educator	2.00	1	7	1.72
Use of other health services	4.63	1	26	6.62

The average number of times the health services were used in the last 12 months are presented in Figure B. 3.

Figure B. 3: Average number of times health services were used in the last 12 months



CLD Index

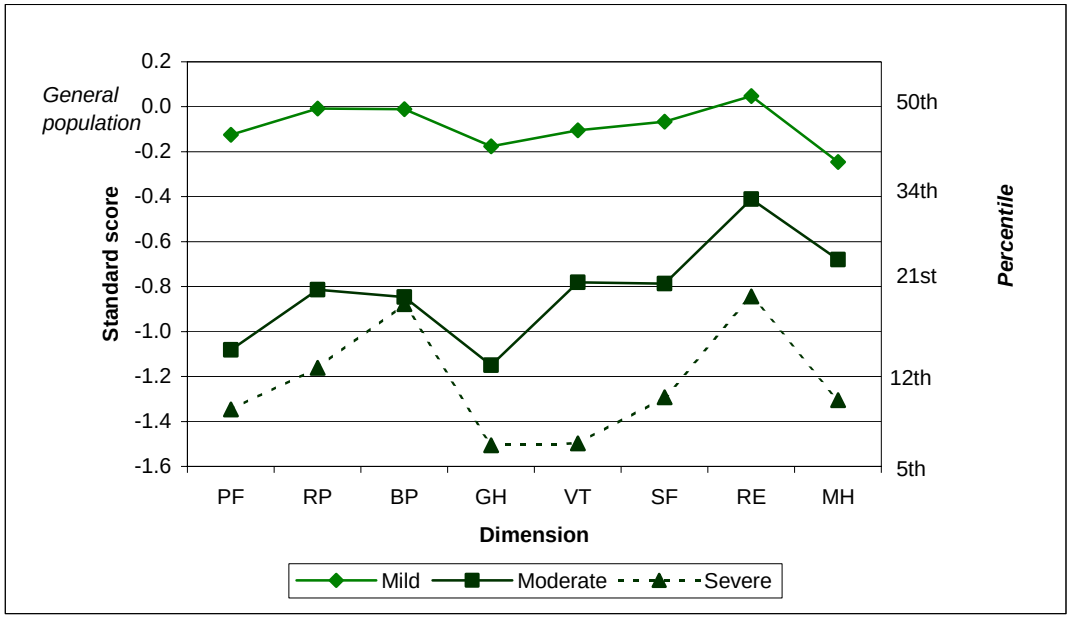
The CLD index is a symptom-based measure of severity for CLD developed by Selim et al[1] and shown to be a valid and reliable instrument for use in Australia[2]. The six-item instrument addresses the frequency and intensity of dyspnea (shortness of breath), frequency and intensity of wheezing, frequency of coughing, and amount of sputum production, and can be summarised into mild, moderate and severe symptoms as shown in Table B. 4.

Table B. 4: CLD Index for severity of symptoms

	n	%
Mild	2265	91.3
Moderate	170	6.9
Severe	46	1.9
Total	2481	100.0

Figure B. 4 shows the standard scores of the SF-36 subscales for people with mild, moderate and severe CLD symptoms. For details on the calculation and the interpretation of standard scores, see Appendix 1. People with moderate and severe CLD symptoms were impaired in all aspects of their physical and mental quality of life.

Figure B. 4: SF-36 standard scores for people with mild, moderate and severe CLD symptoms compared to the general South Australian population



Skin allergies

Allergy skin test were performed at the clinic to determine if the respondent reacted to seven allergens: saline, rye grass, cat, house dust mite, alternaria (mould), feather and cockroach. This involved putting drops of liquid allergens on the respondent's slightly scratched skin on their forearm. After 15 minutes, the clinic staff measured the diameter (millimetres) of the wheal or bump of the skin.

A successful test required that a person's negative control bump be less than 2 mm in diameter. A person was defined as having an allergic reaction to the selected allergen if:

- the difference between the negative control bump and the allergen bump was more than 2 mm in diameter, and
- the allergen bump on the skin measured 2 mm or more in diameter.

Table B. 5: Proportion of people with allergic reaction to selected allergens

	n	%
Reaction to selected (≥ 2 mm)		
Rye grass	1101	43.7
Cat	593	23.5
House dust mite	698	27.7
Alternaria	484	19.2
Feather	228	9.0
Cockroach	572	22.7
No reaction to any	1020	40.4
Reaction to at least one of the allergens	1501	59.5
Not stated	2	0.1
Total	2523	100.0

Medication use

Table B. 6 shows the proportion of people taking antihistamines, Ventolin or any other respiratory medication.

Table B. 6: Medication use

	n	%
Taking any antihistamines		
No	2363	94.2
Yes	144	5.8
Total	2507	100.0
Taken any Ventolin		
No	2361	94.2
Yes	145	5.8
Total	2506	100.0
Taken any other respiratory medication		
No	2388	95.6
Yes	110	4.4
	2498	100.0

References

1. Selim AJ, Xinhua SR, Fincke G, Rogers W, Lee A, Kazis L. A symptom-based measure of the severity of chronic lung disease. *Chest* 1997; 111: 1607-1614.

2. Ruffin RE, Wilson DH, Chittleborough CR, Southcott AM, Smith B, Christopher DJ. Multiple respiratory symptoms predict quality of life in chronic lung disease: A population based study of Australian adults. *Quality of Life Research* 2001; 9: 1031-1039.

APPENDIX 3: STUDY TEAM

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APPENDIX 4: NORTH WEST ADELAIDE HEALTH STUDY REPORTS

REPORTS

1. Cheek J, Oster C. A qualitative investigation of the experiences, perceptions and understandings of people with a chronic condition: Part of the North West Adelaide Health Study. November 2000. University of South Australia. ISBN 0 7308 9193 3
2. Taylor A, Dal Grande E, Chittleborough C, Ruffin D, Wilson D, Phillips P. The North West Adelaide Health Study – Key biomedical findings, policy implications and research recommendations. May 2002. SA Department of Human Services. ISBN 0 7308 9189 5
3. Taylor A, Dal Grande E, Chittleborough C, Ruffin D, Wilson D, Phillips P. The North West Adelaide Health Study – Summary of key findings, policy implications and research recommendations. May 2002. SA Department of Human Services. ISBN 0 7308 9190 9
4. Wilson D, Appleton S, Taylor A, Dal Grande E, Chittleborough C, Ruffin D. The North West Adelaide Health Study – Risk factors and associated chronic diseases. June 2002. SA Department of Human Services. ISBN 0 7308 9191 7
5. Chittleborough C, Cheek J, Grant J, Phillips P, Taylor A. Education and information issues among people with diabetes. May 2002. SA Department of Human Services. ISBN 0 7308 9185 2

INTERNAL REPORTS

Report 1	North West Adelaide Health Study – General overview of data collected in 2000
Report 2	Demographic characteristics of participants in the North West Adelaide Health Study compared with 1996 Census data
Report3	Community responses to the notion of taking part in the North West Adelaide Health Study
Report 4	Community responses to the notion of having participated in the North West Adelaide Health Study
Report 5	Interviews with subjects unwilling to participate in the North West Adelaide Health Study
Report 6	Exit survey of people taking part in the North West Adelaide Health Study
Report 7	The North West Adelaide Health Study - Initial Results
Report 8	Report to the Commonwealth Department of Health and Aged Care on the process of conducting a biomedical study in SA