

ACCEPTED VERSION

Pham, C.; Gill, T.; Hoon, E.; Rahman, M.; Whitford, D.; Lynch, J.; Beilby, J.
Profiling bone and joint problems and health service use in an Australian regional population: The Port Lincoln Health Study, *Australian Health Review*, 2013; 37(4):504-512

Journal compilation © AHHA 2013

DOI: [10.1071/AH13064](https://doi.org/10.1071/AH13064)

PERMISSIONS

<http://www.publish.csiro.au/nid/272/aid/17720.htm>

Green Open Access

All journals published by CSIRO Publishing allow authors to deposit the Accepted version of their manuscript into an institutional repository or put it on a personal website, with no embargo.

The Accepted version is the author-created, peer-reviewed, accepted manuscript. The Publisher's edited or typeset versions cannot be used. The institutional repository should be that of the institution employing the author at the time the work was conducted or PubMed Central. We ask that authors link to the published version on the CSIRO Publishing website, wherever possible.

12th March 2015

<http://hdl.handle.net/2440/80836>

Profiling bone and joint problems and health service use in an Australian regional population: The Port Lincoln Health Study

Clarabelle Pham¹ BSc(Hons), GDipPubHlth, Senior Researcher

Tiffany K Gill² MAppSc, MBA, PhD, NHMRC Early Career Fellow

Elizabeth Hoon^{1,6} BA(Hons), PhD, Research Fellow & Project Coordinator

Muhammad Aziz Rahman³ MBBS, MPH, PhD, Senior Research Fellow

Deirdre Whitford PhD¹, Adjunct Associate Professor

John Lynch^{1,4} MPH, PhD, Professor Epidemiology and Public Health

Justin Beilby⁵ MBBS, MD, MPH, FRACGP, Executive Dean Faculty of Health Sciences

¹ School of Population Health, The University of Adelaide, Adelaide SA 5005, Australia.

Email: clarabelle.pham@adelaide.edu.au; john.lynch@adelaide.edu.au

² School of Medicine, The University of Adelaide, Adelaide SA 5005, Australia. Email:

tiffany.gill@adelaide.edu.au

³ St Vincent's Centre for Nursing Research, Australian Catholic University, East Melbourne

VIC 3002, Australia. Email: aziz.rahman@acu.edu.au

⁴ School of Social and Community Medicine, University of Bristol, Bristol BS8 2PS, UK.

⁵ Faculty of Health Sciences, The University of Adelaide, Adelaide SA 5005, Australia.

Email: justin.beilby@adelaide.edu.au

⁶ Corresponding author. Telephone: +61 8 8313 1567 Email: elizabeth.hoon@adelaide.edu.au

Acknowledgements

Professor Konrad Jamrozik originally designed and obtained funding for the LINKIN Study while head of the School of Population Health and Clinical Practice, University of Adelaide, 2008-2010. Professor Jamrozik passed away after a short illness in March 2010. The BJP Research strand would like to acknowledge the contribution of all the CIs, AIs and

researchers on the LINKIN Health Study (Professor Jonathan Newbury, Professor Alison Kitson, Associate Professor Anne Wilson, Associate Professor Deirdre Whitford, Professor Jonathan Karnon, Associate Professor Jenny Baker, Dr Kathryn Powell, and Ms Emma Richards). The LINKIN Health study is funded by the NHMRC Project grant 627240: The Physiology of Health Systems; Port Lincoln as a case study. Tiffany Gill is currently a National Health and Medical Research Council Early Career fellow (Australian Public Health, ID 1013552). John Lynch is supported by a NHMRC Australia Fellowship (570120).

Profiling bone and joint problems and health service use in an Australian regional population: The Port Lincoln Health Study

ABSTRACT

Objectives

To describe the burden of bone and joint problems (BJP) in a defined regional population, and to identify characteristics and service usage patterns.

Methods

In 2010, a health census of adults aged ≥ 15 years was conducted in Port Lincoln, South Australia. A follow-up computer assisted telephone interview provided more specific information about those with BJP.

Results

Overall, 3350 (42%) reported current BJP. General practitioners (GP) were the most commonly used provider (85%). People with BJP were also 85% more likely to visit chiropractors, twice as likely to visit physiotherapists, and 34% more likely to visit Accident and Emergency/GPs out of hours (compared to rest of the population). Among the phenotypes, those with BJP with co-morbidities were more likely to visit GPs, had a significantly higher mean pain score and higher levels of depression or anxiety, compared to those with BJP only. Those with BJP only were more likely to visit physiotherapists.

Conclusions

GPs were significant providers for those with co-morbidities, the group who also reported higher levels of pain and mental distress. GPs have a central role in effectively managing this phenotype within the BJP population including linking allied health professionals with general practice to manage BJP more efficiently.

What is known about the topic?

As a highly prevalent group of conditions which are likely to impact on health-related quality of life and are a common cause of severe long term disability musculoskeletal (MSK)

conditions place a significant burden on individuals and the health system. However far less is known about access and usage of MSK related health services and programs in Australia.

What does this paper add?

As a result of analysing the characteristics of the overall BJP population, as well as phenotypes within it, a greater understanding of patterns of health service interactions, care pathways, and opportunities for targeted improvements in delivery of care, may be identified. The results emphasize that participants with BJP utilised the services of a narrow range of providers which may have workforce implications for these sectors. The funding models for physiotherapists and chiropractors in Australia involve a mix of private and fees for service which limits access to those who have private health insurance or can pay directly for these services.

What are the implications for practitioners?

These analyses indicate the importance of linking allied health professionals with general practice to manage BJP more efficiently. Alternative and appropriate care pathways need to be more strongly developed and identified for effective management of these conditions rather than relying on a traditional range of practitioners. Alternatively, greater ease of access to allied health practitioners may enable more effective treatment and improved quality of life for those with BJP. There is an urgent need to develop an effective population-based model of integrated care for BJP within regional Australia.

MAIN TEXT

Introduction

Bone and joint problems (BJP) otherwise known as musculoskeletal (MSK) disorders are highly prevalent across different age, gender and socioeconomic groups [1]. They are the most common cause of severe long term disability around the world [2, 3 GBD], place a significant burden on the health care system, and impact significantly on an individual's quality of life [4]. BJP include osteoarthritis, rheumatoid arthritis, osteoporosis, and low back pain [2] and strains or damage to the musculoskeletal system [5]. There is also a high likelihood of co-morbid conditions associated with BJP as people age and experience other disease processes [6].

BJP have an impact on health-related quality of life outcomes. Quality of life instruments measure individual's perceptions of health status and have physical, psychological and social well-being components [6]. Pain, a key variable of musculoskeletal conditions, differs according to the specific disorders [4]. In addition, activity limitation or physical disability are directly related to decreased self-perceived health of people suffering from BJP [5], and studies have also suggested that there is a strong association between BJP and psychological distress [4,6]. Environmental and personal factors such as beliefs, experience and expectations also impact the perceptions of health among those with BJP [6].

BJP pose a large economic burden in Australia. For example, with arthritis, the estimated cost in the Australian economy in 2007 was \$23.9 billion and had increased from 2004, and 61% of such costs was borne by those with arthritis [7]. With an aging population, the prevalence of BJP will continue to increase in Australia and by 2050 it is estimated there will be seven million Australians who have arthritis [7], with important implications for the capacity of the health system to effectively manage these conditions.

Many health service providers are involved in managing BJP, such as general practitioners (GPs), specialists (e.g. rheumatologists, orthopaedic surgeons), physiotherapists, chiropractors, and podiatrists [4]. The management of BJP is primarily focused on relieving pain and reducing associated symptoms and improving day-to-day physical function [8,9].

Britt et al [10] have identified that BJP are among the most common combinations of conditions to attend general practices. Beyond these studies there is limited information regarding services utilisation to address BJP in Australia. The LINKIN Health Study, based in Port Lincoln, South Australia is examining the overall functioning of the health system through a population based analysis of how this system is used, by whom, and how the system affects health in this defined population [11]. This paper describes the burden of BJP in the Port Lincoln population, and presents an analysis of four BJP “phenotypes”. The use of phenotypes enables greater insights into the underlying heterogeneity of the BJP population, in regard to socio-demographics, clinical presentation, health related quality of life, and typical patterns of health service use.

Methods

Study Population

Data from the 2010 health census of the Port Lincoln community, part of the LINKIN Health Study, were used. The census methodology is described in more detail elsewhere [11], but briefly, data was collected on socio-demographic characteristics, health insurance, current medical conditions, quality of life and health service use using a household and individual questionnaire for all residents (aged 15 years and over). The overall response rate was 74% (n=7895) (Figure 1). Respondents who reported having current BJP were the focus of this analysis. A Computer Assisted Telephone Interview (CATI) was then conducted with the BJP respondents who agreed to be recontacted (July, 2012). Overall 1142 interviews were conducted (response rate 78%) (Figure 1). The CATI obtained specific information relating to self-report levels of pain and sequence of service provider interactions for their BJP reported in the 2010 health census. Human Research Ethics clearance has been given for this project by the University of Adelaide (H-036-2010).

Measures

From the census, respondents with self-reported BJP were identified by asking, “Do you currently have any bone and joint problems (e.g. back pain, osteoporosis)?” Beyond a “yes”

response, no further detail on the type or severity of BJP was collected in the health census.

Preliminary descriptive analyses were undertaken to determine the prevalence of BJP.

In order to develop a more detailed understanding of differences in characteristics of this population, BJP “phenotypes” (sub-populations) were defined based on clinical relevance, service usage and demographic characteristics (Table 1).

Covariates included in the analysis were grouped into four domains: socio-demographics, current medical conditions, quality of life, and health service use (based on whether respondents had visited a broad range of providers, e.g. Aboriginal health service, hospital, general practitioners, allied health professionals, in the past 12 months). In order to reflect service access issues in rural Australia a distinction between providers in Port Lincoln and elsewhere was made. Quality of life indicators were the Short Form-1 (SF-1) [13] and EQ-5D-3L. [14].

The CATI focused on both the BJP identified as part of the health census and also sought details of any new BJPs. A measure of the level of pain at its worst, on a scale of 0-10 for their problem reported in the census and the current level of pain was also obtained [15].

Data analyses

For descriptive analysis census data were weighted by age and sex to the most recent estimated resident population for Port Lincoln (2009) to compensate for non response [16]. Multivariable logistic regression modelling was then used to examine characteristics of the overall BJP population compared to the rest of the Port Lincoln population and phenotype characteristics compared to the rest of the BJP population. All variables were included and all models were assessed for multicollinearity [17]. All models were acceptable as the variance inflation factors were all under 2.5 and the condition numbers between 4.0 and 4.3 indicating low degrees of multicollinearity. T-tests were used to compare differences in mean pain scores between the phenotypes. All analyses were performed using STATA, release 12.0 (Statacorp LP).

Results

Demographic characteristics of overall BJP population

Of the 3350 (42%) participants who reported current BJP, the highest proportion were in the 45-64 age group (40.0%), over half (57.4%) were female, and one-third of the participants (32.6%) had a trade, certificate or diploma (Table 2). Compared with the overall LINKIN Health Study population, significantly higher proportions of the BJP population were in the older age groups, retired, and required a regular carer.

Health related characteristics of overall BJP population

Table 3 demonstrates that a higher proportion of respondents with BJP self-reported that they had heart/circulatory disease/high blood pressure compared to the overall LINKIN population. They were also more likely to self-report having asthma, diabetes/high blood sugar, and a mental health problem, more likely to be a daily or former smoker, and more likely to report fair or poor health (32.0%). Overall 69.8% reported moderate pain/discomfort and one-third of the participants (33.9%) reported moderate anxiety/depression (Table 3). The most commonly used service provider amongst the BJP population was general practitioners (GPs).

Given that almost two thirds of census respondents with BJP reported at least moderate pain, the CATI survey was used to examine this issue further. At its worst, the mean pain score was 7.2 (on a scale 0-10) with 86% of BJP self-reporting that their worst pain rated five or above. The current mean pain score for all BJP recontactees was 3.2 (on a scale of 0-10), and 32% reported that their current pain score was five or above.

Multivariable analysis of the Port Lincoln population

Multivariable analysis determined characteristics of those with BJP compared to the remainder of the population of Port Lincoln without BJP (Table 4). Co-morbidities of asthma and heart/circulatory disease/ high blood pressure and were significantly more likely to be reported by the BJP population (OR 1.61, 95% CI 1.29 - 2.01, and OR 1.27, 95% CI 1.04 – 1.56, respectively). With regard to pain and discomfort, the ratios of moderate or extreme pain or discomfort to none were 12.6 (OR 12.64, 95% CI 10.68 - 14.96) and 33.7 (OR 33.65, 95%

CI 16.74 - 67.66) times higher, respectively, in the BJP population than in the population of Port Lincoln without BJP (Table 4). Further, in the BJP population the ratio of some issues with mobility to no issues was 1.8 times higher than in the population of Port Lincoln without BJP (OR 1.87, 95% CI 1.32 - 2.64) and those who had some problems with usual activities was 2.1 times higher (OR 2.12, 95% CI 1.67 - 2.70) (Table 4).

People with BJP were twice as likely to visit physiotherapists (adjusted OR 2.20, 95% CI 1.81 - 2.68), 85% more likely to visit chiropractors (adjusted OR 1.85, 95% CI 1.54 - 2.22), and 34% more likely to visit Accident and Emergency/GPs out of hours (adjusted OR 1.34, 95% CI 1.11 - 1.62) compared to rest of the Port Lincoln population (Table 4).

Analysis of BJP phenotypes

The population with BJP were grouped into four phenotypes: BJP only (n=1204, 36%), BJP with other co-morbidities (n=2146, 64%), Aboriginal population with BJP (n=81, 2%) and a health service non-user population reporting BJP (n=111, 3%).

BJP only phenotype

Table 5 highlights that the BJP only group was younger (OR 0.98, 95% CI 0.97 - 0.99) and more likely to visit a physiotherapist in Port Lincoln (OR 1.34 95% CI 1.06 - 1.70) and elsewhere (OR 2.76, 95% CI 1.45 - 5.26) compared to the rest of the BJP population.

BJP with other co-morbidities

BJP respondents with other co-morbidities were twice as likely to visit a GP in Port Lincoln (OR 2.05, 95% CI 1.51 - 2.78) or elsewhere (OR 2.22, 95% CI 1.33 - 3.72). The ratios for reported fair or poor health to excellent or good (OR 2.25, 95% CI 1.68 - 3.00), moderate anxiety/depression to none (OR 2.30, 95% CI 1.82 - 2.92), and extreme anxiety/depression to none (OR 6.98, 95% CI 2.67 - 18.27) were also higher in this phenotype than in those with BJP only. The results are shown in Table 5.

Although multivariable analysis did not indicate a significant difference in terms of pain between those with BJP and co-morbidities and those with BJP only, analysis of the CATI pain score variables indicated that the mean score for pain at its worst was significantly higher for people with BJP co-morbidities (7.34; 95% CI 7.19-7.5) compared to BJP only, (6.97;

95% CI 6.73-7.22; $t = -2.60$, $p = 0.01$). The current pain score for those with co-morbidities was also significantly higher (3.41 compared to 2.81, respectively; $t = -3.71$, $p < 0.01$).

Aboriginal People with BJP

These respondents were 2.4 times more likely to report that they had asthma (OR 2.45, 95% CI 0.97 - 6.19) and 3.6 times more likely to report that they had drug and/or alcohol problems (OR 3.63, 95% CI 0.89 - 14.81). The ratio of unable to wash/dress to no problems with self care was 14 times higher (OR 13.98, 95% CI 2.62 - 74.57) in this phenotype than in the remaining BJP population (Table 6). Although the number of Aboriginal CATI respondents was small ($n = 17$) their pain score at its worst was significantly higher than the rest of the CATI BJP population (8.76 compared to 7.19, respectively; $t = -2.92$, $p < 0.01$).

Non-Users of Health Services with BJP

Of particular interest, this group were significantly less likely to have private health insurance for services other than those provided by a hospital (OR 0.21, 95% CI 0.10 - 0.45) and the ratios of daily smoker or occasional smoker to never smoked were 2.1 (OR 2.14, 95% CI 1.13 - 4.05) and 3.25 (OR 3.25, 95% CI 1.33 - 7.94) times higher in this phenotype than in the remaining BJP population (Table 6). There were 19 respondents to the CATI in the non-user category and their mean pain score, at its worst, was not significantly different compared to the rest of the BJP respondents (6.21 and 7.24 respectively; $t = 1.43$, $p = 0.17$).

Detailed tables with a complete listing of all variables included in the models can be found in the Appendix.

Discussion

BJPs were the most commonly reported condition in the LINKIN Health Study. Participants with BJP reported higher ratios than those without BJP with regard to some mobility problems, moderate and extreme pain/discomfort, and some problems with usual activities. The CATI data indicated that those with a BJP and co-morbidities reported significantly higher levels of pain. They were also more likely to report both moderate and high levels of anxiety/depression. Breivik et al [18] identified that musculoskeletal pain was a common

cause of chronic pain in European countries and it is likely that these conditions also impact on the presence of chronic pain in an Australian population.

The patterns of health system usage then become important in the context of managing these conditions. Services such as GPs, physiotherapists and chiropractors were most commonly used by people with BJP. This population were 34% more likely visit A&E/GP (out of hours), were twice as likely to visit a physiotherapist, 85% more likely to visit a chiropractor/osteopath and were more likely to visit alternative health practitioners (OR=1.40, 95% CI 1.01 - 1.93). It is known that Port Lincoln has a public pool but no specific hydrotherapy services and both public and private physiotherapy services. There are no resident orthopaedic or rheumatology services, with orthopaedic services visiting from Adelaide or patients travelling to Adelaide or another regional centre. Public specialist services do not exist in outpatients. Considering that 42% of the population reported a BJP this significantly affects service need, demand, and usage and exacerbates any existing access issues for a range of services within the health system.

As highlighted, a key difference for people with BJP only, compared to other subgroups was their propensity to use physiotherapists. For the BJP population with co-morbidities, unsurprisingly, the key difference was that respondents in this group were more likely to access GP services. Because of their higher levels of pain and levels of anxiety/depression this provides a significant issue for the effective management of BJP. GPs need to consider whether clinical management of the bone and joint condition is receiving due priority, including making links to allied health practitioners.

It is also of note that there were a proportion of respondents with a BJP that did not use any services in previous 12 months. These participants were less likely to have private health insurance with general extras (i.e. cover for out of hospital services). Other possible reasons for not accessing services include: level of severity, lack of access, and high cost of services. As the characteristics and needs of this group are rarely reported, and poorly understood, along with their specific requirements in the design of service delivery models, it is important that methods are developed to document their health needs and care.

The limitations of the census are the lack of a specific question to identify the type of musculoskeletal condition, the use of self-report to identify service use and not defining the reason for the visits to health professionals. A further limitation is that the census question only asked if participants currently had a BJP and thus intermittent issues were unlikely to be identified and using examples such as back pain and osteoporosis may have impacted on reporting the presence of other conditions such as arthritis. This is the focus of on-going investigations in LINKIN. A further limitation is the issue of missing data, which may have impacted on associations between covariates, and that the population under examination is a regional town in South Australia which may not be representative of the general population of Australia. Limitations related to the CATI were the recall of pain level and the inability to interview all of those with a BJP. However the strengths of this study are that it achieved 74% response rate for the census and a 78% for the CATI.

Future directions in the study involve a more detailed analysis specifically of service use; description of care pathways through the health system; and a mixed method approach to enhance the quality and application of the above analyses. Engagement of service providers in focus group discussions will afford a clinical perspective. Traditionally, the provision of care to patients with musculoskeletal conditions has been delivered by separate practitioners; however, more recently there has been an emergence of models of care that encourage team-based or integrative care [19]. Studies have demonstrated that an integrated care approach to musculoskeletal conditions is clinically and cost effective [19,20]. The LINKIN study aims to further build on these data, with the ultimate aim of implementing a health service intervention to enhance the current model of care.

In conclusion, this analysis demonstrates GPs were significant providers for those with co-morbidities, the group who also reported higher levels of pain and mental distress. This highlights the central role of GPs in effectively managing this phenotype within the BJP population including the importance of linking allied health professionals with general practice to manage BJP more efficiently.

References

1. Woolf AD, Vos T, March L. How to measure the impact of musculoskeletal conditions. *Best Pract Res Clin Rheumatol* 2010, 24:723-32.
2. Woolf AD, Pfleger B. Burden of major musculoskeletal conditions. *Bull World Health Organ*, 2003, 81:646-56.
3. Murray CJL, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, Ezzati M, Shibuya K et al. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet* 2012, 380: 2197-223
4. Australian Institute of Health and Welfare. Arthritis and musculoskeletal conditions in Australia 2005. AIHW CAT. NO. PHE 67. Canberra: Australian Institute of Health and Welfare; 2005.
5. Australian Bureau of Statistics. National Health Survey: Summary of Results. 2007-2008 (Reissue). Cat. no. 9. 4364.0. Canberra: Australian Bureau of Statistics; 2009.
6. Australian Institute of Health and Welfare. A snapshot of arthritis in Australia 2010. Arthritis series no. 13. Cat. no. PHE 126. Canberra: Australian Institute of Health and Welfare; 2010.
7. Access Economics. Painful realities: The economic impact of arthritis in Australia in 2007. Canberra: Arthritis Australia; 2007.
8. Australian Institute of Health and Welfare. Use of health services for arthritis and osteoporosis. Arthritis series no. 14. Cat. no. PHE 130. Canberra: Australian Institute of Health and Welfare; 2010.
9. Australian Institute of Health and Welfare. Population differences in health-care use for arthritis and osteoporosis in Australia. Arthritis series no. 17. Cat. no. PHE 147. Canberra: Australian Institute of Health and Welfare; 2011.
10. Britt HC, Harrison CM, Miller GC, Knox SA. Prevalence and patterns of multi-morbidity in Australia, *MJA*, 2008, 189 (2):72-77.

11. Hoon-Leahy CE, Newbury JW, Kitson AL, Whitford DJ, Wilson A, Karnon J, Baker J, Jamrozik K, Beilby J. The LINKIN Health Census process: design and implementation, *BMC Health Services Research*, 2012, 12:321.
12. Brazier JE, Harper R, Jones NM, O'Cathain A, Thomas KJ, Usherwood T, Westlake L. Validating the SF-36 health survey questionnaire: new outcome measure for primary care. *BMJ* 1992, 305:160-4.
13. Ware J, Sherbourne D. The MOS 36-item shortform, health survey (SF-36). *Med Care*, 1992;60(6):473-83
14. Rabin R, de Charro F. EQ-5D: a measure of health status from the EuroQol Group. *Ann Med* 2001, 33:337-43.
15. Jennings PA, Cameron P, Bernard S. Measuring acute pain in the pre-hospital setting, *Emerg Med J* 2009, 26:552–555
16. Australian Bureau of Statistics. National regional profile: Port Lincoln 2006-2010, Table 02. Population and people, Time series spreadsheet, cat. no. 1379.0.55.001, viewed 25 August 2011, URL:
<http://www.abs.gov.au/AUSSTATS/abs@nrf.nsf/Lookup/LGA46300Main%20Features12006-2010?OpenDocument&tabname=Summary&prodno=LGA46300&issue=2006-2010&num=&view=&>
17. Belsley DA, Kuh E, Welsch RE. Regression diagnostics: identifying influential data and sources of collinearity. New York: Wiley, 1980.
18. Breivik H, Collett B, Ventafridda V, Cohen R, Gallacher D. Survey of chronic pain in Europe: Prevalence, impact on daily life, and treatment. *Eur J Pain* 2006, 287-333.
19. Kopansky-Giles D, Vernon H, Boon H, Steiman I, Kelly M, Kachan N. Inclusion of a CAM therapy (chiropractic care) for the management of musculoskeletal pain in an integrative, inner city, hospital-based primary care setting. *Journal of Alternative Medicine Research* 2010, 2:61-74.
20. Bernstein I. Integrated musculoskeletal service design by GP consortia. *London J Prim Care* 2011, 4:16-26.

Tables

Table 1. Clinically Relevant Phenotypes for BJP Population

	Phenotype	Acronym
1	Those with only BJP and no other current medical conditions*	BJP Only
2	Those with BJP plus other current medical conditions*	BJP + other
3	Those of Aboriginal origin with BJP	BJP + Aboriginal
4	BJP who did not visit any health service provider in the last 12 months	(BJP + non-user)

* Participants were provided with a list of broad medical condition categories, such as asthma, cancer, diabetes mellitus, heart. For a complete list of medical conditions, see Appendix tables.

Table 2. Socio-demographic characteristics of population with bone and joint problems and the total population participating in the LINKIN Health Census at Port Lincoln, 2010*

Characteristics	BJP population <i>n(%)[†]</i>	LINKIN Health Study population <i>n(%)[†]</i>
Total participants	3350	7895
Age (years)		
<45	860 (31.9)	3274 (49.7)
45-64	1408 (40.0)	2747 (31.3)
>64	1055 (28.1)	1794 (19.0)
Gender		
Males	1461 (42.6)	3585 (45.6)
Females	1872 (57.4)	4275 (54.4)
Marital status		
Married/living with partner	2216 (65.9)	5032 (62.2)
Separated/divorced	370 (10.8)	690 (8.2)
Widowed	366 (10.1)	599 (6.6)
Single/never married	373 (13.2)	1518 (23.0)
Aboriginal origin	81 (2.6)	250 (3.4)
First language English	3240 (97.2)	7616 (97.0)
Highest qualification		
No formal qualifications	600 (17.4)	1147 (13.9)
Year 10 or school certificate	849 (26.0)	1969 (25.6)
Year 12 or leaving certificate	472 (15.2)	1302 (17.9)
Trade/apprenticeship/certificate/diploma	1020 (32.6)	2367 (31.5)
University degree/higher degrees	273 (8.8)	826 (11.1)
Work status		
Full time	991 (32.0)	2792 (37.8)
Part time	643 (20.5)	1618 (21.5)
Unemployed	87 (2.9)	257 (3.6)
Home duties	285 (9.0)	663 (8.6)
Retired	1012 (27.2)	1707 (18.2)
Student	41 (1.6)	383 (6.3)
Unable to work	231 (6.8)	334 (4.0)
Annual income		
Nil or negative income	140 (4.7)	453 (6.8)
<\$13,000	385 (12.5)	947 (13.5)
\$13,000 - 31,199	1257 (39.8)	2493 (32.9)
\$31,200 - 51,199	642 (22.0)	1601 (22.6)
\$51,200 - 83,199	408 (14.1)	1151 (16.3)
>\$83,200	208 (6.9)	574 (7.9)
Regular carer		
At home	253 (7.6)	489 (6.0)
Elsewhere	320 (9.6)	619 (7.6)

* Missing data not reported; † Percentages are weighted for age and gender; numbers are unweighted. Weighting based on 2009 ABS Port Lincoln estimated resident population [13].

Table 3. Self-reported chronic conditions, health status and service use by population with bone and joint problems and all population participating in the LINKIN Health Census at Port Lincoln, 2010*

Characteristics	BJP population <i>n</i> (%) [†]	LINKIN Health Study population <i>n</i> (%) [†]
Total participants	3350	7895
Medical conditions		
Alzheimer's disease/dementia	78 (2.1)	120 (1.3)
Asthma	574 (17.8)	1064 (14.1)
Cancer	138 (3.7)	220 (2.4)
Diabetes/high blood sugar	488 (13.3)	838 (9.4)
Drug or alcohol problem	112 (3.6)	209 (2.8)
Gynaecological/obstetrics	168 (5.2)	281 (3.6)
Heart/circulatory disease/high BP	1159 (31.8)	1892 (21.1)
Infectious disease	33 (1.0)	55 (0.7)
Kidney disease	65 (1.8)	105 (1.2)
Mental health problem	338 (10.6)	607 (8.0)
Respiratory problems	241 (6.8)	342 (4.0)
Stroke/neurological	116 (3.3)	205 (2.4)
Other co-morbidity	296 (8.6)	544 (6.6)
Smokers		
Daily	570 (18.7)	1314 (16.6)
Occasionally	130 (4.2)	375 (5.3)
Don't smoke but used to	1029 (30.1)	2092 (25.5)
Never smoked/only a few times	1531 (47.0)	3833 (51.2)
Self-reported health status		
Regular health checks	1822 (52.1)	3802 (45.4)
Wait until something wrong	1468 (47.9)	3945 (54.6)
Self-rated health		
excellent	140 (4.7)	1051 (15.1)
very good	847 (26.9)	2603 (34.7)
good	1213 (36.4)	2519 (31.3)
fair	876 (25.2)	1310 (15.2)
poor	240 (6.8)	326 (3.7)
EQ5D self care		
some problems	240 (6.7)	312 (3.5)
unable to wash/dress	76 (2.1)	120 (1.4)
EQ5D anxiety/depression		
moderately anxious/depressed	1096 (33.9)	1901 (24.4)
extremely anxious/depressed	130 (4.1)	198 (2.6)

Continued over page

Table 3. Self-reported chronic conditions, health status and service use by population with bone and joint problems and all population participating in the LINKIN Health Census at Port Lincoln, 2010 (cont)*

Characteristics	BJP population <i>n(%)[†]</i>	LINKIN Health Study population <i>n(%)[†]</i>
EQ5D mobility		
some problems	921 (26.2)	1141 (12.9)
confined to bed	31 (0.8)	52 (0.6)
EQ5D pain/discomfort		
moderate pain/discomfort	2326 (69.8)	3033 (36.8)
extreme pain/discomfort	251 (7.4)	275 (3.3)
EQ5D usual activities		
some problems	1340 (39.2)	1699 (20.1)
unable to perform	148 (4.2)	214 (2.4)
Health care card	438 (14.2)	1077 (15.0)
Private health insurance		
Hospital cover	1195 (35.7)	2805 (35.4)
Other health services	1547 (46.8)	3566 (45.4)
Use of health service providers		
Aboriginal Health Service (PLAHS)	50 (1.6)	147 (2.0)
Accident & Emergency/GP Out of hours	799 (25.4)	1658 (22.3)
Alternative Health Practitioner	223 (7.0)	392 (5.1)
Chiropodist/Podiatrist	582 (16.3)	966 (11.0)
Chiropractor/Osteopath	834 (26.4)	1630 (21.4)
Counsellor/Psychologist/Mental Health Worker	256 (8.2)	518 (7.0)
Dentist/Dental professional	1415 (43.7)	3259 (42.5)
Diabetes Educator	211 (5.8)	351 (3.9)
Dietician/Nutritionist	175 (5.0)	267 (3.1)
Drug, Alcohol and Addiction Services	57 (1.8)	88 (1.1)
General Practitioners 9am-5pm	2866 (85.6)	5803 (73.5)
Hospital as inpatient	433 (12.9)	875 (10.9)
Nurse (Community/Practice)	235 (7.1)	421 (5.2)
Occupational Therapist (OT)	55 (1.6)	83 (1.0)
Optician/Optomtrist/Audiologist	959 (28.1)	1763 (21.0)
Others	93 (2.7)	149 (1.8)
Physiotherapist/Hydrotherapist/Acupuncturist	853 (26.2)	1364 (17.3)
Social worker/Welfare officer	75 (2.3)	135 (1.8)
Specialist doctor	535 (15.6)	968 (11.7)

* Missing data not reported; † Percentages are weighted for age and gender; numbers are unweighted. Weighting based on 2009 Port Lincoln estimated resident population [13].

Table 4. Variables associated with having a BJP compared to the Port Lincoln population without BJP (significant at 0.05).

Variable	Odds ratio (95% confidence interval)	p-value
Age	1.02 (1.01 - 1.03)	0.00
Aboriginal origin	0.49 (0.25 - 0.97)	0.04
Medical conditions		
Asthma	1.61 (1.29 - 2.01)	0.00
Cancer	0.58 (0.36 - 0.92)	0.02
Diabetes/high blood sugar	0.68 (0.49 - 0.95)	0.02
Drug or alcohol problem	1.86 (1.06 - 3.24)	0.03
Infectious disease	1.27 (1.04 - 1.56)	0.02
Other co-morbidity	0.56 (0.41 - 0.77)	0.00
Use of health service providers		
Accident & Emergency/GP Out of hours (PL)	1.34 (1.11 - 1.62)	0.00
Alternative Health Practitioner (PL)	1.40 (1.01 - 1.93)	0.04
Chiropodist/Podiatrist (PL)	0.77 (0.60 - 1.00)	0.05
Chiropractor/Osteopath (PL)	1.85 (1.54 - 2.22)	0.00
Drug, Alcohol and Addiction Services (PL)	2.29 (1.30 - 4.04)	0.00
Drug, Alcohol and Addiction Services (E)	0.14 (0.04 - 0.48)	0.00
Hospital as inpatient (PL)	0.71 (0.54 - 0.92)	0.01
Occupational Therapist (OT) (PL)	0.44 (0.22 - 0.90)	0.02
Optician/Optomestrist/Audiologist (PL)	1.20 (1.00 - 1.44)	0.05
Optician/Optomestrist/Audiologist (E)	1.79 (1.20 - 2.66)	0.00
Physiotherapist/Hydrotherapist/Acupuncturist (PL)	2.20 (1.81 - 2.68)	0.00
Physiotherapist/Hydrotherapist/Acupuncturist (E)	2.84 (1.41 - 5.73)	0.00
EQ5D anxiety/depression		
Moderately anxious/depressed	1.02 (0.84 - 1.23)	0.87
Extremely anxious/depressed	0.56 (0.31 - 0.98)	0.04
EQ5D mobility		
Some problems	1.87 (1.32 - 2.64)	0.00
Confined to bed	1.21 (0.32 - 4.55)	0.78
EQ5D pain/discomfort		
Moderate pain/discomfort	12.64 (10.68 - 14.96)	0.00
Extreme pain/discomfort	33.65 (16.74 - 67.66)	0.00
EQ5D usual activities		
Some problems	2.12 (1.67 - 2.70)	0.00
Unable to perform	1.01 (0.55 - 1.87)	0.97

Reference categories: not anxious/depressed; no problems with mobility; no pain/discomfort; no problems with usual activities. PL - Port Lincoln; E - elsewhere. For complete list of all included variables and odds ratios, see Appendix table 1.1.

Table 5. Variables associated with having a BJP only compared to having a BJP and other chronic conditions	BJP only compared to BJP and other chronic conditions		BJP and other chronic conditions compared to BJP only	
Variable	OR (95% CI)	p-value	OR (95% CI)	p-value
Age	0.98 (0.97 - 0.99)	0.00	1.02 (1.01 - 1.03)	0.00
Marital status				
Single/never married	0.71 (0.49 - 1.02)	0.06	1.41 (0.98 - 2.02)	0.06
Highest qualification				
Year 12 or leaving certificate	1.47 (0.98 - 2.18)	0.06	0.68 (0.46 - 1.02)	0.06
Work status				
Retired	0.61 (0.40 - 0.92)	0.02	1.64 (1.08 - 2.48)	0.02
Self-rated health				
Fair to poor	0.45 (0.33 - 0.59)	0.00	2.25 (1.68 - 3.00)	0.00
Use of health service providers				
Accident & Emergency/GP Out of hours (PL)	0.78 (0.60 - 1.00)	0.05	1.29 (1.00 - 1.66)	0.05
Chiropodist/Podiatrist (PL)	0.60 (0.43 - 0.84)	0.00	1.66 (1.20 - 2.32)	0.00
Counsellor/Psychologist/Mental health worker (PL)	0.51 (0.33 - 0.81)	0.00	1.95 (1.24 - 3.06)	0.00
Dietician/Nutritionist (PL)	0.29 (0.13 - 0.64)	0.00	3.45 (1.55 - 7.66)	0.00
Drug, Alcohol and Addiction Services (PL)	0.47 (0.19 - 1.17)	0.10	2.14 (0.86 - 5.34)	0.10
General Practitioners 9am-5pm (PL)	0.49 (0.36 - 0.66)	0.00	2.05 (1.51 - 2.78)	0.00
General Practitioners 9am-5pm (E)	0.45 (0.27 - 0.75)	0.00	2.22 (1.33 - 3.72)	0.00
Nurse (Community/Practice) (PL)	0.52 (0.33 - 0.80)	0.00	1.94 (1.25 - 3.01)	0.00
Optician/Optomtrist/Audiologist (PL)	0.68 (0.53 - 0.86)	0.00	1.47 (1.16 - 1.88)	0.00
Physiotherapist/Hydrotherapist/Acupuncturist (PL)	1.34 (1.06 - 1.70)	0.02	0.75 (0.59 - 0.94)	0.02
Physiotherapist/Hydrotherapist/Acupuncturist (E)	2.76 (1.45 - 5.26)	0.00	0.36 (0.19 - 0.69)	0.00
Specialist doctor (PL)	0.51 (0.38 - 0.69)	0.00	1.95 (1.44 - 2.65)	0.00
Specialist doctor (E)	0.54 (0.40 - 0.73)	0.00	1.86 (1.38 - 2.50)	0.00
EQ5D anxiety/depression				
Moderately anxious/depressed	0.43 (0.34 - 0.55)	0.00	2.30 (1.82 - 2.92)	0.00
Extremely anxious/depressed	0.14 (0.05 - 0.38)	0.00	6.98 (2.67 - 18.27)	0.00

Reference categories: married/living with partner; no qualification; full time work; excellent to good self-rated health; not anxious/depressed. BJP - bone and joint problems; OR - odds ratio; CI - confidence interval; PL - Port Lincoln; E - elsewhere. For complete list of all included variables and odds ratios, see Appendix table 1.2.

Table 6. Variables associated with having a BJP and being Aboriginal and having a BJP but not using any health services compared to the rest of the population in Port Lincoln with a BJP

Variable	Aboriginal with BJP compared to rest of BJP population		Non-health service user with BJP compared to rest of BJP population	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Female	0.89 (0.38 - 2.04)	0.78	0.57 (0.31 - 1.05)	0.07
Marital status				
Separated/divorced	0.14 (0.01 - 1.90)	0.14	0.37 (0.12 - 1.14)	0.08
Highest qualification				
Trade/apprenticeship/certificate/diploma	0.25 (0.06 - 1.01)	0.05	0.36 (0.16 - 0.84)	0.02
Work status				
Retired	0.29 (0.08 - 1.14)	0.08	0.48 (0.16 - 1.44)	0.19
Annual income				
<\$13,000	0.26 (0.06 - 1.06)	0.06	0.92 (0.27 - 3.10)	0.89
\$31,200 - 51,199	0.15 (0.02 - 1.01)	0.05	0.45 (0.12 - 1.66)	0.23
Private health insurance				
Other health services	0.38 (0.11 - 1.36)	0.14	0.21 (0.10 - 0.45)	0.00
Smoking status				
Daily	1.33 (0.44 - 4.04)	0.61	2.14 (1.13 - 4.05)	0.02
Occasionally	0.11 (0.02 - 0.59)	0.01	3.25 (1.33 - 7.94)	0.01
Medical conditions				
Asthma	2.45 (0.97 - 6.19)	0.06	0.87 (0.43 - 1.77)	0.70
Drug or alcohol problem	3.63 (0.89 - 14.81)	0.07	-	-
Respiratory problems	0.26 (0.06 - 1.09)	0.07	-	-
Use of health service providers				
Aboriginal Health Service (PLAHS) (PL)	736.34 (142.27 - 3,811)	0.00	-	-
Counsellor/Psychologist/Mental health worker (PL)	0.17 (0.03 - 0.83)	0.03	-	-
General Practitioners 9am-5pm (PL)	0.39 (0.14 - 1.09)	0.07	-	-
Hospital as inpatient (PL)	0.26 (0.06 - 1.12)	0.07	-	-

Continued over page

Table 6. Variables associated with having a BJP and being Aboriginal and having a BJP and not using health services compared to the rest of the population in Port Lincoln with a BJP (cont)

Variable	Aboriginal with BJP compared to rest of BJP population		Non-health service user with BJP compared to rest of BJP population	
	OR (95% CI)	p-value	OR (95% CI)	p-value
EQ5D self care				
Some problems	0.48 (0.12 - 1.95)	0.30	0.19 (0.03 - 1.20)	0.08
Unable to wash/dress	13.98 (2.62 - 74.57)	0.00	1.00	-
EQ5D anxiety/depression				
Moderately anxious/depressed	2.25 (0.81 - 6.26)	0.12	0.58 (0.33 - 1.02)	0.06
EQ5D usual activities				
Some problems	1.13 (0.38 - 3.37)	0.83	0.37 (0.18 - 0.77)	0.01

Reference categories: married/living with partner; no qualification; full time work; never smoked; no problems with self-care; not anxious/depressed; no problems with usual activities. BJP - bone and joint problems; OR - odds ratio; CI - confidence interval; PL - Port Lincoln; E - elsewhere. For complete list of all included variables and odds ratios, see Appendix table 1.3.

Appendix

Table 1.1 All included variables associated with having a BJP compared to the Port Lincoln population without BJP

Variable	Odds ratio (95% confidence interval)	p-value
Age	1.02 (1.01 - 1.03)	0.00
Female	1.02 (0.86 - 1.21)	0.81
Marital status		
Separated/divorced	1.21 (0.92 - 1.58)	0.17
Widowed	1.01 (0.70 - 1.46)	0.95
Single/never married	0.89 (0.70 - 1.13)	0.34
Aboriginal origin	0.49 (0.25 - 0.97)	0.04
First language English	1.21 (0.80 - 1.85)	0.37
Highest qualification		
Year 10 or school certificate	1.19 (0.91 - 1.56)	0.20
Year 12 or leaving certificate	1.12 (0.83 - 1.51)	0.47
Trade/apprenticeship/certificate/diploma	1.16 (0.89 - 1.52)	0.27
University degree/higher degrees	0.87 (0.62 - 1.22)	0.43
Work status		
Part time	1.12 (0.89 - 1.39)	0.33
Unemployed	0.76 (0.45 - 1.26)	0.28
Home duties	1.02 (0.73 - 1.43)	0.90
Retired	0.94 (0.68 - 1.29)	0.69
Student	0.77 (0.45 - 1.31)	0.33
Unable to work	0.91 (0.56 - 1.49)	0.70
Annual income		
<\$13,000	0.91 (0.61 - 1.37)	0.65
\$13,000 - 31,199	1.06 (0.72 - 1.54)	0.78
\$31,200 - 51,199	1.08 (0.72 - 1.61)	0.71
\$51,200 - 83,199	1.14 (0.74 - 1.74)	0.55
>\$83,200	1.16 (0.74 - 1.83)	0.52
Health care card	1.07 (0.82 - 1.40)	0.62
Private health insurance		
Hospital cover	0.98 (0.80 - 1.21)	0.87
Other health services	1.09 (0.87 - 1.35)	0.45
Self-rated health		
Fair to poor	1.05 (0.82 - 1.34)	0.72
Smoking status		
Daily	1.08 (0.87 - 1.35)	0.50
Occasionally	0.79 (0.56 - 1.13)	0.20
Former	1.05 (0.89 - 1.25)	0.55
Medical conditions		
Alzheimer's disease/dementia	0.86 (0.39 - 1.89)	0.71
Asthma	1.61 (1.29 - 2.01)	0.00
Cancer	0.58 (0.36 - 0.92)	0.02

Continued over page

Table 1.1 All included variables associated with having a BJP compared to the rest of the Port Lincoln population (cont)

Variable	Odds ratio (95% confidence interval)	p-value
Diabetes/high blood sugar	0.68 (0.49 - 0.95)	0.02
Drug or alcohol problem	1.86 (1.06 - 3.24)	0.03
Heart/circulatory disease/high blood pressure	0.93 (0.62 - 1.37)	0.70
Infectious disease	1.27 (1.04 - 1.56)	0.02
Kidney disease	0.77 (0.26 - 2.28)	0.63
Mental health problem	0.87 (0.42 - 1.82)	0.71
Respiratory problems	1.03 (0.66 - 1.59)	0.91
Stroke/neurological	0.66 (0.38 - 1.16)	0.15
Other co-morbidity	0.56 (0.41 - 0.77)	0.00
Use of health service providers		
Aboriginal Health Service (PLAHS) (PL)	1.14 (0.54 - 2.38)	0.73
Accident & Emergency/GP Out of hours (PL)	1.34 (1.11 - 1.62)	0.00
Accident & Emergency/GP Out of hours (E)	1.00 (0.60 - 1.67)	0.99
Alternative Health Practitioner (PL)	1.40 (1.01 - 1.93)	0.04
Alternative Health Practitioner (E)	1.20 (0.59 - 2.44)	0.62
Chiropodist/Podiatrist (PL)	0.77 (0.60 - 1.00)	0.05
Chiropodist/Podiatrist (E)	1.00 (0.37 - 2.67)	1.00
Chiropractor/Osteopath (PL)	1.85 (1.54 - 2.22)	0.00
Chiropractor/Osteopath (E)	1.84 (0.78 - 4.34)	0.17
Counsellor/Psychologist/Mental health worker (PL)	0.91 (0.65 - 1.27)	0.58
Counsellor/Psychologist/Mental health worker (E)	1.29 (0.69 - 2.41)	0.43
Dentist/Dental professional (PL)	1.00 (0.85 - 1.17)	0.97
Dentist/Dental professional (E)	1.14 (0.75 - 1.74)	0.54
Diabetes Educator (PL)	1.25 (0.79 - 1.97)	0.35
Dietician/Nutritionist (PL)	1.26 (0.81 - 1.96)	0.31
Dietician/Nutritionist (E)	1.26 (0.47 - 3.38)	0.65
Drug, Alcohol and Addiction Services (PL)	2.29 (1.30 - 4.04)	0.00
Drug, Alcohol and Addiction Services (E)	0.14 (0.04 - 0.48)	0.00
General Practitioners 9am-5pm (PL)	1.10 (0.90 - 1.35)	0.35
General Practitioners 9am-5pm (E)	0.95 (0.66 - 1.36)	0.77
Hospital as inpatient (PL)	0.71 (0.54 - 0.92)	0.01
Hospital as inpatient (E)	0.85 (0.59 - 1.24)	0.41
Nurse (Community/Practice) (PL)	0.84 (0.57 - 1.22)	0.35
Nurse (Community/Practice) (E)	2.11 (0.64 - 6.92)	0.22
Occupational Therapist (OT) (PL)	0.44 (0.22 - 0.90)	0.02
Optician/Optomtrist/Audiologist (PL)	1.20 (1.00 - 1.44)	0.05
Optician/Optomtrist/Audiologist (E)	1.79 (1.20 - 2.66)	0.00
Other health services (PL)	1.47 (0.83 - 2.59)	0.19
Other health services (E)	1.94 (0.78 - 4.82)	0.15
Physiotherapist/Hydrotherapist/Acupuncturist (PL)	2.20 (1.81 - 2.68)	0.00

Continued over page

Table 1.1 All included variables associated with having a BJP compared to the rest of the Port Lincoln population (cont)

Variable	Odds ratio (95% confidence interval)	p-value
Physiotherapist/Hydrotherapist/Acupuncturist (E)	2.84 (1.41 - 5.73)	0.00
Social worker/Welfare officer (PL)	1.07 (0.60 - 1.92)	0.82
Specialist doctor (PL)	1.13 (0.89 - 1.42)	0.31
Specialist doctor (E)	1.00 (0.77 - 1.29)	0.98
EQ5D self care		
Some problems	0.82 (0.47 - 1.43)	0.49
Unable to wash/dress	1.57 (0.54 - 4.55)	0.40
EQ5D anxiety/depression		
Moderately anxious/depressed	1.02 (0.84 - 1.23)	0.87
Extremely anxious/depressed	0.56 (0.31 - 0.98)	0.04
EQ5D mobility		
Some problems	1.87 (1.32 - 2.64)	0.00
Confined to bed	1.21 (0.32 - 4.55)	0.78
EQ5D pain/discomfort		
Moderate pain/discomfort	12.64 (10.68 - 14.96)	0.00
Extreme pain/discomfort	33.65 (16.74 - 67.66)	0.00
EQ5D usual activities		
Some problems	2.12 (1.67 - 2.70)	0.00
Unable to perform	1.01 (0.55 - 1.87)	0.97

Reference categories: married/living with partner; no qualification; full time work; nil or negative income; excellent to good self-rated health; never smoked; no problems with self care; not anxious/depressed; no problems with mobility; no pain/discomfort; no problems with usual activities.

PL - Port Lincoln; E - elsewhere.

Excluded covariates: Aboriginal Health Service (PLAHS) (E); Diabetes Educator (E); Occupational Therapist (OT) (E); Social worker/Welfare officer (E).

Table 1.2 All included variables associated with having a BJP only compared to the rest of the Port Lincoln population with a BJP

Variable	BJP only compared to BJP and other chronic conditions		BJP and other chronic conditions compared to BJP only	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age	0.98 (0.97 - 0.99)	0.00	1.02 (1.01 - 1.03)	0.00
Female	0.84 (0.66 - 1.07)	0.15	1.19 (0.94 - 1.51)	0.15
Marital status				
Separated/divorced	1.09 (0.77 - 1.54)	0.64	0.92 (0.65 - 1.30)	0.64
Widowed	1.14 (0.67 - 1.92)	0.63	0.88 (0.52 - 1.48)	0.63
Single/never married	0.71 (0.49 - 1.02)	0.06	1.41 (0.98 - 2.02)	0.06
Aboriginal origin	0.75 (0.31 - 1.84)	0.53	1.33 (0.54 - 3.26)	0.53
First language English	0.92 (0.54 - 1.59)	0.78	1.08 (0.63 - 1.87)	0.78
Highest qualification				
Year 10 or school certificate	1.21 (0.85 - 1.73)	0.29	0.82 (0.58 - 1.18)	0.29
Year 12 or leaving certificate	1.47 (0.98 - 2.18)	0.06	0.68 (0.46 - 1.02)	0.06
Trade/apprenticeship/certificate/diploma	1.19 (0.84 - 1.70)	0.33	0.84 (0.59 - 1.19)	0.33
University degree/higher degrees	0.92 (0.58 - 1.44)	0.70	1.09 (0.69 - 1.72)	0.70
Work status				
Part time	0.97 (0.72 - 1.33)	0.87	1.03 (0.75 - 1.40)	0.87
Unemployed	0.57 (0.28 - 1.19)	0.14	1.75 (0.84 - 3.63)	0.14
Home duties	1.16 (0.73 - 1.86)	0.53	0.86 (0.54 - 1.37)	0.53
Retired	0.61 (0.40 - 0.92)	0.02	1.64 (1.08 - 2.48)	0.02
Student	0.89 (0.34 - 2.33)	0.81	1.13 (0.43 - 2.95)	0.81
Unable to work	1.10 (0.61 - 2.00)	0.75	0.91 (0.50 - 1.65)	0.75
Annual income				
<\$13,000	0.66 (0.36 - 1.19)	0.16	1.53 (0.84 - 2.77)	0.16
\$13,000 - 31,199	0.68 (0.40 - 1.17)	0.16	1.47 (0.86 - 2.52)	0.16
\$31,200 - 51,199	0.69 (0.39 - 1.24)	0.22	1.44 (0.81 - 2.58)	0.22
\$51,200 - 83,199	0.83 (0.45 - 1.53)	0.55	1.20 (0.66 - 2.20)	0.55
\$83,200	0.98 (0.51 - 1.89)	0.96	1.02 (0.53 - 1.97)	0.96

Continued over page

Table 1.2 All included variables associated with having a BJP only compared to the rest of the Port Lincoln population with a BJP (cont)

Variable	BJP only compared to BJP and other chronic conditions		BJP and other chronic conditions compared to BJP only	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Health care card	0.80 (0.55 - 1.15)	0.23	1.26 (0.87 - 1.82)	0.23
Private health insurance				
Hospital cover	1.04 (0.78 - 1.40)	0.77	0.96 (0.72 - 1.28)	0.77
Other health services	0.98 (0.73 - 1.32)	0.89	1.02 (0.76 - 1.38)	0.89
Self-rated health				
Fair to poor	0.45 (0.33 - 0.59)	0.00	2.25 (1.68 - 3.00)	0.00
Smoking status				
Daily	1.07 (0.79 - 1.44)	0.66	0.94 (0.69 - 1.26)	0.66
Occasionally	1.12 (0.67 - 1.88)	0.67	0.89 (0.53 - 1.50)	0.67
Former	0.88 (0.70 - 1.12)	0.31	1.13 (0.89 - 1.44)	0.31
Use of health service providers				
Aboriginal Health Service (PLAHS) (PL)	0.92 (0.34 - 2.48)	0.86	1.09 (0.40 - 2.96)	0.86
Accident & Emergency/GP Out of hours (PL)	0.78 (0.60 - 1.00)	0.05	1.29 (1.00 - 1.66)	0.05
Accident & Emergency/GP Out of hours (E)	1.11 (0.58 - 2.16)	0.75	0.90 (0.46 - 1.74)	0.75
Alternative Health Practitioner (PL)	0.79 (0.55 - 1.14)	0.21	1.26 (0.88 - 1.80)	0.21
Alternative Health Practitioner (E)	1.35 (0.58 - 3.12)	0.49	0.74 (0.32 - 1.72)	0.49
Chiropodist/Podiatrist (PL)	0.60 (0.43 - 0.84)	0.00	1.66 (1.20 - 2.32)	0.00
Chiropractor/Osteopath (PL)	1.04 (0.82 - 1.32)	0.73	0.96 (0.76 - 1.21)	0.73
Chiropractor/Osteopath (E)	1.20 (0.49 - 2.96)	0.69	0.83 (0.34 - 2.04)	0.69
Counsellor/Psychologist/Mental health worker (PL)	0.51 (0.33 - 0.81)	0.00	1.95 (1.24 - 3.06)	0.00
Counsellor/Psychologist/Mental health worker (E)	0.86 (0.41 - 1.81)	0.69	1.16 (0.55 - 2.45)	0.69
Dentist/Dental professional (PL)	1.11 (0.90 - 1.38)	0.33	0.90 (0.72 - 1.11)	0.33
Dentist/Dental professional (E)	1.08 (0.65 - 1.81)	0.76	0.92 (0.55 - 1.54)	0.76
Dietician/Nutritionist (PL)	0.29 (0.13 - 0.64)	0.00	3.45 (1.55 - 7.66)	0.00
Drug, Alcohol and Addiction Services (PL)	0.47 (0.19 - 1.17)	0.10	2.14 (0.86 - 5.34)	0.10
General Practitioners 9am-5pm (PL)	0.49 (0.36 - 0.66)	0.00	2.05 (1.51 - 2.78)	0.00

Continued over page

Table 1.2 All included variables associated with having a BJP only compared to the rest of the Port Lincoln population with a BJP (cont)

Variable	BJP only compared to BJP and other chronic conditions		BJP and other chronic conditions compared to BJP only	
	OR (95% CI)	p-value	OR (95% CI)	p-value
General Practitioners 9am-5pm (E)	0.45 (0.27 - 0.75)	0.00	2.22 (1.33 - 3.72)	0.00
Hospital as inpatient (PL)	1.12 (0.81 - 1.57)	0.49	0.89 (0.64 - 1.24)	0.49
Hospital as inpatient (E)	1.07 (0.69 - 1.68)	0.76	0.93 (0.59 - 1.46)	0.76
Nurse (Community/Practice) (PL)	0.52 (0.33 - 0.80)	0.00	1.94 (1.25 - 3.01)	0.00
Occupational Therapist (OT) (PL)	0.95 (0.43 - 2.07)	0.89	1.05 (0.48 - 2.30)	0.89
Optician/Optomtrist/Audiologist (PL)	0.68 (0.53 - 0.86)	0.00	1.47 (1.16 - 1.88)	0.00
Optician/Optomtrist/Audiologist (E)	0.82 (0.49 - 1.36)	0.45	1.22 (0.73 - 2.03)	0.45
Other health services (PL)	1.01 (0.58 - 1.77)	0.96	0.99 (0.57 - 1.72)	0.96
Other health services (E)	0.99 (0.46 - 2.14)	0.98	1.01 (0.47 - 2.19)	0.98
Physiotherapist/Hydrotherapist/Acupuncturist (PL)	1.34 (1.06 - 1.70)	0.02	0.75 (0.59 - 0.94)	0.02
Physiotherapist/Hydrotherapist/Acupuncturist (E)	2.76 (1.45 - 5.26)	0.00	0.36 (0.19 - 0.69)	0.00
Social worker/Welfare officer (PL)	1.19 (0.51 - 2.77)	0.69	0.84 (0.36 - 1.97)	0.69
Specialist doctor (PL)	0.51 (0.38 - 0.69)	0.00	1.95 (1.44 - 2.65)	0.00
Specialist doctor (E)	0.54 (0.40 - 0.73)	0.00	1.86 (1.38 - 2.50)	0.00
EQ5D self care				
Some problems	1.12 (0.61 - 2.03)	0.71	0.89 (0.49 - 1.63)	0.71
Unable to wash/dress	0.63 (0.22 - 1.86)	0.41	1.58 (0.54 - 4.63)	0.41
EQ5D anxiety/depression				
Moderately anxious/depressed	0.43 (0.34 - 0.55)	0.00	2.30 (1.82 - 2.92)	0.00
Extremely anxious/depressed	0.14 (0.05 - 0.38)	0.00	6.98 (2.67 - 18.27)	0.00
EQ5D mobility				
Some problems	0.94 (0.68 - 1.30)	0.72	1.06 (0.77 - 1.47)	0.72
Confined to bed	1.17 (0.23 - 5.99)	0.85	0.86 (0.17 - 4.38)	0.85
EQ5D pain/discomfort				
Moderate pain/discomfort	0.89 (0.70 - 1.14)	0.37	1.12 (0.88 - 1.43)	0.37

Continued over page

Table 1.2 All included variables associated with having a BJP only compared to the rest of the Port Lincoln population with a BJP (cont)

Variable	BJP only compared to BJP and other chronic conditions		BJP and other chronic conditions compared to BJP only	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Extreme pain/discomfort	1.55 (0.89 - 2.70)	0.12	0.64 (0.37 - 1.12)	0.12
EQ5D usual activities				
Some problems	0.96 (0.74 - 1.25)	0.77	1.04 (0.80 - 1.35)	0.77
Unable to perform	0.97 (0.40 - 2.38)	0.95	1.03 (0.42 - 2.52)	0.95

Reference categories: married/living with partner; no qualification; full time work; excellent to good self-rated health; never smoked; no problems with self care; not anxious/depressed; no problems with mobility; no pain/discomfort; no problems with usual activities.

BJP - bone and joint problems; OR - odds ratio; CI - confidence interval; PL - Port Lincoln; E - elsewhere.

Excluded covariates: Aboriginal Health Service (PLAHS) (E); Chiropodist/Podiatrist (E); Diabetes Educator (PL); Diabetes Educator (E); Dietician/Nutritionist (E); Drug, Alcohol and Addiction Services (E); Nurse (Community/Practice) (E); Occupational Therapist (OT) (E); Social worker/Welfare officer (E).

Table 1.3 All included variables associated with having a BJP and being Aboriginal and having a BJP but not using any health services compared to the rest of the population in Port Lincoln with a BJP

Variable	Aboriginal with BJP compared to rest of BJP population		Non-health service user with BJP compared to rest of BJP population	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Age	0.98 (0.95 - 1.02)	0.28	0.99 (0.97 - 1.01)	0.33
Female	0.89 (0.38 - 2.04)	0.78	0.57 (0.31 - 1.05)	0.07
Marital status				
Separated/divorced	0.14 (0.01 - 1.90)	0.14	0.37 (0.12 - 1.14)	0.08
Widowed	0.71 (0.10 - 5.14)	0.74	0.26 (0.03 - 2.07)	0.20
Single/never married	1.82 (0.74 - 4.52)	0.19	1.28 (0.65 - 2.55)	0.48
Highest qualification				
Year 10 or school certificate	0.44 (0.15 - 1.32)	0.14	0.67 (0.31 - 1.45)	0.31
Year 12 or leaving certificate	0.26 (0.05 - 1.45)	0.13	0.78 (0.32 - 1.90)	0.59
Trade/apprenticeship/certificate/diploma	0.25 (0.06 - 1.01)	0.05	0.36 (0.16 - 0.84)	0.02
University degree/higher degrees	0.35 (0.09 - 1.38)	0.13	0.76 (0.24 - 2.36)	0.63
Work status				
Part time	1.01 (0.33 - 3.11)	0.99	0.98 (0.40 - 2.41)	0.96
Unemployed	1.14 (0.30 - 4.35)	0.84	0.61 (0.14 - 2.73)	0.52
Home duties	0.37 (0.05 - 2.76)	0.33	0.99 (0.31 - 3.11)	0.99
Retired	0.29 (0.08 - 1.14)	0.08	0.48 (0.16 - 1.44)	0.19
Student	0.64 (0.08 - 5.11)	0.67	1.00	-
Unable to work	0.72 (0.19 - 2.65)	0.62	0.71 (0.21 - 2.42)	0.58
Annual income				
<\$13,000	0.26 (0.06 - 1.06)	0.06	0.92 (0.27 - 3.10)	0.89
\$13,000 - 31,199	0.56 (0.16 - 1.94)	0.36	0.50 (0.15 - 1.67)	0.26
\$31,200 - 51,199	0.15 (0.02 - 1.01)	0.05	0.45 (0.12 - 1.66)	0.23
\$51,200 - 83,199	0.89 (0.18 - 4.49)	0.89	0.34 (0.08 - 1.49)	0.15
>\$83,200	0.37 (0.07 - 1.99)	0.25	0.55 (0.11 - 2.83)	0.47

Continued over page

Table 1.3 All included variables associated with having a BJP and being Aboriginal and having a BJP but not using any health services compared to the rest of the population in Port Lincoln with a BJP (cont)

Variable	Aboriginal with BJP compared to rest of BJP population		Non-health service user with BJP compared to rest of BJP population	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Health care card	1.28 (0.42 - 3.93)	0.66	1.02 (0.51 - 2.06)	0.95
Private health insurance				
Hospital cover	1.90 (0.43 - 8.36)	0.40	1.38 (0.64 - 2.97)	0.41
Other health services	0.38 (0.11 - 1.36)	0.14	0.21 (0.10 - 0.45)	0.00
Self-rated health				
Fair to poor	1.66 (0.60 - 4.59)	0.33	1.51 (0.78 - 2.93)	0.22
Smoking status				
Daily	1.33 (0.44 - 4.04)	0.61	2.14 (1.13 - 4.05)	0.02
Occasionally	0.11 (0.02 - 0.59)	0.01	3.25 (1.33 - 7.94)	0.01
Former	1.65 (0.64 - 4.24)	0.30	1.14 (0.60 - 2.20)	0.69
Medical conditions				
Asthma	2.45 (0.97 - 6.19)	0.06	0.87 (0.43 - 1.77)	0.70
Cancer	1.65 (0.22 - 12.38)	0.63	-	-
Diabetes/high blood sugar	2.02 (0.46 - 8.79)	0.35	-	-
Drug or alcohol problem	3.63 (0.89 - 14.81)	0.07	-	-
Heart/circulatory disease/high blood pressure	1.74 (0.59 - 5.08)	0.31	0.66 (0.34 - 1.27)	0.21
Mental health problem	1.00 (0.38 - 2.66)	1.00	-	-
Respiratory problems	0.26 (0.06 - 1.09)	0.07	-	-
Other co-morbidity	1.71 (0.51 - 5.69)	0.38	-	-
Use of health service providers				
Aboriginal Health Service (PLAHS) (PL)	736.34 (142.27 - 3,811)	0.00	-	-
Accident & Emergency/GP Out of hours (PL)	1.17 (0.42 - 3.27)	0.76	-	-
Chiropodist/Podiatrist (PL)	1.66 (0.62 - 4.43)	0.32	-	-
Counsellor/Psychologist/Mental health worker (PL)	0.17 (0.03 - 0.83)	0.03	-	-

Continued over page

Table 1.3 All included variables associated with having a BJP and being Aboriginal and having a BJP and not using health services compared to the rest of the population in Port Lincoln with a BJP (cont)

Variable	Aboriginal with BJP compared to rest of BJP population		Non-health service user with BJP compared to rest of BJP population	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Dentist/Dental professional (PL)	1.56 (0.71 - 3.47)	0.27	-	-
Diabetes Educator (PL)	1.52 (0.37 - 6.27)	0.56	-	-
General Practitioners 9am-5pm (PL)	0.39 (0.14 - 1.09)	0.07	-	-
Hospital as inpatient (PL)	0.26 (0.06 - 1.12)	0.07	-	-
Optician/Optomtrist/Audiologist (PL)	1.45 (0.54 - 3.88)	0.46	-	-
Physiotherapist/Hydrotherapist/Acupuncturist (PL)	0.83 (0.32 - 2.18)	0.71	-	-
Specialist doctor (PL)	1.48 (0.54 - 4.03)	0.44	-	-
Specialist doctor (E)	1.19 (0.43 - 3.29)	0.74	-	-
EQ5D self care				
Some problems	0.48 (0.12 - 1.95)	0.30	0.19 (0.03 - 1.20)	0.08
Unable to wash/dress	13.98 (2.62 - 74.57)	0.00	1.00	-
EQ5D anxiety/depression				
Moderately anxious/depressed	2.25 (0.81 - 6.26)	0.12	0.58 (0.33 - 1.02)	0.06
Extremely anxious/depressed	3.69 (0.70 - 19.40)	0.12	0.47 (0.11 - 1.97)	0.30
EQ5D mobility				
Some problems	1.11 (0.39 - 3.14)	0.85	1.98 (0.88 - 4.46)	0.10
Confined to bed	0.42 (0.02 - 7.29)	0.56	1.00	-
EQ5D pain/discomfort				
Moderate pain/discomfort	0.46 (0.15 - 1.38)	0.17	1.00 (0.55 - 1.82)	0.99
Extreme pain/discomfort	1.25 (0.31 - 5.01)	0.75	0.37 (0.11 - 1.23)	0.11
EQ5D usual activities				
Some problems	1.13 (0.38 - 3.37)	0.83	0.37 (0.18 - 0.77)	0.01
Unable to perform	1.83 (0.49 - 6.84)	0.37	0.68 (0.21 - 2.24)	0.53

Reference categories: married/living with partner; no qualification; full time work; excellent to good self-rated health; never smoked; no problems with self-care; not anxious/depressed; no problems with mobility; no pain/discomfort; no problems with usual activities.

BJP - bone and joint problems; OR - odds ratio; CI - confidence interval; PL - Port Lincoln; E - elsewhere.

Excluded covariates: First language English; Alzheimer's disease/dementia; Gynaecological/obstetrics; Infectious disease; Kidney disease; Stroke/neurological; Aboriginal Health Service (PLAHS) (E); Accident & Emergency/GP Out of hours (E); Alternative Health Practitioner (PL & E);

Counsellor/Psychologist/Mental Health Worker (E); Chiropodist/Podiatrist (E); Chiropractor/Osteopath (PL & E); Dentist/Dental professional (E); Diabetes Educator (E); Dietician/Nutritionist (PL & E); Drug, Alcohol and Addiction Services (PL & E); General Practitioners 9am-5pm (E); Hospital as inpatient (E); Nurse (Community/Practice) (PL & E); Occupational Therapist (OT) (PL & E); Optician/Optomtrist/Audiologist (E); Physiotherapist/Hydrotherapist/Acupuncturist (E); Social worker/Welfare officer (PL & E); Other health services (PL & E).