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Author/s:

Glenister, K;Bourke, L;Terry, D;Simmons, D

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Chronic Ill Health in a Regional Victoria setting: a 13 year comparison.

Kristen Glenister PhD¹, Lisa Bourke PhD¹, Daniel Terry PhD², David Simmons FRACP MD (Cantab)^{1,3}

¹Department of Rural Health, University of Melbourne

² School of Nursing and Healthcare Professions, Federation University

³Macarthur Clinical School, Western Sydney University

Correspondence:

Department of Rural Health, University of Melbourne, 'The Chalet', Docker Street, Wangaratta, 3677.

Kristen.glenister@unimelb.edu.au

03 58 23 4532

Author contributions:

KG: 50%, LB: 25%, DT 10%, DS: 15%.

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Ethical approvals:

Crossroads-I: Ethics approval was granted by the Goulburn Valley Health Ethics committee.

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Nil to disclose.

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DR. KRISTEN GLENISTER (Orcid ID : 0000-0003-0510-5314)

PROF. DAVID SIMMONS (Orcid ID : 0000-0003-0560-0761)

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Chronic Ill Health in a Regional Victoria setting: a 13 year comparison

Abstract:

High quality data regarding prevalence of chronic disease in rural areas are essential in understanding the challenges faced by rural populations and for informing strategies to address health care needs.

Objective:

This study compared the prevalence of a range of self-reported chronic conditions and utilisation of GP services and ED in a regional Victorian setting between two studies conducted in the same region in 2001-2003 and 2014.

Design:

Repeat cross-sectional studies conducted over a decade apart.

Setting:

The projects were conducted in the Goulburn Valley in regional Victoria.

Participants:

The earlier study consisted of 3803 participants (43% male) from households randomly selected from local government lists. The later study included 703 participants (61% male) randomly selected from the telephone directory.

Main outcome measures:

Participants were asked whether they had been diagnosed with a range of chronic health conditions and how often they had visited a General Practitioner or Emergency Department in the past 12 months.

Results:

The age-standardised prevalence of depression was higher in the 2014 study than the 2001-2003 study in males (increased by 8.0% (95%CI 7.3,15.3%) and females (increased by 13.7% (95%CI 14.0,27.7%). Similarly, the prevalence of age-standardised diabetes and hypertension were higher in 2014 than 2001-2003 (males increased by 3.6% (95%CI 5.3,8.9% (diabetes) and 13.6% (95%CI 17.4,31.0% (hypertension)), females increased by 3.1% (95%CI 5.3,8.9% (diabetes) and 8.4% (95%CI 21.3,29.7% (hypertension)).

Conclusion:

The results of this study indicate that the prevalence of self-reported depression, diabetes and hypertension have increased in this regional Victorian area over the past 13 years. The reasons for these observed increases and the subsequent impact on the health care needs of regional communities warrants further investigation.

Key words:

Regional, rural, chronic disease, obesity, health service utilisation.

What this paper adds: (2 dot points)

- *Age-standardised prevalence of self-reported depression, diabetes, obesity and hypertension have increased in the Goulburn Valley in Regional Victoria in the past 13 years.*

What is already known on this subject: (2-3 dot points)

- *The prevalence of chronic disease is increasing in Australia, including rural Australia.*

1 - *Rural strategies are needed to address the burden of chronic disease in rural areas.*

6 **Introduction:**

7 Chronic diseases are leading causes of ill health and mortality in Australia (1). The burden of chronic
8 disease (expressed as years lost due to ill health, injury or death) increases with increasing distance
9 from major cities (2). Increasing prevalence of chronic disease and increased life expectancy mean
10 that people are living with ill-health for longer periods, impacting on quality of life, financial burden
11 and the capacity of the health system to cope. The prevalence of mental health issues are thought to
12 be similar in major cities and in rural areas, but the impact of suicide and self-inflicted injuries is
13 higher in rural areas than in cities (2).

14 The Australian Health Policy Collaboration (AHPC) has set targets to reduce key health risk factors
15 including smoking, overweight/obesity, high blood pressure, rates of diabetes and suicide by 2025
16 (3). However, high quality, current, publically available data tracking the rates of a range of chronic
17 diseases and key risk factors remains lacking in Australia, particularly among rural populations. High
18 quality, contemporary, localised data is essential to inform the public health policy and health
19 service planning required to work toward these targets.

20 The Crossroads study was undertaken between 2001 and 2003 in the Goulburn Valley in regional
21 Victoria to address this lack of data, and remains one of the preeminent sources of rural health data,
22 for a broad range of chronic health conditions and access to healthcare (4).

23 This paper compares patterns of self-reported chronic disease and utilisation of General Practice
24 (GP) and Emergency Departments (ED) in the 2001-2003 Crossroads study with another survey
25 within the same region undertaken in 2014 by the same University Department of Rural Health.
26 Although the two studies did not follow the same data collection methods, they provide an insight
27 into whether the prevalence of self-reported chronic ill health and patterns of health service
28 utilisation in these communities have changed.

29 **Methods:**

The two shires included in both studies were Greater Shepparton (including the regional centre of Shepparton (population of 62 000, located 191km from Melbourne) (5) and Moira shire (including the Shire capital, Cobram (shire population of 28 000) (6). Greater Shepparton and the majority of Moira Shire are categorised as Inner Regional, with a small part of Moira Shire considered Outer Regional (7).

Crossroads study:

Households were randomly selected from local government residential rate payer lists of the major town in each Shire (namely Shepparton and Cobram). The response rate for the study was 70%. All people living at the address aged over 16 were invited to participate and consenting participants were interviewed face to face. Written consent was obtained from each participant. Ethics approval was granted by the [details to be provided after blind review].

Community Health Survey (CHS):

The self-administered CHS was conducted between September and October 2014. The questionnaire was mailed to 2068 individuals randomly selected from the telephone directory, and contained many questions from the Crossroads study (8). A total of 703 people from Moira and Greater Shepparton shires responded (34% response rate). Ethical approval was received from the [details to be provided after blind review]. Return of the completed questionnaire implied consent.

Data collection:

Data collected included demographic, socioeconomic, health utilisation (although only GP and ED utilisation are reported here) and health history. Questions regarding chronic disease, health behaviours and health service utilisation were the same in the two surveys but the CHS included fewer categories for the answers, to condense and simplify the survey. Categories used in the Crossroads Survey were therefore mapped onto the CHS categories. Self-reported rates of chronic health conditions within the CHS dataset (Heart disease, Cancer, Stroke, Respiratory Disease, Kidney Disease, Liver Disease, Diabetes, Asthma, Epilepsy, Arthritis, Hypertension, Depression) were re-coded from 'never' into 'no' and all other answers into 'yes', in effect combining current diagnoses with previous diagnoses. Body mass index (BMI) was calculated from self-reported height and weight according to the formula 'weight (kilograms) / height (metres)²'. A body mass index (BMI) ≥ 30 corresponded to obesity according to the WHO classification system (9).

Statistical analysis:

Data were entered into Microsoft Excel and SPSS v20.0. Group comparisons were undertaken using independent t-tests (two groups). Chi-square tests for independence was undertaken to assess relationships between categorical variables. Comparisons were chosen for factors that may be associated with health including full time employment, GP visits, ED visits, educational attainment and self-reported health status. Age-standardised prevalence for each self-reported chronic condition for males and females were calculated by direct method applied to the Australian population (10) with seven age groups (16-24, 25-34, 35-44, 45-54, 55-64, 65-74 and 74+). Analysis of age-standardised prevalence between the two studies was undertaken using two proportions Z test. Ordinal logistic regression was used to assess potential associations between dependent (health status; excellent, very good, good, fair, poor) and independent variables (age, number of chronic health conditions, sex, smoker, obesity, depression) using data pooled from the two surveys. Results are shown as mean $\pm$ standard deviation (SD), percentages and 95% confidence intervals. Significance was determined as two-tailed $p < 0.05$. Margins of error up to $\pm 3.6\%$ have been calculated for the Community health survey results and $\pm 1.6\%$ for the Crossroads study.

Results:

Compared with the 2001-2003 study, participants in the 2014 survey included marginally (0.8% increase) (but significantly) more Aboriginal and Torres Strait Islander people, those with English as second language (2.7% increase), people retired (17.2% increase) or in full time employment (6.5% increase), and were more likely to have attained post-secondary school education (8.7% increase), as summarised in Table 1. Those in the 2014 survey were older (58.4 years vs 44.3 years, $p < 0.001$), more likely to be male (60.8% vs 43.4%, $p < 0.001$), less likely to smoke (10.8% vs 26.4%, $p < 0.001$), more likely to be obese (30.1% vs 18.5%, $p < 0.001$) and less likely to report excellent health (11.8 vs 14.0%, $p = 0.07$) than the 2001-2003 survey. When compared with the underlying population of each town, the 2014 survey comprised a higher proportion of males (60.8%) and had an older mean age (58.4 years) (Greater Shepparton median age 39 years, 50.1% males (5), Moira Shire median age 47 years, 50.3% males (6)). The 2001-2003 survey comprised a lower proportion of males (43.4%) and an older age structure (mean age 44.3 years) than the underlying population (Greater Shepparton median age 34 years, 49.7% males, Moira Shire median age 39 years, 50.3% males (11)). The age-standardised prevalence of depression, diabetes and hypertension were higher in the 2014 study than the 2001-2003 study in both males (15.3% vs 7.3% depression, 8.9% vs 5.3% diabetes, 31.0% vs 17.4% hypertension, each $p < 0.05$) and females (27.7% vs 14.0% depression, 8.4% vs 5.3% diabetes, 29.7% vs 21.3% hypertension, each $p < 0.05$), as summarised in Table 2. Age-standardised rates of

1 asthma and liver disease were higher in the 2014 study than the 2001-2003 study among females
2 (23.5% vs 16.6% asthma, 4.8% vs 0.9% liver disease, each $p < 0.05$) but not males. A significantly
3 higher proportion of participants in the 2014 study reported presenting to ED at least once in the
4 previous 12 months, and to the GP at least once compared with participants in the 2001-2003 study
5 (24.1% vs 18.1% males to ED, $p = 0.008$, 23.6% vs 15.9% females to ED, $p = 0.003$, 91.4% vs 76.7%
6 males to GP $p < 0.001$, 97.3% vs 88.8% females to GP, $p < 0.001$) (Table 3). Poor health status was
7 significantly associated with age, number of chronic health conditions, males, smokers, obesity,
8 depression), with number of chronic health conditions showing the strongest association (odds ratio
9 1.545 (1.385, 1.723), $p < 0.001$) (Table 4).

11 Discussion:

12 Longitudinal studies or repeat cross sectional studies of rural health outcomes are uncommon,
13 particularly if they are inclusive of all adults and multiple health conditions. Results suggest markedly
14 greater age-standardised prevalence of depression, diabetes, obesity and hypertension in both sexes
15 in 2014 than in the same region over a decade earlier. In regard to mental health, the prevalence of
16 anxiety or depression among the participants in the 2014 study (37%) was higher than reported by
17 the Australian Rural Mental Health Study (ARMHS) (26%) (12). Whether the prevalence of mental
18 health conditions is increasing in Australia is under debate (13) because increased prevalence may
19 be due to greater recognition and diagnosis of common mental health conditions rather than
20 increased psychological distress. The age dependent decrease in prevalence of poor mental health
21 reported previously at a National level (14) may be eroding, particularly among males, with 23% of
22 males aged 65-74 and 18% of males aged 75+ reporting depression in our 2014 study. The
23 prevalence of diabetes and hypertension were similarly higher than reported by the Australian
24 Bureau of Statistics figures for inner regional Australia (15), ($\geq 8.4\%$ vs 6% diabetes, $\geq 30\%$ vs 27%
25 hypertension), but likely within the margin of error. Obesity prevalence in the 2014 study (30%) was
26 equivalent to data reported for Inner Regional Australia (15). These conditions share common risk
27 factors including poor diet and sedentary lifestyle (16). A complex interplay exists between chronic
28 physical and mental health conditions; they may occur as comorbidities, increase the risk of
29 developing other chronic diseases, or increase the risk of complications (17, 18). Research continues
30 to investigate the pathophysiological mechanisms between diabetes and obesity, giving rise to the
31 term 'diabesity' (19) or diabetes in the context of obesity (20). Diabetes and obesity are strongly
32 associated with hypertension and depression (20).

1
2 It may be surprising that a greater number of these chronic health conditions had not increased in
3 prevalence over this time period. The age standardisation utilised in this study controlled for the
4 increasing age of the regional population (21), and as such accounted for one of the most influential
5 risk factors for chronic disease (22). Increased prevalence of obesity is associated with increased risk
6 of several chronic diseases, in addition to being associated with increased mortality (23). In this
7 study, obesity showed a significant association with self-rated poor health, second only in
8 importance to the number of chronic diseases. The level of self-rated poor to fair health reported in
9 the ARMHS was higher (21%) to the level reported here (18%) (12), although similarly associated
10 with age, number of chronic diseases and history of anxiety or depression. Decreased smoking was a
11 positive finding, although smoking remained significantly associated with self-rated poor health.
12 Importantly, there is still work to be done to achieve the AHPC target of 5% smoking by 2025 (3).

13
14 Approximately half of the participants in the 2014 study (47.8% males and 54.7% females) reported
15 having at least one of the twelve chronic health conditions. Although this proportion had not
16 changed significantly since the earlier study, improvements in treatment may mean that people live
17 with chronic disease for decades, impacting on quality of life, years with disability, financial security
18 and health system utilisation (24). People choosing to retire to rural Australia ('tree changers' or 'sea
19 changers') are likely to contribute to ageing of rural communities and compound these issues (25).

20
21 An increased utilisation of both ED and GPs was identified in this study, although we cannot say
22 definitively that utilisation is related to chronic health conditions. The increased proportion of
23 people visiting a GP a minimum of once in the previous 12 months is encouraging, because these
24 encounters are opportunities to screen for chronic disease, educate and initiate interventions.
25 Conversely, the increased utilisation of ED may suggest an unmet need for care, perhaps after hours
26 or cost of GP appointments (26). Although there were differences in the mode of data collection,
27 participants were located within the same region.

28
29 Limitations to the study include the difference in sampling methodology, the older age structure of
30 the samples compared with the underlying population and the use of self-reported data (including
31 self-reported chronic conditions, weight and height). The significantly higher age, BMI and

percentage of males in the 2014 sample are likely to have contributed to the higher prevalence of chronic disease observed, compared with the 2001-2003 sample, as they are also key risk factors. Likely interactions between these diseases and self-reported health status need to be explored in future work. The decreased rate of smoking in the 2014 sample compared with the earlier sample may have counter-balanced the changes in chronic disease prevalence to some extent. Strengths include the size of the samples, the consistency in questionnaire used and the breadth of health issues investigated.

In conclusion, this comparison of the two studies provided an insight into changes in chronic disease in a regional Victorian setting over more than a decade, and adds to the understanding of rural chronic ill health. Our aim is to now repeat the Crossroads study to assess: *'Has increased availability of primary care translated to improved health outcomes for people in the Goulburn Valley?'*.

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Table 1: Characteristics of people participating in the two population surveys conducted in regional Victoria, Australia:

	Crossroads study, 2001-2003.	Community Health Survey, 2014.	Significance
Study participants n	3803	703	NA
Male n (%)	1643 (43.4)	418 (60.8)	p<0.001
Age (years, mean ± SD)	44.3±16.9	58.4±15.7	p<0.001
Aboriginal/Torres Strait Island people n (%)	29 (0.8)	11 (1.6)	p<0.05
English as second language n (%)	224 (5.9)	59 (8.6)	p<0.01
Employment:			
Full time n (%)	1355 (35.6)	292 (42.1)	Full time vs other p<0.01
Part time n (%)	386 (18.0)	98 (14.1)	
Studying n (%)	124 (3.3)	22 (3.2)	
Retired n (%)	624 (16.4)	233 (33.6)	Retired vs other p<0.001
Other n (%)	1014 (26.7)	49 (7.1)	
Highest Level of Education:			
Partial secondary school n (%)	1843 (50.0)	357 (52.4)	Secondary school vs Post secondary school p<0.001
Completed secondary school n (%)	760 (20.6)	64 (9.4)	
Completed TAFE/Diploma n (%)	576 (15.6)	159 (23.4)	
Completed University n, (%)	511 (13.9)	101 (14.8)	
Risk factors:			

Current smoker n (%)	835 (26.4)	75 (10.8)	p<0.001
Obesity (BMI≥30) n(%)	574 (18.5)	192 (30.1)	p<0.001
Self reported health status:			
Excellent n (%)	520 (14.0)	80 (11.8)	Excellent health vs other p=0.07
Very Good n (%)	1296 (34.9)	263 (38.9)	
Good n (%)	1286 (34.5)	212 (31.3)	
Fair n (%)	507 (13.6)	91 (13.4)	
Poor n (%)	108 (2.9)	31 (4.6)	
SD, standard deviation, TAFE, technical and further education, BMI, body mass index			

Table 2: Age standardised prevalence (95% CI) of self-reported chronic health conditions in the two population surveys conducted in regional Victoria, Australia:

		Crossroads study (2001-2003, n=3803)		Community Heath Survey (2014, n=703)		
		Prevalence (%)	95% CI	Prevalence (%)	95% CI	% Difference 2014-2001/2003 (95% CI)
Heart disease	Male	8.5	7.5,9.5	10.4	7.7,13.1	1.9 (-1.6,5.4)
	Female	5.5	4.8,6.3	7.8	5.8,9.8	2.3 (-1.1,5.7)
Cancer	Male	7.7	6.7,8.6	7.3	5.6,8.9	0.4 (-2.9,3.7)
	Female	9.2	8.2,10.1	9.6	6.9,12.4	0.4 (-3.9,4.7)
Diabetes	Male	5.3	4.4,6.3	8.9	5.8,11.9	3.6 (0.7,6.5) *
	Female	5.3	4.4,6.3	8.4	5.7,11.0	3.1 (0.3,6.5) *
Respiratory disease	Male	5.2	4.3,6.1	5.9	4.1,7.8	0.7 (-2.1,3.5)
	Female	5.9	5.1,6.7	6.4	3.7,9.1	0.5 (-3.0,4.0)
Asthma	Male	13.0	11.7,14.4	14.8	10.5,19.1	1.8 (-2.4,6.0)
	Female	16.6	15.3,17.8	23.5	18.3,28.7	6.9 (1.3,12.5) *
Stroke	Male	1.8	1.3,2.3	2.8	1.6,3.9	1.0 (-0.7,2.7)
	Female	1.7	1.2,2.1	2.5	1.4,3.7	0.8 (-1.1,2.7)
Kidney Disease	Male	4.5	3.7,5.3	3.4	1.9,4.9	1.1 (-1.4,3.6)
	Female	3.4	2.8,4.0	3.1	1.7,4.5	0.3 (-2.4,3.0)
Liver Disease	Male	0.6	0.3,0.9	1.4	0.7,2.1	0.8 (-0.3,1.9)
	Female	0.9	0.6,1.2	4.8	2.6,6.9	3.9 (2.3,5.5) *
Epilepsy	Male	1.1	0.7,1.5	1.9	0.8,3.0	0.8 (-0.6,2.2)
	Female	1.5	1.1,1.9	1.2	0.4,2.1	0.3 (-1.5,2.1)

Depression	Male	7.3	6.3,8.3	15.3	10.9,19.7	8.0 (4.5,11.5)*
	Female	14.0	12.8,15.2	27.7	22.3,33.1	13.7 (8.4,19.0)*
Arthritis	Male	14.7	13.4,16.0	18.5	15.8,21.2	3.8 (-0.7,8.3)
	Female	19.2	18.0,20.4	19.7	17.1,22.2	0.5 (-5.3,6.3)
Hypertension	Male	17.4	16.1,18.7	31.0	26.2,35.8	13.6 (8.6,18.6) *
	Female	21.3	20.0,22.5	29.7	25.6,33.8	8.4 (2.3,14.5) *
Age standardised percentage of participants reporting none of the 12 listed chronic health conditions						
	Male	53.8	51.5,56.2	52.2	44.9,59.5	1.6 (-3.76,6.96)
	Female	45.0	42.9,47.0	45.3	37.7,52.9	0.30 (-5.85,6.45)

* p<0.05 (2 sample z test, 2 tailed).

CI, confidence interval

Table 3: Self-reported frequency of GP attendance and ED presentations in the 12 months prior to the two population surveys conducted in regional Victoria, Australia:

Crossroads study (2001-2003, n=3747) n(%)				Community Heath Survey (2014, n=612) n(%)		
ED presentations in past 12 months						
						0 vs ≥1 ED presentations
Males	0	1329 (81.9)	81.9%	281 (75.9)	75.9%	p=0.008
	1	206 (12.7)	18.1%	66 (17.8)	24.1%	
	2-3	69 (4.3)		19 (5.1)		
	4-8	15 (0.9)		3 (0.8)		
	>8	3 (0.2)		1 (0.3)		
Females	0	1787 (84.1)	84.1%	185 (76.4)	76.4%	p=0.003
	1	225 (10.6)	15.9%	39 (16.1)	23.6%	
	2-3	96 (4.5)		14 (5.8)		
	4-8	14 (0.7)		3 (1.2)		
	>8	3 (0.1)		1 (0.4)		
GP visits in past 12 months						
						0 vs ≥1 GP visits and 0-3 visits vs ≥4
Males	0	378 (23.3)	68.5%	35 (8.6)	61.6%	0 vs ≥1: p<0.001
	1	287 (17.7)		56 (13.8)		0-3 vs ≥4:

	2-3	445 (27.5)		159 (39.2)		p=0.008
	4-8	345 (21.3)	31.5%	91 (22.4)	38.4%	
	>8	166 (10.2)		65 (16.0)		
Females	0	239 (11.2)	55.0%	7 (2.7)	55.3%	0 vs ≥1: p<0.001
	1	295 (13.9)		38 (14.4)		0-3 vs ≥4:
	2-3	636 (29.9)		101 (38.3)		p=0.934
	4-8	629 (29.6)	45.0%	68 (25.8)	44.7%	
	>8	327 (15.4)		50 (18.9)		

ED, emergency department, GP, general practitioner

Table 4: Factors associated with self-rated poor health among all participants of the two population surveys conducted in regional Victoria, Australia:

	B	95% CI	SE	Wald	p
Age	1.029	1.019,1.039	0.005	33.502	<0.001
Number of chronic health conditions	1.545	1.385,1.723	0.056	61.168	<0.001
Sex					
Male	1.414	1.083,1.848	0.136	6.460	0.01
Female	1.000 (ref)				
Smoker					
No	0.625	0.423,0.925	0.200	5.515	0.02
Yes	1.000 (ref)				
Depression					
No	0.582	0.398,0.852	0.194	7.741	0.01
Yes	1.000 (ref)				
Obesity					
No	0.526	0.344,0.803	0.216	8.850	<0.01
Yes	1.000 (ref)				

CI, confidence interval, SE standard error of the co-efficient. Data pooled from the two surveys.