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National trends in sexual health indicators among gay and bisexual men
disaggregated by ethnicity: repeated cross-sectional behavioural surveillance in
New Zealand

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BMJ Open National trends in sexual health indicators among gay and bisexual men disaggregated by ethnicity: repeated cross-sectional behavioural surveillance in New Zealand

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ABSTRACT

Objectives To assess trends in sexual health outcomes among men who have sex with men (MSM) disaggregated by ethnicity.

Design Repeated cross-sectional.

Setting Behavioural surveillance data from 2006, 2008, 2011 and 2014 were collected in-person and online across Aotearoa New Zealand.

Participants Eligible participants were self-identified men aged 16 years or older who reported sex with another man in the past 5 years. We classified 10 525 participants' ethnicities: Asian (n=1003, 9.8%), Māori (Indigenous people of Aotearoa New Zealand, n=1058, 10.3%), Pacific (n=424, 4.1%) and European (n=7867, 76.8%).

Outcome measures The sexual health outcomes examined were >20 recent (past 6 months) male sexual partners, past-year sexually transmitted infection (STI) testing, past-year STI diagnosis, lifetime and past-year HIV testing, lifetime HIV-positive diagnosis and any recent (past 6 months) condomless anal intercourse with casual or regular partners.

Results When disaggregated, Indigenous and ethnic minority groups reported sexual health trends that diverged from the European MSM and each other. For example, Asian MSM increased lifetime HIV testing (adjusted OR, AOR=1.31 per survey cycle, 95% CI 1.17 to 1.47) and recent HIV testing (AOR=1.14, 95% CI 1.02 to 1.28) with no changes among Māori MSM or Pacific MSM. Condomless anal intercourse with casual partners increased among Māori MSM (AOR=1.13, 95% CI 1.01 to 1.28) with no changes for Asian or Pacific MSM. Condomless anal intercourse with regular partners decreased among Pacific MSM (AOR=0.83, 95% CI 0.69 to 0.99) with no changes for Asian or Māori MSM.

Conclusions Population-level trends were driven by European MSM, masking important differences for Indigenous and ethnic minority sub-groups. Surveillance data disaggregated by ethnicity highlight inequities in sexual health service access and prevention uptake. Future research should collect, analyse and report disaggregated data by ethnicity to advance health equity.

INTRODUCTION

Internationally, men who have sex with men (MSM) frequently bear the greatest burden of

Strengths and limitations of this study

- This is the first study to report on temporal trends in HIV and sexual health indicators among men who have sex with men in Aotearoa New Zealand disaggregated by ethnicity.
- This study used large participant samples from serial cross-sectional behavioural surveillance surveys to address limited statistical power of previous research.
- Survey data were collected both in-person and online.
- Participants who completed more than one survey were removed from the analysis.
- Temporal trends were examined using repeated cross-sectional samples and not a within-person longitudinal design.

HIV infection,¹ and within these populations HIV prevalence varies by race and ethnicities.^{2–4} Researchers have sought to understand these inequities, but there is no clear and consistent reason. A 2012 meta-analysis of studies of black MSM in Canada, the USA and the UK indicated greater odds of HIV prevalence among this group, but also greater odds of reporting preventive behaviours (eg, fewer partners, condom use) against HIV infection compared with non-black MSM.² Furthermore, while sexual partnering characteristics among black MSM such as more assortative mixing by race and dissortive mixing by age could elevate exposure to HIV,^{5,6} the evidence from multiple studies is inconclusive.⁷ Instead, differences in HIV prevalence for Indigenous and ethnic minority MSM appear to be driven more by structural barriers (eg, lower education completion and income) that increase HIV transmission risk,² such as higher rates of undiagnosed HIV and sexually

transmitted infections (STI) and lower uptake of antiretroviral therapy.⁷

Historically, Aotearoa New Zealand has experienced a relatively well-controlled HIV epidemic with low annual incidence of locally-acquired infection that is concentrated among MSM.⁸ HIV diagnosis rates among Indigenous MSM are similar to non-Indigenous MSM in Australia, Canada and New Zealand⁹; in New Zealand these were 36.8 per 100 000 for Māori MSM and 43.1 per 100 000 for non-Māori MSM between 2004 and 2008.⁹ Unlike many other settings, New Zealand has little evidence of disparities for Indigenous and ethnic minority MSM in HIV prevalence,¹⁰ although there appear to be inequities in HIV/STI testing service uptake.^{11 12} For example, a 2011 HIV biobehavioural study in Auckland indicated that HIV prevalence did not differ by ethnicity, however, non-European MSM were less likely to have had their HIV infection diagnosed compared with European MSM.¹¹ Further, among MSM newly diagnosed with HIV from 2005 to 2010, Māori and Pacific men were twice as likely to present with 'advanced HIV disease' (CD4 count <200 cells/mL and/or an AIDS-defining event) compared with European MSM.¹² While some studies in New Zealand have not been sufficiently powered for comparisons by ethnicity, ongoing behavioural surveillance conducted in New Zealand nationally from 2006 produces large and diverse samples of MSM and these data are well suited for an analysis focused on smaller ethnic groups.

After Europeans, the Indigenous Māori are the second most populous ethnic group in New Zealand, and make up 14.9% of the national population as of 2013.¹³ Asian and Pacific are the next two largest ethnic groups in New Zealand, who comprised 11.8% and 7.4% of the 2013 national population respectively.¹³ Internationally, very little research has focused on Pacific MSM, whom are often combined with Asian MSM as one ethnic group.¹⁴ New Zealand, similar to many other western countries, is experiencing significant demographic changes given increases in Indigenous and ethnic minority populations due to higher birth rates and/or immigration.¹³

Researchers using race/ethnicity information must inform their work with local demographics and histories of racism, colonisation, immigration and cultural discrimination. In New Zealand, there is fast-growing recognition of the impact of colonisation and racism—institutional, interpersonal and internalised—on the health of minority ethnic groups.¹⁵ Māori and Pacific communities experience a higher burden of serious infectious diseases¹⁶ and higher exposure to cardiovascular disease risk factors.¹⁷ Health inequities are especially pronounced for Māori.¹⁸ In response, the New Zealand Ministry of Health has prioritised action on health equity¹⁹ and agencies have identified the myriad pathways through which health inequities by ethnicity are produced.¹⁸ New Zealand's founding document the Treaty of Waitangi also provides urgency to implement Government obligations towards Māori, for example, by redressing structural inequities.¹⁹

To date, no research among MSM in New Zealand has specifically examined the role of ethnicity in HIV prevention as the primary lens. Therefore, the aim of this research was

to use national behavioural surveillance data among MSM in New Zealand to investigate temporal trends in sexual health outcomes from 2006 to 2014 within Asian, European, Māori and Pacific ethnic groups.

METHODS

Data collection and participants

New Zealand's national HIV behavioural surveillance is informed by World Health Organization (WHO) / Joint United Nations Programme on HIV/AIDS (UNAIDS) recommendations²⁰ and consists of repeated cross-sectional surveys of MSM. The Gay Auckland Periodic Sex Survey (GAPSS) recruits participants during 1 week in February starting at a community fair day and then from gay bars and sex-on-site venues. Subsequently, for 2–4 weeks, the Gay men's Online Sex Survey (GOSS) recruits participants from online dating sites nationally. To be eligible for either survey, individuals must self-identify as a man, be 16 years of age or older, read English, and report sex with a man in the last 5 years. The legal age of consent in New Zealand is 16 years old, and all participants provided their own consent to participate. Participation is voluntary, anonymous and self-completed following informed consent. The goal of the surveillance programme was to recruit as large and as diverse samples as possible. Responses that indicated an individual had completed a previous survey were removed (ie, a participant's earliest response was retained). This was done in order to reduce duplicate responses from the same individual in the pooled sample in order to ameliorate concerns of 'looping effects'²¹ and to avoid violation of the statistical assumption of independent observations. The surveillance methods are described in detail elsewhere.¹¹

Patient and public involvement

This work was undertaken in partnership with the community-based New Zealand AIDS Foundation organisation, which provides ongoing input and support for the programme of research. MSM from the community were trained and supported to conduct data collection. Staff and volunteers, many of whom are MSM, provided iterative feedback on questionnaire design, recruitment strategies, analysis plans, and interpretation and dissemination of results.

Main predictor

The focus of this research was to investigate behavioural trends among MSM for New Zealand's major ethnic groups. Participants self-identified their ethnic affiliations using Statistics New Zealand's census question, 'Which ethnic group do you belong to? (Tick the box or boxes that apply to you)', which were subsequently categorised into one or more major ethnic groups using a modified 'total-response' classification method.^{22 23} In 'total-response' classification, each major ethnic group is designated by a unique variable and an individual may be included in more than one of these. For example, a respondent identifying with both Māori and Asian ethnicities would be included in two variables, both the Māori and the Asian variables. We report results for four major ethnic

groups: Asian, European-only, Indigenous Māori and Pacific. Men reporting only other ethnicities such as Middle Eastern, African and Latin American were excluded from subsequent analyses due to inadequate sample size and large within-group heterogeneity that would inhibit possible interpretations. An individual who identified with multiple ethnicities across more than one major group was included in each of the Māori, Pacific and Asian groups; none of these men would be classified as European-only.

Outcomes

We selected a variety of sexual health and behavioural variables as outcomes. The number of male sexual partners in the past 6 months was dichotomised to up to 20 partners and greater than 20 partners to be consistent with previous research.^{24 25} Reporting recent STI testing and treatment was dichotomised into 'within the past 12 months' or longer (including those never tested/treated). Men who reported any STI diagnosis in the past 12 months (ie, chlamydia, gonorrhoea, genital or anal warts, genital or anal herpes, syphilis, non-specific urethritis, LGV) were compared with those men who reported no STI diagnosis (including those not tested). HIV testing was measured in two ways: lifetime testing (ever having been tested for HIV vs never having been tested) and recent testing (having been tested for HIV in the past 12 months vs less recent testing or never being tested); participants reporting a positive HIV test result were included in these population-level HIV testing indicators. HIV status was measured by having ever received a positive HIV diagnosis vs not (including those not tested). Condom use in the past 6 months was measured in two variables dichotomously by partner type: any condomless anal intercourse versus not with a casual partner (defined as having had sex with that partner once, twice or three times) or any condomless anal intercourse vs not with a regular partner (defined as having had sex with that partner four or more times).

Other measures

The year (2006, 2008, 2011 and 2014) and recruitment method (online vs offline) were recorded for all participants. Participant age (dichotomised as under 30 vs older to be consistent with previous research),^{26 27} sexual identity (categorised as gay/homosexual vs other) and education level (categorised into less than postsecondary/tertiary education vs at least some post-secondary/tertiary education) were also included in the analysis.

Statistical analyses

All statistical analyses were conducted using Stata/SE V.13.1. Descriptive statistics for the demographic variables and outcomes were calculated for Asian, Māori, Pacific and European-only men as well as for the total sample. Univariate temporal trends from 2006 to 2014 for ethnic group sample size were assessed using the non-parametric Wilcoxon rank-sum test (nptrend command in Stata). We subsequently conducted an analysis for trends within each ethnic group. We used multivariable logistic regression, in order to control for recruitment method (online/offline),

to assess temporal trends for each sexual health outcome by using a continuous variable for recruitment cycle (2006=1, 2008=2, 2011=3, 2014=4, $p<0.05$ considered significant). This provided a singular adjusted OR (AOR) with 95% CIs for each outcome's temporal trend.

RESULTS

A total of 12 816 questionnaires were completed across the 2006, 2008, 2011 and 2014 national HIV behavioural surveillance rounds. Of these, 1896 (14.8%) questionnaires were removed as they indicated completion of an earlier survey. Of 10 920 unique responses, 10 525 MSM completed the ethnicity question ($n=395$, 3.6% missing). Men who indicated any ethnicity other than the major four groups under investigation were excluded ($n=282$, 2.6%). Of the remaining 10 243 MSM, 1003 identified as Asian (9.8%), 1058 identified as Māori (10.3%), 424 identified as Pacific (4.1%) and 7867 men identified as only European ethnicities (76.8%). Overall, 728 (7.1%) MSM reported multiple ethnicities, of whom 668 (91.8%) reported at least one European ethnicity.

The demographic characteristics by year for Asian, Māori and Pacific men along with univariable trends are shown in [table 1](#). Each indigenous and ethnic minority group had a statistically significant trend over time indicating an increase in ethnic diversity in the sample from 2006 to 2014: from 8.3% to 15.4% for Asian MSM, 10.4% to 13.1% for Māori MSM and 4.5% to 6.6% for Pacific MSM. There were no significant trends with respect to online versus in-person recruitment. Māori, European and the overall sample of MSM reported significant increases in the proportion of the sample aged less than 30 years of age and the proportion who were gay-identified, but similar trends for Asian and Pacific MSM were not statistically significant. There were statistically significant increasing trends for the overall sample and for Asian MSM who reported at least tertiary education, with no statistically significant trends for Māori, Pacific and European-only MSM.

Descriptive statistics by year and temporal trends in sexual health outcomes for each ethnic group are shown in [table 2](#). The temporal trends are shown graphically in [figure 1](#). Over time, proportionally fewer men in the overall sample and within each ethnic group reported over 20 male sexual partners in the past 6 months. STI testing and any STI diagnosis increased significantly overall and for European-only MSM, but there were no significant trends for Asian, Māori or Pacific MSM. Lifetime and recent (past year) HIV testing increased significantly for Asian MSM, European-only MSM and overall, but there were no significant trends for Māori or Pacific MSM. Few reported being HIV positive (<5% for any ethnic group at any time point); the only significant trends were an increase overall and among European-only MSM. Any condomless anal

Table 1 Descriptive statistics and trends in demographics of Asian, Māori, Pacific and European-only MSM in New Zealand, 2006–2014

	Asian n (%)	Māori n (%)	Pacific n (%)	European n (%)	Total n (%)
Sample size (% of N)	1003 (9.8)	1058 (10.3)	424 (4.1)	7867 (76.8)	10 243 (100.0)
Recruitment year					
2006	234 (8.3)	301 (10.4)	122 (4.5)	2595 (80.9)	3209 (31.3)
2008	204 (11.2)	220 (12.0)	89 (5.2)	1619 (76.7)	2111 (20.6)
2011	254 (11.6)	279 (12.6)	92 (4.6)	1941 (76.3)	2544 (24.8)
2014	311 (15.4)	258 (13.1)	120 (6.6)	1712 (72.0)	2379 (23.2)
Trend test:	p<0.001	p=0.002	p=0.011	p<0.001	
Recruited online (vs in-person)					
2006	119 (50.9)	180 (59.8)	67 (54.9)	1737 (66.9)	2079 (64.8)
2008	82 (40.2)	127 (57.7)	41 (46.1)	904 (55.8)	1143 (54.1)
2011	137 (53.9)	178 (63.8)	55 (59.1)	1294 (66.7)	1647 (64.7)
2014	152 (48.9)	161 (62.4)	50 (49.2)	1133 (66.2)	1493 (62.8)
Trend test:	p=0.646	p=0.311	p=0.712	p=0.430	p=0.835
Aged <30 years (versus ≥30)					
2006	130 (56.8)	143 (48.2)	69 (57.0)	1002 (38.8)	1314 (41.2)
2008	110 (54.2)	112 (52.6)	58 (67.4)	599 (37.3)	867 (41.5)
2011	146 (57.7)	148 (53.6)	56 (60.9)	751 (38.9)	1084 (42.9)
2014	196 (63.4)	146 (57.7)	81 (68.1)	734 (43.6)	1140 (48.6)
Trend test:	p=0.071	p=0.027	p=0.145	p=0.004	p<0.001
Gay identified (vs not)					
2006	171 (73.7)	172 (57.5)	64 (53.3)	1788 (69.3)	2175 (68.2)
2008	157 (78.1)	135 (61.4)	61 (68.5)	1162 (71.9)	1500 (71.3)
2011	194 (76.7)	176 (63.1)	62 (66.7)	1392 (72.0)	1810 (71.4)
2014	253 (81.4)	174 (68.2)	71 (59.2)	1348 (78.8)	1835 (77.3)
Trend test:	p=0.053	p=0.010	p=0.408	p<0.001	p<0.001
Tertiary degree or greater (vs not)					
2006	151 (65.1)	101 (33.9)	40 (32.8)	940 (36.6)	1210 (38.1)
2008	125 (61.3)	69 (32.1)	25 (28.7)	569 (35.4)	782 (37.4)
2011	173 (68.9)	86 (31.1)	33 (37.5)	676 (35.2)	957 (38.0)
2014	218 (71.2)	79 (31.1)	37 (31.4)	677 (40.1)	1009 (43.1)
Trend test:	p=0.044	p=0.442	p=0.909	p=0.073	p<0.001

Bolded text indicates statistically significant univariable temporal trend ($p<0.05$).
MSM, men who have sex with men.

intercourse with casual partners increased over time for Māori MSM, European-only MSM, and overall, with no significant trends among Asian or Pacific MSM. Any condomless anal intercourse with regular partners decreased over time among Pacific MSM, with no significant trends among Asian MSM, Māori MSM, European-only MSM or overall.

DISCUSSION

When disaggregated by ethnicity, trends from 2006 to 2014 in HIV and sexual health indicators among MSM in New Zealand varied between ethnic groups. Over time, the proportion of Indigenous and ethnic minority

participants increased. The proportion of younger and gay-identified Māori MSM increased, as did the proportion of Asian MSM with tertiary education. In sum, the majority European ethnic group drove aggregated population-level trends; without disaggregation by ethnicity this would mask important differences for Indigenous and ethnic minority subgroups. For example, despite increasing overall trends in recent STI diagnosis and HIV-positive diagnoses, neither Indigenous nor ethnic minority groups had significant trends in these sexual health outcomes. Other trends were seen among the overall sample, the majority European group and only some of the Indigenous or ethnic minority groups but not others. For example, Asian men reported increases

Table 2 Trends in sexual health outcomes of Asian, Maori, Pacific and European-only MSM in New Zealand, 2006–2014

>20 male sex partners in the past 6 months (versus ≤20 partners)					
2006	32 (13.9)	43 (14.6)	21 (17.8)	268 (10.4)	353 (11.1)
2008	10 (5.0)	24 (11.4)	19 (22.4)	133 (8.5)	184 (9.0)
2011	21 (8.5)	23 (8.6)	9 (10.0)	137 (7.3)	190 (7.7)
2014	21 (6.8)	22 (8.8)	6 (5.1)	128 (7.6)	177 (7.6)
Trend test: AOR (95% CI)	0.80 (0.66 to 0.97)		0.64 (0.50 to 0.84)		0.86 (0.81 to 0.91)
Any STI testing in the past year (vs not tested)					
2006	88 (37.9)	143 (48.6)	57 (47.9)	1135 (44.0)	1405 (44.2)
2008	74 (37.8)	94 (45.4)	35 (42.7)	697 (44.7)	888 (43.8)
2011	99 (39.0)	148 (53.2)	39 (43.8)	948 (49.2)	1225 (48.5)
2014	141 (45.6)	128 (50.0)	54 (45.0)	891 (52.6)	1202 (51.0)
Trend test: AOR (95% CI)	1.11 (1.00 to 1.24)		0.96 (0.82 to 1.14)		1.10 (1.06 to 1.14)
Any STI diagnosis the past year* (vs none/not tested)					
2006	16 (7.1)	32 (11.2)	13 (10.9)	210 (8.3)	260 (8.4)
2008	22 (11.5)	22 (10.3)	18 (21.2)	164 (10.4)	222 (10.9)
2011	16 (6.5)	23 (8.4)	8 (8.8)	160 (8.4)	201 (8.0)
2014	25 (8.3)	27 (10.8)	19 (16.4)	206 (13.4)	272 (11.8)
Trend test: AOR (95% CI)	0.98 (0.81 to 1.20)		1.07 (0.84 to 1.36)		1.09 (1.03 to 1.16)
Any HIV testing in lifetime (vs never tested)					
2006	124 (53.7)	192 (65.1)	59 (48.8)	1633 (63.8)	1990 (62.9)
2008	122 (60.7)	143 (65.3)	50 (58.1)	1071 (66.6)	1370 (65.5)
2011	163 (65.2)	184 (66.2)	58 (63.0)	1365 (70.6)	1761 (69.5)
2014	223 (72.4)	164 (64.1)	64 (55.2)	1237 (72.7)	1677 (71.1)
Trend test: AOR (95% CI)	1.31 (1.17 to 1.47)		1.10 (0.93 to 1.30)		1.14 (1.10 to 1.19)
Any HIV testing in past year (vs none/never tested)					
2006	75 (32.5)	118 (40.0)	35 (28.9)	902 (35.2)	1124 (35.5)
2008	78 (38.8)	81 (37.0)	29 (33.7)	614 (38.2)	789 (37.7)
2011	111 (44.4)	132 (47.5)	43 (46.7)	907 (46.9)	1184 (46.7)
2014	128 (41.6)	102 (39.8)	37 (31.9)	688 (40.5)	947 (40.1)
Trend test: AOR (95% CI)	1.14 (1.02 to 1.28)		1.09 (0.92 to 1.30)		1.11 (1.07 to 1.15)
Any HIV positive test result (vs none/never tested)					

Continued

Table 2 Continued

	Asian n (%)	Māori n (%)	Pacific n (%)	European-only n (%)	Total n (%)
2006	2 (0.9)	5 (1.7)	3 (2.5)	65 (2.6)	74 (2.4)
2008	4 (2.0)	2 (1.4)	2 (2.4)	43 (2.8)	51 (2.5)
2011	3 (1.2)	2 (0.7)	3 (3.4)	80 (4.2)	87 (3.5)
2014	5 (1.6)	9 (3.6)	5 (4.6)	74 (4.4)	91 (3.9)
Trend test: AOR (95% CI)	1.12 (0.70 to 1.79)	1.28 (0.85 to 1.93)	1.25 (0.78 to 2.02)	1.23 (1.11 to 1.37)	1.20 (1.09 to 1.33)
Any condomless anal intercourse with a casual partner in the past 6 months (vs none)					
2006	55 (24.4)	79 (27.6)	36 (31.0)	627 (25.0)	778 (25.2)
2008	51 (26.0)	67 (32.4)	25 (29.8)	357 (22.8)	494 (24.4)
2011	60 (24.6)	83 (31.0)	28 (30.1)	578 (30.6)	744 (30.1)
2014	67 (22.0)	93 (37.5)	39 (33.6)	553 (33.2)	746 (32.2)
Trend test: AOR (95% CI)	0.95 (0.83 to 1.08)	1.13 (1.01 to 1.28)	1.04 (0.87 to 1.26)	1.16 (1.11 to 1.21)	1.14 (1.10 to 1.19)
Any condomless anal intercourse with a regular partner in the past 6 months (vs none)					
2006	53 (23.5)	67 (23.0)	40 (33.9)	683 (26.9)	828 (26.5)
2008	55 (27.8)	42 (20.4)	24 (28.6)	385 (24.6)	503 (24.8)
2011	56 (22.9)	52 (19.4)	25 (27.8)	504 (26.8)	635 (25.8)
2014	59 (19.6)	63 (25.7)	25 (21.9)	436 (26.3)	578 (25.2)
Trend test: AOR (95% CI)	0.91 (0.80 to 1.04)	1.04 (0.91 to 1.18)	0.83 (0.69 to 0.99)	1.00 (0.95 to 1.04)	0.98 (0.94 to 1.02)

Bolded text indicates statistically significant ($p < 0.05$) continuous recruitment year variable, controlling for recruitment method (online/offline).

*Questions on STI diagnosis asked slightly differently in each survey round.

AOR, adjusted OR; MSM, men who have sex with men; STI, sexually transmitted infection.

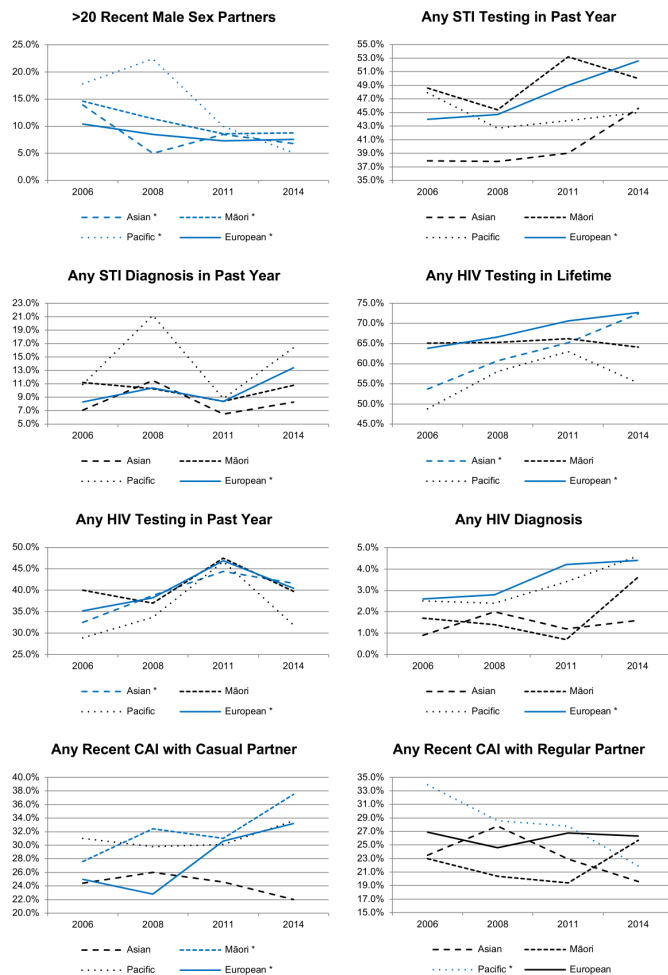


Figure 1 Sexual health outcome trends among New Zealand MSM, 2006–2014 (Nb: blue coloured lines and * in legend indicates statistical significant multivariable trend over time). MSM, men who have sex with men; STI, sexually transmitted infection.

in lifetime and recent HIV testing alongside European men, but no changes were seen for Māori or Pacific men. Similarly, Māori men reported increased in condomless anal intercourse with casual partners alongside European men, but no changes were seen for Asian or Pacific men. Finally, one trend was only seen among ethnic minority groups and not in others or overall. Pacific men were the only ethnic group to report decreases in condomless anal intercourse with regular partners.

This is the first comprehensive analysis of temporal trends in HIV and sexual health behaviours by ethnicity among MSM in New Zealand. The data are from a well-established, robust behavioural surveillance programme,^{11 23–27} and were pooled across four rounds spanning nearly a decade (2006–2014). Recruitment included internet dating sites in addition to community venues, which increased the sample size and diversity. In order to control for differences by recruitment method, multivariable regression was used to assess temporal trends; while recruitment cycle was treated as a continuous variable to simplify assessment and reporting of

temporal trends, this approach may not have been appropriate for all outcomes. However, these findings may not be generalisable to all MSM in New Zealand, and caution should be taken when comparing findings with other countries. Multivariable logistic regressions were used to examine trends over time instead of simpler non-parametric statistics, which allowed for control of recruitment method and appears more statistically defensible. The use of a pooled sample, necessitating the removal of duplicate and more recent surveys from a given individual, resulted in a slightly younger and earlier sampled group of MSM. Over the period 2006–2014 our samples became younger, more gay-identified and had higher education. Like all repeat convenience-based surveys of MSM, we cannot know whether these observed trends are most likely due to underlying shifts in the national population, sociodemographic shifts within the gay community in New Zealand, attrition of certain MSM away from venues where sampling occurs, or the introduction of biases in our sampling approach over time.²⁵ The events, venues and online sites used to recruit participants are also likely to sample different types of MSM, including ethnic minority MSM.²⁴

The ‘total-response’ approach to ethnicity classification enabled respondents’ experiences relating to multiple ethnic affiliations to be revealed rather than masked, the latter being more typical under a single-choice or prioritisation approach to classification.^{22 23} Our analyses focused on major ethnic groups, which attenuate diversity within these macro categories, particularly for Asian and Pacific MSM. While the primary focus of the current analyses was on Indigenous Māori and ethnic minority MSM, European-only men comprise the largest macroethnic group of MSM in New Zealand (78.3%). Given the large size and heterogeneity of this European classification, future analyses could investigate ethnic subgroups within this macro category where this seems warranted, such as work in the UK that has investigated eastern European MSM separate from British MSM.^{3 4} Further, although individuals who reported ethnicities from two or more major ethnic groups were placed into each major group within these analyses; future research could address whether and how these multiple-ethnicities individuals may be unique.²³

HIV and STI diagnosis trends are often reported by ethnicity, but this is rarely done for behavioural antecedents of these sexual health outcomes.^{28–30} The increasing trends in the overall sample of MSM in New Zealand for both recent and lifetime HIV testing as well as recent STI testing/treatment are similar to findings for MSM in eastern Australia (although ethnicity was not considered in the latter).³⁰ In the current study, Māori and European men had increasing reports of condomless anal intercourse with casual partners, which is consistent with research in London, England where any condomless anal intercourse went from 24.3% in 1998 to 33.9% in 2008, although that did not disaggregate between casual and regular partners.²⁸ In Scotland, there was little change

in the number of MSM reporting two or more condomless anal intercourse partners over time (14.5% in 2002 and 13.1% in 2008),²⁹ which might reflect composite measures aggregated across ethnicities. Compared with national data from Māori MSM from 1996,³¹ the current study indicates new trends in greater proportions reporting condomless anal intercourse with casual partners. These disparities should be addressed with culturally appropriate sexual health education and health promotion strategies that are free of stigma and discrimination related to HIV status and ethnicity.³² Relatedly, with respect to Pacific MSM, future research and health promotion may require a more nuanced country-level focus in order for it to be culturally appropriate given the diversity of Pacific communities.³³

Improvements in recent and lifetime HIV testing have been experienced inequitably, with static rates for Māori and Pacific MSM. Similarly, only European men reported increases in STI testing and diagnosis, which was not experienced by any of the Indigenous or ethnic minority groups. Undiagnosed HIV and STI infections among Indigenous and ethnic minority populations may compound other health inequities and lead to HIV and sexual health disparities if not addressed,¹¹ which highlights the importance of disaggregating trends by ethnicity. Behavioural trends over time should be interpreted in light of point estimate values and differences between ethnicities, which together should inform HIV prevention and health promotion targets. The results imply that HIV and sexual health prevention, education and testing should be culturally relevant and accessible to diverse groups of MSM. Due to experiences of discrimination in healthcare³¹ and limited uptake of testing services among some ethnic groups, structural changes in health services³⁴ and societal attitudes³⁵ are necessary to improve sexual health for Māori, Pacific and Asian MSM in New Zealand.

Research into race/ethnicity should be informed by and consider regional demographics and histories of racism, colonisation, immigration and cultural discrimination. Future efforts should strive for equal explanatory power and consider additional data collection on socially assigned race/ethnicity and experiences of discrimination and racism.^{15 36} Future surveillance and research may also consider country of birth,^{37 38} migration,³⁹ and language, which is particularly important among heterogeneous populations of Asian and Pacific MSM.⁴⁰ Research on the social and sexual networks of MSM,⁴¹ and ethnic mixing, in particular an understanding of how they are mediated by ethnic and cultural norms and processes of racialisation, may strengthen extant health promotion efforts. There may also be important differences by age or generation within MSM of different ethnicities. For example, compared with other ethnicities, Pacific youth in New Zealand were more likely to report being transgender⁴²; future research should consider traditional/cultural identities related to sexual orientation and gender (eg, Māori takatāpui and Pacific fa'afafine), and their influence on

sexual behaviour, as well as access to and uptake of health services. Differences, or lack thereof, in HIV and STI testing uptake and diagnosis may indicate higher rates of undiagnosed infection and should be investigated further.

In conclusion, this was the first analysis of temporal trends in HIV and sexual health indicators among MSM in New Zealand disaggregated by ethnicity. Indigenous and ethnic minority MSM reported trends that often diverged from the European majority as well as each other. Future research should disaggregate data by ethnicity to evaluate public health responses and identify successes and weaknesses in efforts towards health equity.

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