Medical Journal of Australia Manuscript title page

Title:	**Chlamydia trachomatis prevalence in young people attending primary care services in rural and regional Australia: a cross-sectional survey**
Type of article	Research

Authors

Please list authors in order, and include the single position and affiliation of each author that is most relevant to your article. (Add more rows if necessary.)

Author name First name, initial, Last name	**Degrees/ Fellowships**	**Position**	**Institution, City, State, (Nation if not Australia)**	**Phone No**	**Email**
Anna H Yeung	BScH, MPH	PhD Candidate	Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria	03 9035 3498	ayeung@unimelb.edu.au
Meredith Temple-Smith	BSc, Dip Applied Child Psychology, Dip Movement and Dance, MPH, DHSc	Associate Professor	Department of General Practice, University of Melbourne, Melbourne, Victoria	03 8344 3371	m.temple-smith@unimelb.edu.au
Christopher K Fairley	MBBS, PhD	Director (MSHC), Professor	Melbourne Sexual Health Centre, Melbourne, Victoria	03 9341 6236	cfairley@mshc.org.au
Alaina Vaisey	BScPH, MPH	Research Officer	Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria	03 9035 8259	amvaisey@unimelb.edu.au
Rebecca Guy	BAppSc, MAppEpid, PhD	Associate Professor	Kirby Institute, University of New South Wales, Sydney, New South Wales	02 9385 0900	Rguy@kirby.unsw.edu.au
Matthew Law	BA(Hons), MSc, PhD	Professor	Kirby Institute, University of New South Wales, Sydney, New South Wales	02 93850966	Mlaw@kirby.unsw.edu.au
Nicola Low	MD, MSc, FFPH	Professor	Institute of Social and Preventative Medicine, University of Bern, Bern, Switzerland	+41 31 631 3092	low@ispm.unibe.ch

source: https://doi.org/10.7892/boris.44511 | downloaded: 25.4.2024

Amie Bingham	BAHons, BSc, MPH	PhD Candidate	Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria	03 8344 6990	binghama@unimelb.edu.au
Jane Gunn	MBBS, FRACGP, DRANZCOG, PhD	Professor	Department of General Practice, University of Melbourne, Melbourne, Victoria	03 8344 4530	j.gunn@unimelb.edu.au
John Kaldor	PhD	Professor	Kirby Institute, University of New South Wales, Sydney, New South Wales	02 9385 0961	Jkaldor@kirby.unsw.edu.au
Basil Donovan	MB BS, MD, DipVen, FAFPHM, FRCPI, FAChSHM	Professor	Kirby Institute, University of New South Wales, Sydney, New South Wales	02 9385 9956	Bdonovan@kirby.unsw.edu.au
Jane Hocking	BappSc(MLS) MPH MHSc(PHP), PhD	Associate Professor	Melbourne School of Population and Global Health, University of Melbourne, Melbourne, Victoria	03 8344 0762	j.hocking@unimelb.edu.au

Competing interests statement

Please provide a written statement suitable for publication that covers all of the authors of your article, outlining any potentially relevant conflicts of interest.

Before your article can be accepted for publication in the *MJA*, each author will also be required to complete a **s**tandard disclosure form from The International Committee of Medical Journal Editors (ICMJE). Please click here to download the form. Nothing new that might impede the acceptance of your article should come to light at that stage, so the statement you provide here should be written on the basis of the requirements of the ICMJE form.

For examples of competing interests statements, see our Instructions to authors.

Competing interests:

No relevant disclosures identified.

Acknowledgements (OPTIONAL)

Acknowledgements must be brief. Acknowledge funding sources and people who have contributed to the study but who do not qualify as authors (see Authorship). Do not include secretarial staff.

Note that any person listed in your acknowledgements must give permission to be acknowledged in your article. The corresponding author should collate and forward such permissions. Emails are acceptable. If permission is not obtained and provided to the *MJA*, the names cannot be published.

Acknowledgements:

This prevalence survey was conducted as part of the Department of Health and Ageing funded Australian Chlamydia Control Effectiveness Pilot. We would like to thank the following people: Associate Professor Jane Tomnay from the Centre for Excellence in Rural Sexual Health, University of Melbourne for the provision of resources, support and advice on conducting this study in rural Victoria; Carolyn Murray and Dr Chris Bourne from the Sexually Transmitted Infectious Unit (STIPU), NSW Health for their advice and provision of resources; the ACCEPt research team of Simone Spark, Alaina Vaisey, Anna Wood, Rebecca Lorch, Belinda Ford, Jenny Walker, Michelle King, Dyani Lewis, Eris Smyth, Lisa Edward, Chantal Maloney and Anne Shaw who recruited all participating clinics and the 80 research assistants employed to recruit participants for the prevalence survey.

We acknowledge the input of the ACCEPt Consortium of investigators: A/Prof JS Hocking, Prof CK Fairley, Prof J Gunn, A/Prof M Chen, A/Prof M Pirotta, A/Prof Meredith Temple-Smith, A/Prof L Sanci, University of Melbourne; A/Prof R Guy, Prof M Law, Prof J Kaldor, Prof B Donovan, A/Prof D Wilson, Dr D Regan, University of New South Wales; A/Prof S Tabrizi, Royal Women's Hospital; J Ward, Baker IDI and University of New South Wales; Prof M Pitts, Prof A Mitchell, Latrobe University; Prof R Carter, Deakin University; Prof M Saville, Prof D Gertig, Victorian Cytology Service; Prof M Hellard, Burnet Institute; Prof N Low, University of Bern; Prof J Imrie, University of KwaZulu-Natal.

Medical Journal of Australia Manuscript submission template

Type of article See Types of articles published by the *MJA*	Research
Title:	**Chlamydia trachomatis prevalence in young people attending primary care services in rural and regional Australia: a cross-sectional survey**

Abstract	
Articles requiring a descriptive 15-word introductory line are: **Editorials**, and **Perspectives.** Articles requiring short (50-word) unstructured abstracts are: **Notable cases** (abstract should state the general area of relevance, describe the specific nature of the case, and point out the relevance/implications for clinical practice or health policy). Articles requiring 4–6 bullet-point) summaries are: **Clinical focus** article including narrative review. Articles requiring structured abstracts are: **Research reports** (use the headings: Objectives, Design, Setting, Participants, Main outcome measures, Results, Conclusions and Trial registration [if applicable]) and **Systematic reviews** (use the headings: Objective, Study design, Data sources, Study selection, Data extraction, Data synthesis, Conclusions).	
Abstract word count	246

Objectives: To estimate chlamydia prevalence among 16-29 year olds attending general practice.

Design: Cross-sectional survey conducted May 2010 to December 2012.

Setting: 134 general practice clinics taking part in a cluster randomised trial in 54 rural/regional towns in 4 Australian States and 9 metropolitan clinics.

Participants: 4284 sexually experienced men and women aged 16 to 29 years (response rate 70%).

Methods: Consecutive patients were recruited and completed a questionnaire and tested for chlamydia.

Outcome: Chlamydia prevalence in general practice.

Results: 197/4284 tested positive for chlamydia (4.60%;95%Confidence Interval[CI]:3.85,5.34%). Prevalence was similar in men (5.17%;95%CI:3.92,6.43%[65/1257]) and women (4.36%;95%CI:3.54,5.18%[132/3027];p=0.25) and highest in those reporting genital symptoms or a partner with chlamydia – 17.02% in men (95%CI:2.85,31.20%[8/47]); 9.47% in women (95%CI:5.09,13.85%[16/169]). Nearly three–quarters of cases (73.45% [130/177]) were diagnosed in asymptomatic patients attending for non–sexual health reasons (83.75% of patients). Prevalence was slightly higher in rural (4.81%;95%CI:4.04,5.57[179/3724]) than metropolitan participants

(3.10%;95%CI:1.46,4.74%[17/548];p=0.08). In multivariable analysis, increasing partner numbers (3+ partners:odds ratio[OR]=5.11;95%CI:2.35,11.08), past chlamydia diagnosis (OR=4.35;95%CI:1.52,12.41), and inconsistent condom use (OR=2.90;95%CI:1.31,6.40) were significantly associated with chlamydia in men. In women, increasing partner numbers (2 partners:OR=2.59;95%CI:1.59,4.23; 3+ partners: OR=3.58;95%CI:2.26,5.68), past chlamydia diagnosis (OR=3.13;95%CI:1.62,6.06) and being aged 25 to 29 years (OR=0.23;95%CI:0.12,0.44) were associated with chlamydia.

Conclusions: Chlamydia prevalence is similar in women and men attending general practice. Testing only those with genital symptoms or partner with chlamydia would have missed over 73% of cases. Most men and women are amenable to being tested and treated in general practice, even in rural areas.

Text	
Research reports should be written in IMRAD format (Introduction, Methods, Results and Discussion). **Case reports** should comprise a Clinical record followed by a Discussion.	
Text word count	2247

Introduction

Chlamydia is the most common bacterial sexually transmissible infection (STI) in Australia and notifications have nearly quadrupled in the last decade, with over 80,000 cases diagnosed in 2012 (1). In women, chlamydia can cause pelvic inflammatory disease (PID) and lead to serious health consequences such as ectopic pregnancy and tubal infertility (2-5). In men, untreated infection can develop into epididymo-orchitis (6) and in both men and women, chlamydia can increase the risk of HIV transmission (7).

Given that over 80% of all chlamydia infections are asymptomatic (8), and testing rates are less than 10% in young Australian adults (9), notification data greatly underestimate the prevalence. A recent meta-analysis estimating chlamydia prevalence in different settings in Australia found that prevalence among young adults ranged from 4–5% in general practice and 6–10% in sexual health or family planning clinics (10). However, there were few data available for men.

In 2008, the Department of Health and Ageing funded a trial to investigate whether annual chlamydia testing for 16–29 year olds in general practice (GP) clinics can reduce chlamydia prevalence (11). The Australian Chlamydia Control Effectiveness Pilot (ACCEPt) trial was initiated in 2010. We report on the findings of the baseline prevalence survey, the largest survey to estimate chlamydia prevalence in general practice in Australia conducted to date.

Methods

Study design

The cross-sectional survey measured chlamydia prevalence among sexually experienced patients attending GP clinics as the baseline assessment for ACCEPt. All 134 GP clinics and Aboriginal medical services in 54 towns (clusters) in rural and regional Victoria (18 towns), New South Wales (21 towns), Queensland (11 towns) and South Australia (four towns) have been enrolled. To be eligible for inclusion, the town had to have a minimum of 500 people between 16-29 years in the 2006 census, be 150 kilometres away from an Australian capital city and have fewer than seven clinics in the town. Towns were excluded if a military base, university or mine was nearby or if it was a tourist town. A list of towns from each state was made and towns were selected in no particular order until the required sample size was obtained. ACCEPt is based in rural/regional towns to reduce the possibility that patients will attend both participating and non-participating clinics which is more likely to happen in a large city. However, we included another nine metropolitan GP clinics to collect some data for urban areas. Over 85% of clinics approached agreed to participate.

Recruitment of participants

Participants were recruited when they attended the clinic for a consultation. A University of Melbourne employed research assistant was based in each clinic for up to 6 weeks and invited consecutive patients to participate as they arrived. Men and women were eligible if they were between 16–29 years (17–29 years in Queensland and South Australia), and had ever had vaginal and/or anal sex. Participants gave written consent, completed a questionnaire on a hand-held computer and provided a self-collected urine specimen or vaginal swab for chlamydia testing. The questionnaire included items about demographic characteristics, sexual behaviour, reasons for attending and genital symptoms. Sexual behaviour questions included number of partners in the last 12 months, concurrency (2 or more overlapping partnerships), duration of most recent partnership and condom use (inconsistent or consistent use with most recent partner). The survey was conducted between May 2010 and December 2012.

Testing and management of positive cases

Chlamydia tests were conducted by the clinics' usual pathology providers. All pathology laboratories used nucleic acid amplification tests to detect *Chlamydia trachomatis.* Positive chlamydia diagnoses were managed by the clinic; clinics were supplied with one gram doses of azithromycin for positive patients. Partner notification resources and advice were provided to all clinics.

Sample size

Assuming an intracluster correlation coefficient (ICC) of 0.009 (12) and a cluster size of 80, a total sample size of 4000 would provide precision of ±0.8% for a prevalence of 4%. This will provide a precision of ±1% in women and ±1.4% in men assuming 70% of clinic attenders will be women. Between 60 and 100 participants were enrolled from each town or metropolitan clinic.

Analysis of results

We estimated the prevalence in clinic attenders as the proportion of positive results among those tested. The chlamydia prevalence and 95% confidence intervals (95%CI) were calculated. Factors associated with chlamydia were investigated; odds ratios (OR) and 95%CIs were calculated using a random effects logistic regression model. Demographic characteristics such as age, education and geographical location, sexual behaviour variables such as number of partners in last 12 months, duration of partnership and condom use and health care utilisation variables such as previous chlamydia testing or reason for GP attendance were examined. Some variables were highly correlated with others and the likelihood ratio test was used to determine which variable to include in the multivariable model. Covariates which had weak statistical evidence of an association with prevalence ($p \geq 0.1$) in the univariable analyses were excluded from the multivariable model. All analyses accounted for potential intracluster correlation within the town or metropolitan clinic; we used the survey commands for the prevalence estimates and panel commands for the logistic regression. All analysis was conducted using Stata 12.0^{TM} (College Station, Texas).

Ethical approval was obtained from the Royal Australian College of General Practitioners, the Aboriginal Health & Medical Research Council and the University of Melbourne Human Research Ethics Committees.

Results

Response rates

A total of 4284 patients participated in the prevalence survey: 3027 (70.66%) women and 1257 (29.34%) men. The response rate was 69.67%; 71.52% for women and 65.65% for men ($p<0.01$).

Demographic and sexual behaviour profile

One quarter (24.28% [1040/4284]) of participants was aged 16–19 years, 5.97% (240/4017) reported Aboriginal and/or Torres Strait Islander background and 93.75% (3793/4046) were born in Australia. Most participants (87.17% [3724/4272]) were recruited from rural/regional clinics. A total of 699/3924 (17.81%) reported 3+ partners in the last 12 months and 43/1123 (3.83%) men and 262/2813 (9.31%) women reported having ever had same sex contact.

Health care utilisation and reasons for attending

Women were more likely to have attended the same clinic in the last 12 months (84.47% [2371/2807] versus 77.10% [818/1061], $p<0.01$) and more likely to be attending for a sexual health related reason (19.99% [552/2761] versus 7.08% [80/1129], $p<0.01$) (Table 1). Twice as many women (48.02% [1215/2530]) as men (24.02% [262/1091]) could recall ever being tested for chlamydia ($p<0.01$). About 86.94% [3042/3499] of men and women in rural areas were attending a clinic within their local postcode compared with 57.76% [309/535] in metropolitan areas ($p<0.01$).

Prevalence of chlamydia

There were 197 cases of chlamydia, with an overall prevalence of 4.60% (95%CI:3.85, 5.34). The ICC for chlamydia prevalence within clusters or metropolitan clinics was 0.004. Prevalence was 5.83% (95%CI:2.91, 8.76% [14/240]) among those reporting Aboriginal and/or Torres Strait Islander background and similar between men (5.17%; 95%CI:3.92, 6.43% [65/1257]) and women (4.36%; 95%CI:3.54, 5.18% [132/3027]; $p=0.25$). Prevalence was slightly higher in rural participants (4.81%; 95%CI:4.04, 5.57% [179/3724]) than metropolitan participants (3.10%; 95%CI:1.46, 4.74% [17/548]; $p=0.08$). Prevalence was highest among 16–19 year old women (7.95%; 95%CI:5.87, 10.03%), but among men, prevalence was highest in 20–24 year olds (6.64%; 95%CI:4.32, 8.96%) (Table 2). Overall, prevalence was highest among those presenting with genital symptoms or contact with a partner with an STI – 17.02% in men (95%CI:2.85, 31.20%) and 9.47% in women (95%CI:5.09, 13.85%). However, 73.45% (130/177) of infections were in participants presenting for a non–sexual health related consultation with a prevalence of 3.99% (95%CI:3.18, 4.80%).

Factors associated with chlamydia

In multivariable analyses for men, the odds of chlamydia were significantly increased for an increasing number of partners in the last 12 months (3+ partners: OR=5.11; 95%CI:2.35, 11.08), previous chlamydia diagnosis in the last 12 months (OR=4.35; 95%CI:1.52, 12.41) and inconsistent condom use with the most recent partner (OR=2.90; 95%CI:1.31, 6.40). Concurrency and duration of partnerships were highly correlated with number of partners; number of partners had the strongest association with chlamydia and was included in the model.

In multivariable analyses for women, the odds of chlamydia were significantly increased for an increasing number of partners (2 partners: OR=2.59, 95%CI:1.59, 4.23; 3+ partners per year: OR=3.58; 95%CI:2.26, 5.68) and previous chlamydia diagnosis (OR=3.13; 95%CI:1.62, 6.06). The odds were decreased for 25-29 year olds relative to 16-19 year olds (OR=0.23; 95%CI:0.12, 0.44). Education was highly correlated with age; age had the strongest association with chlamydia and was included in the model. As in men, number of partners was highly correlated with duration of partnership and concurrency but had a stronger association and was included in the model.

Discussion

We have conducted Australia's largest survey of chlamydia prevalence to date and found that 4.60% of sexually experienced 16–29 year old men and women attending GP clinics have chlamydia. Prevalence was similar between the sexes, highlighting the importance of including men in any chlamydia control strategies. Notably, 74% of infections were diagnosed among patients attending for a non–sexual health related reason. If only symptomatic patients were tested, then three–quarters of chlamydia cases would be missed; this emphasises the need to offer testing to all young people. In conjunction with our high participation rate, over 80% of rural participants were attending their local GP, providing evidence that young adults living in rural Australia will agree to be tested at their local clinic if asked.

The strengths of this study are: the large sample size; high participation of 70%; and the large number of men tested. However, there are also limitations. Firstly, selection bias cannot be ruled out despite the high response rate, as the sexual practices of non-responders and responders could not be compared. Secondly, participants were recruited from general practice and not from the general population. Conducting a population-based survey of chlamydia prevalence is extremely challenging, partly due to the choice of sampling frame and the generally low response rates (12). However, given our high response rate of 70% and the fact that 64% of men and 86% of women in this age group attend a GP for their own health each year (9), recruiting from every general practice in each town does provide a quasi-population approach to estimating prevalence. Thirdly, as it was a largely rural sample, the demographics of the study population differed from the most recent Australian census data (13); participants were more likely to be Australian born (94% versus 73%, $p<0.01$) and more likely to be Aboriginal and/or Torres Strait Islander (6% versus 3%, $p<0.01$). Fourthly, we did investigate several different risk factors for their association with chlamydia, raising issues of statistical multiplicity. However, these variables have been previously found to be associated with chlamydia and were pre-specified in our analysis plan. Finally, only 30% of the sample was male, but this reflects the attendance pattern at our clinics; Medicare GP consultation data show twice as many consultations for women annually than men in this age group (14).

Our estimated prevalence of 4.36% among young women is consistent with findings from Walker and colleagues among a similar sample of women (15). However, our prevalence of 5.17% among men is higher than the 3.7% reported by Hince and colleagues among a similar sample of urban men (16). It is possible that prevalence is higher in rural men than metropolitan men, due to reduced access to health care (17). Our study does provide some weak evidence of a higher prevalence in rural areas versus metropolitan areas (4.81% versus 3.10%, p=0.08), which was not explained by any differences in sexual behaviour as metropolitan participants reported a greater number of partners in the last 12 months (p<0.01) and were more likely to report a concurrent partnership (p<0.01).

In women, prevalence was highest among 16–19 year olds (7.95%) and lowest among 25–29 year olds (1.23%). Conversely, in men, the highest prevalence was in 20–24 year olds (6.64%), and was still elevated in the 25–29 year olds (3.70%). This probably reflects sexual mixing as men are often up to five years older than their female partners (18). Measures of risky sexual behaviours such as multiple partners in the last 12 months, concurrency and a partnership of short duration were all strongly associated with chlamydia, but multivariable modelling showed that number of partners was the most important variable associated with chlamydia. It can be difficult designing the content of a sexual behaviour survey (19), but we have shown that a question about number of partners should be included.

The majority of testing and diagnosis of chlamydia takes place in general practice in Australia. When asked, GPs say that testing should be their responsibility (20), yet testing rates among young adults remain low, particularly among young men (3.7% versus 12.5% in women) (9). Studies have suggested that young people, particularly those in rural areas, do not wish to discuss sexual health issues with GPs because of privacy concerns and will not seek testing (17, 21). However, our study suggests that initiating a discussion about testing with a patient may often be sufficient to overcome these concerns, as 70% of eligible participants accepted a chlamydia test when offered.

Conclusion

Prevalence of chlamydia is high in both men and women attending GP clinics, particularly in rural areas. Current practices of testing mainly those with symptoms or STI contact would have missed nearly 75% of these infections. However, young men and women were amenable to being tested and treated in general practice when asked, which suggests that offering a test in the general practice setting would reach the majority of young adults.

References

References should be in Vancouver style and should **not** appear as endnotes.
References to material on the Internet should include the organisation, the page title, the article title and the author (if there is one) as well as the URL and the month the page was visited (see examples here).

1. National Notifiable Diseases Surveillance System. Commonwealth of Australia. Number of notifications of Chlamydial infection*, Australia, 2012 by age group and sex. 2012; http://www9.health.gov.au/cda/source/rpt_5.cfm, Accessed 22 February 2013.
2. Cates W, Jr., Wasserheit JN. Genital chlamydial infections: epidemiology and reproductive sequelae. *Am J Obstet Gynecol.* 1991;164(6 Pt 2):1771-1781.
3. Haggerty CL, Gottlieb SL, Taylor BD, et al. Risk of Sequelae after Chlamydia trachomatis Genital Infection in Women. *J Infect Dis.* June 15, 2010 2010;201(Supplement 2):S134-S155.
4. Schachter J, ed *Biology of Chlamydia trachomatis.* 4th ed. New York: McGraw-Hill; 2008. Holmes K, Sparling P SW, Piot P, Wasserheit J, Corey L, MS C, eds. In Sexually Transmitted Diseases.
5. Weström L, Joesoef R, Reynolds G, et al. Pelvic inflammatory disease and fertility. A cohort study of 1,844 women with laparoscopically verified disease and 657 control women with normal laparoscopic results. *Sex Transm Dis.* 1992;19(4):185-192.
6. Trojian TH, Lishnak TS and Heiman D. Epididymitis and orchitis: an overview. *Am Fam Physician*. 2009; 79: 583-7.
7. Fleming DT, Wasserheit JN. From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sex Transm Infect.* February 1, 1999 1999;75(1):3-17.
8. Peipert JF. Genital Chlamydial Infections. *N Engl J Med.* 2003;349(25):2424-2430.
9. Kong FYS, Guy RJ, Hocking JS, et al. Australian general practitioner chlamydia testing rates among young people. *Med J Aust.* 2011;194(5):249-252.
10. Lewis D, Newton DC, Guy RJ, et al. The prevalence of Chlamydia trachomatis infection in Australia: a systematic review and meta-analysis. *BMC Infect Dis.* 2012;12(1):113-130.
11. Hocking J, Low N, Guy R, et al. Protocol 12 PRT 09010: Australian Chlamydia Control Effectiveness Pilot (ACCEPt): a cluster randomised controlled trial of chlamydia testing in general practice. *Lancet*. 2013. Accessed 27 Aug 2013.http://www.thelancet.com/protocol-reviews/12PRT09010
12. Hocking JS, Willis J, Tabrizi S, et al. A chlamydia prevalence survey of young women living in Melbourne, Victoria. *Sex Health.* Dec 2006 2006;3(4):235-240.
13. Australian Bureau of Statistics. Commonwealth of Australia.1301.0 - Year Book Australia. 2012; Published 24 May 2012 http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/1301.0~2012~Main%20Features~Country%20of%20birth~54, Accessed December 3 2012.
14. Medicare Australia. Commonwealth of Australia. Medicare Item 23 processed from July 2011 to June 2012: *Medicare Australia Statistics* 2012; https://www.medicareaustralia.gov.au/cgi-bin/broker.exe?_PROGRAM=sas.mbs_item_age_gender_report.sas&_SERVICE=default&_DEBUG=0&VAR=services&STAT=count&PTYPE=finyear&START_DT=201107&END_DT=201206&RPT_FMT=by+state&GROUP=23, Accessed 15 April 2013.

15. Walker J, Fairley C, Bradshaw C, et al. 'The difference in determinants of Chlamydia trachomatis and Mycoplasma genitalium in a sample of young Australian women.'. *BMC Infect Dis.* 2011;11(1):35.
16. Hince D, Brett T, Mak D, et al. Opportunistic screening for chlamydia in young men. *Aust Fam Physician.* 2009;38(9):734-737.
17. Quine S, Bernard D, Booth M, et al. Health and access issues among Australian adolescents: a rural-urban comparison. *Rural Remote Health.* 2003;3(3):245-245.
18. de Visser RO, Smith AMA, Rissel CE, et al. Sex in Australia: Heterosexual experience and recent heterosexual encounters among a representative sample of adults. *Aust N Z J Public Health.* 2003;27(2):146-154.
19. Smith AMA, Rissel CE, Richters J, et al. Sex in Australia: The rationale and methods of the Australian Study of Health and Relationships. *Aust N Z J Public Health.* 2003;27(2):106-117.
20. Hocking JS, Parker RM, Pavlin N, et al. What needs to change to increase chlamydia screening in general practice in Australia? The views of general practitioners. *BMC Public Health.* 2008;8:425-432.
21. Warr D, Hillier L. 'That's the problem with living in a small town': Privacy and Sexual Health Issues for Young Rural People. *Aust J Rural Health.* 1997;5(3):132-139.

Tables
Provide meaningful titles for each **table**. Information in **tables** should be simplified as much as possible, keeping the number of columns to a minimum and the headings short. Information in **tables** should not be duplicated in the text.

Table 1: Healthcare access patterns and reasons for attending

Variable		Proportion (%)					
		Men	Women	P value	Rural	Metro	P value
Seen a doctor in the last 12 months	Yes	83.45% [943/1130]	91.01% [2561/2814]	<0.01	88.94% [3032/3409]	88.07% [465/528]	0.55
Attended this clinic before	Never	16.49% [175/1061]	10.79% [303/2807]	<0.01	11.42% [381/3336]	18.48% [97/525]	<0.01
	Yes <12 months ago	77.10% [818/1061]	84.47% [2371/2807]		83.03% [2770/3336]	78.48% [412/525]	
	Yes 12+ months ago	6.41% [68/1061]	4.74% [133/2807]		5.55% [185/3336]	3.05% [16/525]	
Reason for attending[1]	STI related reasons – contact/symptoms	4.16% [47/1129]	6.12% [169/2761]	<0.01	4.74% [159/3357]	10.84% [57/526]	<0.01
	Other sexual health related reasons	2.92% [33/1129]	13.87% [383/2761]		10.78% [362/3357]	9.52% [52/526]	
	Non-sexual health	92.91% [1049/1129]	80.01% [2209/2761]		84.48% [2836/3357]	79.28% [417/526]	
Tested previously for chlamydia	Yes <12 months ago	13.20% [144/1091]	24.82% [628/2530]	<0.01	20.55% [642/3124]	26.53% [130/490]	<0.01
	Yes 12+ months ago	10.82% [118/1091]	23.20% [587/2530]		20.29% [634/3124]	14.29% [70/490]	
	No	75.99% [829/1091]	51.98% [1315/2530]		59.15% [1848/3124]	59.18% [290/490]	
Willing to have another chlamydia test in 12 months	Yes	80.00% [728/910]	87.93% [2178/2477]	<0.01	85.06% [2500/2939]	90.74% [402/443]	<0.01
	No	20.00% [182/910]	12.07% [299/2477]		14.94% [439/2939]	9.26% [41/443]	
Distance to clinic for postcodes	Within same or neighbouring postcode	81.62% [959/1175]	83.68% [2399/2867]	0.11	86.94% [3042/3499]	57.76% [309/535]	<0.01

1. Multiple answers given for reasons attending – STI related reasons given preference over contraception/pap smear, and over other SH-related reasons

Table 2: Chlamydia prevalence[1] in GP clinic attenders and odds ratios for factors associated with chlamydia by gender[2]

Variable		Men					Women				
		Prevalence (%) (95%CI)	Number	Unadjusted Odds Ratio	Adjusted Odds Ratio	P-value	Prevalence (%) (95%CI)	Number	Unadjusted Odds Ratio	Adjusted Odds Ratio	P-value
Age	16-19	4.70% (1.92%, 7.47%)	14/298	Ref.[3]	Ref.		7.95% (5.87%, 10.03%)	59/742	Ref.	Ref.	
	20-24	6.64% (4.32%, 8.96%)	35/527	1.44 (0.76, 2.74)	1.04 (0.50, 2.21)	0.90	5.15% (3.69%, 6.61%)	59/1145	0.63 (0.43, 0.92)	0.81 (0.54, 1.23)	0.32
	25-29	3.70% (2.13%, 5.28%)	16/432	0.78 (0.37, 1.63)	0.74 (0.30, 1.79)	0.50	1.23% (0.60%, 1.85%)	14/1140	0.14 (0.08, 0.26)	0.23 (0.12, 0.44)	<0.01
State	VIC	5.30% (3.55%, 7.05%)	31/585	Ref.			4.21% (2.85%, 5.57%)	56/1331	Ref.		
	NSW	5.37% (3.03%, 7.72%)	23/428	1.01 (0.58, 1.77)			4.50% (3.13%, 5.87%)	47/1044	1.05 (0.69, 1.62)		
	QLD	5.08% (1.92%, 8.25%)	9/177	0.96 (0.45, 2.05)			5.15% (3.74%, 6.55%)	25/505	1.22 (0.73, 2.04)		
	SA	2.99% (0.00%, 6.71%)	2/67	0.55 (0.13, 2.35)			2.0% (0.27%, 3.81%)	3/147	0.46 (0.14, 1.56)		
Location	Rural	5.53% (4.21%, 6.86%)	59/1066	2.12 (0.84, 5.36)			4.51% (3.67%, 5.36%)	120/2658	1.34 (0.70, 2.54)		
	Metropolitan	2.69% (0.57%, 4.80%)	5/186	Ref.			3.31% (0.84%, 5.79%)	12/362	Ref.		
Aboriginal and/or Torres Strait Islander	Yes	4.69% (0.00%, 9.40%)	3/64	Ref.			6.25% (2.79%, 9.71%)	11/176	Ref.		
	No	5.08% (3.77%, 6.39%)	56/1103	1.09 (0.33, 3.57)			4.23% (3.39%, 5.06%)	113/2674	0.67 (0.35, 1.28)		
Country of birth	Australia	5.27% (3.99%, 6.55%)	58/1100	Ref.			4.49% (3.66%, 5.33%)	121/2693	Ref.		
	Other	1.28% (0.00%, 3.94%)	1/78	0.23 (0.03, 1.71)			2.86% (0.00%, 5.80%)	5/175	0.64 (0.26, 1.61)		
Level of Education	High school	5.36% (3.86%, 6.86%)	47/877	Ref.			5.06% (4.01%, 6.11%)	99/1956	Ref.		
	Trade/ Diploma	4.10% (1.05%, 7.15%)	8/195	0.76 (0.35, 1.63)			3.81% (2.03%, 5.58%)	19/499	0.73 (0.44, 1.21)		
	Tertiary	3.03% (0.02%, 6.04%)	3/99	0.55 (0.17, 1.81)			1.72% (0.41%, 3.02%)	7/408	0.33 (0.15, 0.72)		
Number of partners in the last 12 months[4]	0/1	1.97% (0.85%, 3.10%)	12/609	Ref.	Ref.		2.39% (1.68%, 3.10%)	48/2007	Ref.	Ref.	
	2	5.61% (1.90%, 9.33%)	11/196	3.00 (1.30, 6.94)	2.43 (0.94, 6.27)	0.07	7.51% (4.92%, 10.09%)	31/413	3.35 (2.10, 5.35)	2.59 (1.59, 4.23)	<0.01
	3+	10.93% (6.90%, 14.96%)	34/311	6.28 (3.16, 12.48)	5.11 (2.35, 11.08)	<0.01	10.82% (7.22%, 14.43%)	42/388	5.02 (3.25, 7.74)	3.58 (2.26, 5.68)	<0.01
Same-sex partner ever	No	4.81% (3.47%, 6.16%)	52/1080	Ref.			4.39% (3.54%, 5.24%)	112/2551	Ref.		
	Yes	6.98% (0.00%, 13.98%)	3/43	1.48 (0.44, 4.95)			3.81% (0.90%, 6.73%)	10/262	0.86 (0.45, 1.67)		

Variable		Men					Women				
		Prevalence (%) (95%CI)	Number	Unadjusted Odds Ratio	Adjusted Odds Ratio	P-value	Prevalence (%) (95%CI)	Number	Unadjusted Odds Ratio	Adjusted Odds Ratio	P-value
Sexual health related consult	Symptoms or contact[5]	17.02% (2.85%, 31.20%)	8/47	4.92 (2.04, 11.84)	2.33 (0.86, 6.37)	0.10	9.47% (5.09%, 13.85%)	16/169	2.64 (1.51, 4.64)	1.68 (0.91, 3.11)	0.10
	Other sexual health reasons[6]	9.09% (0.00%, 18.48%)	3/33	2.22 (0.65, 7.65)	1.78 (0.48, 6.67)	0.39	5.22% (2.94%, 7.51%)	20/383	1.39 (0.84, 2.29)	1.19 (0.70, 2.01)	0.52
	No	4.29% (2.98%, 5.60%)	45/1049	Ref.	Ref.		3.85% (2.96%, 4.74%)	85/2209	Ref.	Ref.	
Previous chlamydia test	No	5.07% (3.58%, 6.55%)	42/829	Ref.			4.79% (3.77%, 5.82%)	63/1315	Ref.		
	Yes <12 months	6.25% (2.06%, 10.44%)	9/144	1.26 (0.60, 2.66)			4.30% (2.30%, 6.30%)	27/628	0.90 (0.56, 1.43)		
	Yes 12+ months	5.08% (0.70%, 9.47%)	6/118	1.00 (0.42, 2.42)			3.75% (2.45%, 5.05%)	22/587	0.77 (0.47, 1.27)		
Previous chlamydia diagnosis	No	4.55% (3.37%, 5.74%)	54/1186	Ref.	Ref.		4.07% (3.28%, 4.86%)	113/2776	Ref.	Ref.	
	Yes <12 months	25.81% (8.33%, 43.28%)	8/31	7.35 (3.06, 17.61)	4.35 (1.52, 12.41)	<0.01	18.92% (8.22%, 29.62%)	14/74	5.43 (2.93, 10.07)	3.13 (1.62, 6.06)	<0.01
	Yes 12+ months	5.13% (0.00%, 11.82%)	2/39	1.13 (0.27, 4.84)	0.51 (0.06, 3.96)	0.52	2.35% (0.01%, 4.69%)	4/170	0.57 (0.21, 1.56)	0.62 (0.22, 1.74)	0.37
Concurrency[7]	No	3.80% (2.59%, 5.01%)	35/921	Ref.			3.71% (2.91%, 4.50%)	93/2510	Ref.		
	Yes	10.09% (5.77%, 14.40%)	23/228	2.84 (1.64, 4.91)			9.65% (6.22%, 13.08%)	33/342	2.80 (1.84, 4.25)		
Condom use with the most recent partner[8]	Consistent	2.14% (0.58%, 3.71%)	8/373	Ref.	Ref.		4.39% (2.90%, 5.88%)	35/797	Ref.		
	Inconsistent	6.85% (5.03%, 8.68%)	47/686	3.36 (1.57, 7.18)	2.90 (1.31, 6.40)	<0.01	4.54% (3.46%, 5.62%)	87/1916	1.03 (0.69, 1.55)		
Duration of most recent partnership	5 years or more	1.26% (0.00%, 3.04%)	2/159	Ref.			0.95% (0.19%, 1.71%)	6/632	Ref.		
	3-4 years	3.10% (0.22%, 5.98%)	4/129	2.46 (0.44, 13.76)			1.28% (0.17%, 2.38%)	5/392	1.36 (0.41, 4.48)		
	1-2 years	2.29% (0.02%, 4.54%)	4/175	1.86 (0.33, 10.36)			4.76% (2.63%, 6.89%)	23/483	5.25 (2.11, 13.01)		
	6-12 months	9.84% (4.59%, 15.08%)	12/122	8.78 (1.91, 40.34)			5.46% (2.82%, 8.10%)	13/238	6.07 (2.28, 16.19)		
	Less than 6 months	7.73% (4.72%, 10.75%)	28/362	6.65 (1.56, 28.37)			9.24% (7.00%, 11.49%)	66/714	10.74 (4.61, 25.00)		

Variable		Men					Women				
		Prevalence (%) (95%CI)	Number	Unadjusted Odds Ratio	Adjusted Odds Ratio	P-value	Prevalence (%) (95%CI)	Number	Unadjusted Odds Ratio	Adjusted Odds Ratio	P-value
Antibiotic use in the last three months	No	5.24% (3.78%, 6.70%)	44/839	Ref.			4.58% (3.55%, 5.62%)	96/2095	Ref.		
	Yes	4.46% (1.25%, 7.68%)	10/224	0.84 (0.42, 1.71)			3.69% (2.30%, 5.07%)	23/624	0.79 (0.49, 1.26)		
Visit any GP in the last 12 months	No	4.81% (1.97%, 7.65%)	9/187	Ref.			5.14% (2.46%, 7.81%)	13/253	Ref.		
	Yes	5.09% (3.52%, 6.66%)	48/943	1.07 (0.51, 2.22)			4.30% (3.42%, 5.17%)	110/2561	0.82 (0.46, 1.49)		
Travelled to clinic within same or contiguous postcode	No	6.94% (2.67%, 11.22%)	15/216	Ref.			3.63% (1.70, 5.56%)	17/468	Ref.		
	Yes	4.59% (3.29%, 5.89%)	44/959	0.64 (0.34, 1.20)			4.54% (3.66, 5.42%)	109/2399	1.24 (0.73, 2.10)		

1. Proportion positive among those tested at participating clinics; 2. Results have accounted for clustering; 3. Ref. = reference category; 4. Opposite sex partners only; 5. Symptoms or STI contact; 6. Contraception, Pap smear, new partner/STI check; 7. Overlap in sexual partnerships; 8. Consistent use is defined as always or mostly used condoms. Inconsistent use is never, infrequently, or sometimes used condoms