GEOGRAPHIC MICRO-CLUSTERING OF HOMOSEXUAL MEN: IMPLICATIONS FOR RESEARCH AND SOCIAL POLICY

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Abstract

There is increasing demand internationally for better-quality information on people with a non-heterosexual orientation. Information requirements include both basic demographic characteristics as well as evidence of disparities in outcomes or differences in needs compared to the general population. The availability and therefore collection of such data are essential if social policies are to be responsive to all groups protected under the Human Rights Act 1993, and if the impact of interventions targeted at sexual orientation minorities is to be properly evaluated. In light of ongoing difficulties obtaining accurate data on basic demographic variables for this population, we consider whether the census can provide accurate geographic micro-clustering data on homosexual males by comparing census data with a nation-wide survey of homosexual men. Place of residence information was targeted due to the importance of this variable in guiding future survey sampling and the provision of social and health services. The geographic micro-clustering profile of homosexual men in both data sets was congruent, and considerably different to the general male population: 12–13% of the national population of homosexual men resided in an inner-city Auckland area compared to 1.3% of all males aged over 15.

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INTRODUCTION

A persistent problem when identifying the needs of homosexual populations has been obtaining representative samples, since homosexuality is defined by low prevalence indicators that are difficult to measure, private and usually stigmatised. Furthermore, without accurate basic demographic information on gay communities to guide research, it is difficult to fully evaluate the effects of targeted health promotion programmes, or rigorously assess the impact of general health, social and economic policies on this group (Gates and Ost 2004, McManus 2003, Sell and Becker 2001).

This has led to what Plumb (2001) has described as a "catch-22" situation. Unconventional survey methods and opportunistic research have predominated because of difficulties associated with conventional probability sampling, but this has inevitably compromised the credibility of empirical findings due to potential biases. Data quality concerns have in turn made it more difficult to advocate for funding specific programmes and further research, thereby hindering public health interventions for this population at every step (Plumb 2001). As a result, it is still uncertain whether the accumulated findings from studies surveying homosexual men and women provide an accurate estimate of their basic demographic and behavioural parameters, or whether our current understanding is limited by serious conceptual and methodological problems (Blair 1999).

Consequently, the collection of more accurate data on sexual orientation has become an urgent priority internationally (Dean et al. 2000, Saxton and Hughes 2003). Efforts to this end are proceeding in the United States (Gates and Ost 2004, Meyer 2001, Plumb 2001), Canada (Statistics Canada 2004), New Zealand (Ministry of Health 2004) and Scotland (McLean and O'Connor 2003), with cited tasks including the standardisation of sexual orientation measures and the inclusion of such measures in regular surveillance (Sell and Becker 2001). Canada and New Zealand have both begun to explore the feasibility of including a direct question on sexual orientation in their national census in the future (Statistics New Zealand 2003b, Turcotte et al. 2003). Current legal and social policy debates surrounding homosexuality – such as same-sex partnerships, families headed by same-sex parents, and fair access to social services – broaden this project beyond health and increase its urgency (Black et al. 2000, Phua and Kaufman 1999).

This paper focuses specifically on geographic micro-clustering and the role of this basic demographic variable in planning future research, interpreting survey findings and implementing social policies. This paper also concentrates on homosexual men, due to the greater availability of data for which to make comparisons. Findings on the New Zealand Census and lesbian women have been published elsewhere (Byrne 1998, Hyman 2003).

DIFFICULTIES COLLECTING DATA ON HOMOSEXUAL POPULATIONS

Clarity over the dimensions and definitions of homosexuality is fundamental to the estimation of geographic distribution and all other behavioural outcomes. Sandfort (1997) has demonstrated that the notion of homosexuality as a singular, uncomplicated characteristic is problematic, as shown by findings that identify different aspects of homosexuality in men. By differentiating between lifetime and current same-sex attraction, sexual contact, sexual identity and partnership, one can identify interrelated but often not fully overlapping experiences over the lifetime of survey participants. Several large-scale probability surveys have recognised this multifaceted nature of current and lifetime sexuality with questions on sexual attraction and/or sexual identity in addition to homosexual behaviour (Laumann et al. 1994, Sell et al. 1995, Smith et al. 2003, Wellings et al. 1994).

Secondly, the private and usually stigmatised nature of sexuality heightens the difficulties surrounding data collection, although substantial progress has been made identifying the range and impact of possible biases across various methodological approaches in sexuality research (Bagley and Tremblay 1998, Bancroft 1997, Catania et al. 1990, Fenton et al. 2001). These range from issues of participation (Dunne 1998, Groves et al. 1992, Johnson and Copas 1997) to biases in operation after the selection of respondents (Catania 1999, Gribble et al. 1999), and include sampling and recruitment strategy, interview mode, respondent motivation, survey topic and question wording.

Thirdly, most studies return a low population prevalence and incidence of homosexuality over its various dimensions (ACSF Investigators 1992, Binson et al. 1995, Butler 2000, Fay et al. 1989, Johnson et al. 2001, Laumann et al. 1994, Paul et al. 1995, Rogers and Turner 1991, Sell et al. 1995, Smith et al. 2003). In a recent national study using random sampling, 5.9% of Australian men reported any lifetime homosexual behaviour, reducing to 1.9% for those reporting same-sex behaviour in the past year (Grulich et al. 2003). This places limits on the reliability of data collected, even when extracted from large general population samples. Furthermore, the small size of this population subgroup makes it difficult to justify the inclusion of a broad range of additional questions in national surveys that may be relevant for this group, such as micro-residential information.

The intersection of social stigma with the low population prevalence of homosexuality has also had implications for the most appropriate research technique for obtaining demographic and behavioural estimates. For small populations such as homosexual men or people living with HIV (Grierson et al. 2004), non-random, opportunistic and self-selected surveys can yield richer information and larger samples than can probability surveys. However, non-random techniques such as these often rely on comparisons with estimates derived from probability surveys in order to assess the

generalisability of findings. Probability samples themselves usually look to the most recent national census to design and evaluate sampling strategies and define post-stratification weightings (Catania et al. 2001), and yet most countries do not have this point of reference for homosexual men. The census is without question the benchmark instrument for providing data on demographic profiles and residential sampling lists, particularly for low prevalence populations (Statistics New Zealand 2003a). Yet for many of the reasons mentioned above, the census has rendered most gay, lesbian and bisexual individuals invisible through the absence of any direct questions on sexual orientation as a basic demographic variable.

The upshot of these issues of definition and quantitative technique is that different questions and different methods have been shown to identify different types of homosexual men (Donovan 1992, Prestage 2002, Ross et al. 2000). Men participating in opportunistic studies have been found to differ in several demographic and sexual behaviour characteristics, and are more likely to be homosexually identified, compared to homosexual men recruited in probability studies conducted among the general male population (Harry 1986, Sandfort 1997).

One variable returning consistent findings in national probability studies has in fact been place of residence, with the prevalence of various dimensions of homosexuality being higher in large urban centres (ACSF Investigators 1992, Binson et al. 1995, Laumann et al. 1994, Sandfort 1998, Smith et al. 2003, Wadsworth et al. 1996). Suggested explanations for variations in the geographic distribution of reported homosexuality have included migration to more gay-friendly environments and to places where there is a higher likelihood of meeting a potential sexual or life partner, as well as the greater likelihood of affirmative gay identity formation and higher disclosure of homosexuality in urban as opposed to rural environments (Binson et al. 1995, Laumann et al. 1994, Laumann et al. 2004, Sandfort 1998, Wellings et al. 1994).

Census information distinguishing homosexual from heterosexual males remains limited to same-sex cohabiting couples (SSCC), acquired through indirect, direct or relationship-to-householder questions. These have provided some corroboratory data with the probability studies, at least at the mid-clustering level. Black et al. (2002) determined that 78% of gay couples in the 1990 United States Census lived in a selection of 50 large cities compared to 52% of the total United States population, and Smith and Gates's (2001) consideration of the 2000 United States Census reinforced this profile of differential geographic concentrations, centring on certain metropolitan areas. Gates and Ost (2004) have produced the first comprehensive analysis of census geographic micro-clustering using the 2000 United States Census and have identified high spatial concentrations of SSCC by state, county and neighbourhood. The 2001 Canadian Census identified certain metropolitan areas as having a higher proportion of same-sex common-law couples (Statistics Canada 2002), the 2001 United Kingdom Census

is able to identify SSCC to the local authority level (Office for National Statistics 2004), and data from the 2001 Australian Census revealed higher concentrations of SSCC in inner Sydney and inner Melbourne (Australian Parliamentary Library 2004, Birrell and Rapson 2002).

Yet for a number of valid reasons, census analyses have neither provided national geographic data to the micro-level nor compared these to other non-census national sources of micro-geographic data on homosexual men for the purposes of empirical corroboration. Catania et al. (2001) present behavioural findings from a probability study of gay males from four urban centres in the United States, in which the sampling strategy was informed by a comprehensive triangulation of multiple residential information sources, including the 1990 United States Census, AIDS epidemiology data and marketing lists (Binson et al. 1996). Unfortunately, costs presumably prevented this study from examining geographic distribution beyond these cities. Black et al.'s (2000) landmark study of the demographics of the homosexual population included United States Census data and proposed a similar exercise to the approach we present in this paper. However, they found that their preferred source of corroborative data in the United States (the General Social Survey) held the place of residence information confidential, and concluded that: "unfortunately, there exists no reliable data, other than the census, for calculating even the most rudimentary statistics on the location of the gay and lesbian population" (Black et al. 2000:149).

Beyond these basic macro- and mid-level findings indicating overrepresentations of homosexual men in urban areas, studies have therefore rarely been able to investigate whether there is evidence of clustering at the micro-level, what precise form this takes, and how this knowledge could improve the broader research praxis, policy development and service delivery for homosexual men.

There is now growing acknowledgement that better benchmark demographic profiles and sampling frames are needed, because the low population prevalence and clustered urban concentration of homosexuality can lead to inaccurate and inappropriate generalisations of survey findings in several ways. First, sampling or participation bias associated with place of residence can lead to misattribution of findings if those who do not participate differ in some way to those who do. This can occur even if it involves individuals within the same macro-level geographic category (such as a major urban area) but who are distinguished at the micro-level by gay ghetto and non-ghetto residence (Mills et al. 2001). Second, when there is a very small population prevalence, participant or coding mistakes can lead to disproportionately large errors in estimates or enumeration and result in misclassification of homosexuality (Black et al. 2000, Johnson and Copas 1997, Turcotte et al. 2003). Third, low numbers of participants (as distinct from low proportions) reporting homosexuality will increase the level of uncertainty of estimates by widening confidence intervals, thereby hindering

hypothesis testing and determination of statistical associations (Meyer 2001). Also, unless more accurate information on the micro-residential pattern of gay, lesbian and bisexual individuals is obtained, the high costs associated with probability sampling for this small population will remain an obstacle to obtaining representative samples (Binson et al. 1996, Blair 1999, Catania et al. 2001, Sudman 1985, Sudman et al. 1988).

AIMS

This paper has both empirical and methodological aims:

- to identify whether the location of homosexual men differs from heterosexual men and exactly how this differs
- to assess whether the New Zealand Census can provide an accurate geographic profile of homosexual men by triangulating it with other available data.

Specific focus in this paper is on micro-residential profile, because of the centrality of this variable in guiding other stages of the research, such as sampling design, data weighting and interpretation of findings, and because these processes subsequently impact on needs identification and service delivery. We analysed data available from two surveys, which used contrasting data collection methods and were conducted at the same time: unpublished data from the 1996 New Zealand Census, and re-analysed data from the 1996 New Zealand Male Call/Waea Mai, Tane Ma survey.

METHODS

Census

In 1996 it was possible for the New Zealand Census to identify individuals who lived together as a same-sex couple. Every person in a household was provided with their own individual form, and a separate dwelling form was also filled in by one of the household residents. On the individual form, each person was asked a living arrangements question:

- Which of these people live in the same household as you?
  - your legal husband or wife
  - your partner or de facto, girlfriend or boyfriend
  - none of these

The census was able to distinguish between same-sex and opposite-sex coupled individuals if both men checked the box "partner or de facto, girlfriend or boyfriend", by combining this information with data on sex (male or female). Answers could be cross-referenced with other living arrangements information to resolve ambiguities due to complex households. The separate dwelling form, which required a nominated

reference person to describe their relationship to everyone else in the household, could also be used for this purpose.

Male Call/Waea Mai, Tane Ma

New Zealand's first nationwide telephone survey of men who have sex with men, Male Call/Waea Mai, Tane Ma, was also conducted in mid-1996. The project encouraged men who had sex with men (MSM) in the previous five years to participate and answer questions about their sexual behaviour, sexual identity, safe sex, and knowledge about HIV transmission. Due to the extremely personal nature of the research, and the fact that there are no conventional sampling lists for gay males, the project employed an innovative data collection approach, which was adapted from an Australian Study (Kippax et al. 1994). Male Call used a self-selection process through a toll-free phone number rather than probability sampling or non-random methods such as opportunistic research. The phone lines were open every day for a six-week period from midday to midnight, and all calls including those made from cell phones and public phones were accepted. On average the interviews took 35 minutes, and 1,852 questionnaires were completed.

Most answers were keyed directly into a computer using a CATI (Computer-Aided Telephone Interviewing) facility at an independent market research company. Place of residence information was recorded on an open-ended response sheet beside a unique respondent identifier for subsequent coding, and respondents who lived in New Zealand's five largest cities were also prompted for the suburb in which they lived.

Because the survey employed self-selection, the project relied on the ability of the recruitment campaign to encourage participation among all groups of MSM. The target population was divided into subgroups, including MSM who do not identify as gay and MSM from smaller urban towns and rural areas, and recruitment targets were also developed for men of Māori ethnicity and younger and older men. Two overlapping strategies of advertising in the gay and mainstream media and personal contact with key people in gay communities and MSM sexual networks were then used to raise awareness of the survey among these groups (New Zealand AIDS Foundation 1996).

A key feature of the recruitment campaign was the launch on national television news. An easily recalled phone number was promoted, together with appearances by a high-profile sportsman who was gay and an openly gay Member of Parliament. Television audience ratings estimated that 576,480 people, or 24% of the potential New Zealand viewing audience, were watching when Male Call received coverage during the 6pm One Network News. A quarter of the survey respondents reported that they had heard about the study through this television coverage, and the research team believed that

the recruitment campaign had saturated the majority of the MSM networks in New Zealand (Worth et al. 1997).

Table 1 summarises and contrasts the data collection protocols of the 1996 Census and the 1996 Male Call/Waea Mai, Tane Ma survey.

Table 1 Comparison of 1996 Census and 1996 Male Call Data Collection

Census	Male Call
(a) Conducted 5 March 1996.	(a) Conducted 3 May – 16 June 1996.
(b) Involvement is legally required.*	(b) Involvement is voluntary.
(c) State collects census forms house-to-house through Statistics New Zealand.	(c) New Zealand AIDS Foundation collects information through a market research company using free-phone call-in CATI methodology.
(d) Each individual writes cohabitation information directly onto a discrete census Individual Form.	(d) Each individual verbally provides information through a phone interview.
(e) Census forms are collected and entered confidentially by census staff and recorded in census database.	(e) Information is elicited by gay-friendly interviewers and entered directly into the CATI system.
(f) Census form includes name, address and date of birth.	(f) Anonymous: It is not possible to identify the name, phone number or actual address of participant.
(g) Geographic data are based on actual address.	(g) Geographic data based on self-report.
(h) Every resident is legally obliged to complete the census form accurately.	(h) Participants are able to terminate the interview at any time.
(i) No publicity about same-sex cohabiting status option prior to 1996 census night.	(i) Widespread publicity about survey in gay and non-gay media, including national television news.
(j) Same-sex partnering status was established indirectly through living arrangements question.	(j) Same-sex behaviour status was established directly in survey publicity and in eligibility criteria.
(k) All men who have sex with men were legally required to participate in the census, although only cohabiting same-sex couples aged 15 and over can indirectly identify their same-sex cohabiting status.	(k) All males aged 16 and over who had sex with another male in the previous 5 years were eligible to participate ("sex" is defined as "any intimate physical contact that involves sexual excitement").

Note: CATI = Computer-Aided Telephone Interview.

* The 1996 census post-enumeration survey estimated that 98.1% of males participated, although estimates for cohabiting couples were not conducted (Statistics New Zealand 2002).

Comparability

In terms of the various dimensions of male homosexuality, the census and Male Call data sets overlap to some extent (having a current male partner), but each also provides dimensions of homosexuality that the other does not (respectively, same-sex partnership without sex, and same-sex sexual behaviour without partnership or gay identity). The key question is whether these differences should affect comparability, and specifically whether the geographic distribution of partnered MSM is different to that of non-partnered men. We were able to test this using Male Call data. Comparing the urban distribution of Male Call respondents who referred to their regular male partner as a "de facto partner, husband, boyfriend, lover or long-term lover" to respondents without a current regular male partner or who only referred to their regular sexual male partner as a "fuck buddy", we found statistically significant but small differences ($x^2 = 20.49$, df = 9, p = 0.015). In the results section we therefore identify the partnered and non-partnered Male Call respondents separately.

Response Rates

The 1996 New Zealand Census recorded 2,883 males in a same-sex cohabiting couple, which represented 0.37% of all males living in couples. Regardless of selection criteria (current or lifetime behaviour, attraction, or identity) this is well below most countries' population prevalence estimates for the male homosexual population, including the New Zealand figure of 2% for any lifetime same-sex behaviour (Paul et al. 1995).

In order to estimate how low the undercount of SSCC males is likely to be, issues such as the coupling rate and cohabitation rate of homosexual men would need to be considered, as well as an appropriate estimate of the current homosexual population (Black et al. 2000, Schneider 2000). In an HIV behavioural surveillance study in Auckland, 41% of MSM surveyed had a current regular male partner, 52% of whom cohabited with this man (Saxton et al. 2004). However, the Paul et al. (1995) findings do not include an estimate of the proportion of the New Zealand population with current homosexual identity, attraction or behaviour, meaning that we are unable to estimate what the number of SSCC ought to be given these assumptions. Studies of the United States 1990 and 2000 Census results have suggested undercounts of SSCC of between 16% and 62% (Badgett and Rogers 2003, Black et al. 2000, Gates and Ost 2004, Smith and Gates 2001), but also note that missing SSCC in the census may not necessarily always be the result of low response rates. Rather, a number of measurement errors can lead to incorrect under- and over-enumeration of SSCC (Black et al. 2000, Gates and Ost 2004, Turcotte et al. 2003), with different implications for biasing the results.

Because Male Call/Waea Mai, Tane Ma was a self-selected sample, and the actual number of men in New Zealand who had sex with another man in the previous five years is unknown, it is not possible to calculate a response rate for this data set.

Non-Participation and Reporting Bias

Low response rates will affect the generalisability of findings if the relevant characteristics of those who participate differ systematically from those who do not (Johnson and Copas 1997). For example, the homosexual population identified in the census may have higher levels of gay identity disclosure than the total male same-sex cohabiting population, because those who are fearful of the state "monitoring" their homosexuality may have chosen to hide their partnering status when completing the form.

The characteristics of non-participants in Male Call are, of course, unknown to us. However, the methods put in place to protect anonymity resulted in high levels of MSM taking part who were not attached to the gay community. Respondents claimed a variety of sexual identities (27.4% identified as bisexual) and only 68.6% stated that they personally saw themselves as being part of a gay community (Saxton et al. 1997, Saxton et al. 1998). Six per cent of respondents had never told anyone that they were sexually attracted to men. Male Call behavioural results were also consistent with comparable HIV risk indicators from other opportunistic research on homosexual men in New Zealand (Saxton et al. 2004). In contrast to the census data, we would expect the Male Call sample to have lower levels of gay identity, but also to be less influenced by disincentives to participate.

RESULTS

Table 2 presents the geographic distribution of homosexual men in the two data sets.

The geographic profile of the SSCC and Male Call data showed considerable differences to that of the census data on the general male population (Table 2). Forty-five per cent of the SSCC males lived in the Auckland urban area whereas this was true for just under 27% of OSCC males. Substantial under-representations of SSCC males compared to OSCC males occurred in urban centres with populations smaller than that of Dunedin, which at the time meant centres of fewer than 100,000 people or centres that individually accounted for less than 2.76% of the country's total population. Less than 10% of SSCC males lived in rural areas compared to 16.1% of OSCC males.

Table 2 also shows that around 45% of the Male Call respondents lived in Auckland, and this was true regardless of couple status. Once again, substantial under-representations of homosexual men compared to the general male population occurred in centres with total populations of fewer than 100,000. Respondents to the Male Call survey were,

however, less likely to live in rural areas than either SSCC males or all males aged fifteen and over.

Table 2 National Geographic Distribution of Homosexual Men Using 1996 Census and 1996 Male Call (%, n)

Place of residence	Census males aged 15 and over		Census males in OSCC		Census males in SSCC		Male Call coupled		Male Call non-coupled		Male Call total	
Auckland	27.2	(367,497)	26.6	(206,916)	45.0	(1,296)	45.8	(343)	44.4	(490)	45.0	(833)
Wellington	9.4	(126,354)	9.0	(70,218)	15.2	(438)	15.1	(113)	11.6	(128)	13.0	(241)
Christchurch	9.3	(125,376)	9.0	(70,047)	8.9	(258)	13.4	(100)	11.2	(123)	12.0	(223)
Hamilton	4.3	(57,648)	4.2	(32,529)	3.2	(93)	2.8	(21)	4.4	(48)	3.7	(69)
Dunedin	3.1	(42,372)	2.8	(22,077)	2.5	(72)	3.2	(24)	2.8	(31)	3.0	(55)
Other main urban	16.0	(215,352)	15.9	(123,918)	9.4	(270)	9.9	(74)	13.8	(152)	12.2	(226)
Secondary urban	7.3	(97,929)	7.7	(59,826)	2.4	(69)	3.1	(23)	3.5	(39)	3.3	(62)
Minor urban	8.5	(114,495)	8.6	(66,984)	4.2	(120)	3.2	(24)	4.3	(47)	3.8	(71)
Rural	15.0	(202,071)	16.1	(125,244)	9.2	(264)	2.7	(20)	2.3	(25)	2.4	(45)
Other	0.0	(870)	0.0	(138)	0.0	(0)	0.1	(7)	1.8	(20)	1.5	(27)
Total*	100	(1,349,964)	100	(777,897)	100	(2,883)	100	(749)	100	(1,103)	100	(1,852)

Notes: OSCC = opposite-sex cohabiting couple; SSCC = same-sex cohabiting couple. Place of residence is based on census urban areas. Main urban, secondary urban, minor urban and rural areas have populations of 30,000 and over, 10,000 to 29,999, 1,000 to 9,999, and 300 to 999 respectively (total New Zealand population at 1996 Census was 3,618,303). Census data provided by Statistics New Zealand are rounded to base 3.

* Percentages may not total to 100 due to rounding effects.

Given the high concentration of homosexual men in Auckland, home to 45% of the homosexual men in both data sets compared to around 27% of all males in the census data, we tested for further urban clustering inside the greater Auckland area, and whether this was consistent across both data sets. To explore this we divided the Auckland main urban area into its four large census "urban zones". As seen in Table 3, homosexual men in both datasets were strongly skewed towards the Central Auckland zone, with almost two-thirds of Auckland homosexual men living there compared to about a third of other men.

Table 3 Micro Distribution of Auckland Homosexual Men Using 1996 Census and 1996 Male Call (%, n)

Auckland urban area	Census males aged 15 and over	Census males in OSCC	Census males in SSCC	Male Call
Central zone	35.1 (128,973)	31.7 (65,688)	64.6 (837)	66.3 (552)
Inner city district	13.6 (17,547)	9.7 (6,396)	(41.9) (351)	(44.6) (246)
Other central Akl	86.4 (111,426)	90.3 (59,292)	(58.1) (486)	(55.4) (306)
Northern zone	21.0 (77,118)	23.0 (47,685)	13.4 (174)	12.6 (105)
Western zone	15.9 (58,374)	16.8 (34,683)	10.0 (129)	5.3 (44)
Southern zone	28.0 (103,035)	28.4 (58,863)	11.8 (153)	8.6 (72)
Undisclosed Auckland	0.0 (0)	0.0 (0)	0.0 (0)	7.2 (60)
Total*	100 (367,497)	100 (206,916)	100 (1,296)	100 (833)

Notes: OSCC = opposite-sex cohabiting couple; SSCC = same-sex cohabiting couple. Akl = Auckland. Census data provided by Statistics New Zealand are rounded to base 3.
* Percentages may not total to 100 due to rounding effects.

Following the same logic, we then sought to determine if homosexual men in the Central Auckland zone were distributed evenly throughout the area or whether we could find yet more evidence of clustering and whether this was consistent between data sets. However, because of differences in the data type between Male Call and the census, it was less clear how residential data at this micro level should be analysed. The census divides this zone into 100 small statistical "area units", and codes people using their street address. The self-selection and anonymity of Male Call respondents, on the other hand, meant that Male Call data were coded according to reported suburb, and depended on the respondent's understanding of where they lived (in Auckland there are no legally defined suburb boundaries, hence there is capacity for self-defined suburbs to overlap). Compounding the problem was the fact that in some cases the census area unit boundaries did not equate with usual public understandings of the associated suburbs, so we could not be confident that Male Call data points corresponded directly with those from the census. Because there was no objective system of blocking area units and suburbs together in a way that provided complementary boundaries, we began by examining the results to see whether any general distribution pattern emerged in each data set taken separately.

The findings revealed that high numbers of homosexual men were living close to the city centre in the Auckland Central zone. Consequently, we sought to outline a geographic area that (a) best approximated this "inner city district" and (b) had a consistent definition across Male Call and census databases to enable comparison. Each suburb was assigned a ratio based on its proportion of Auckland Central zone SSCC males compared to its proportion of Auckland Central zone OSCC males. Area units scoring a ratio of more than 1 therefore indicated a higher concentration of SSCC males as a proportion of all

Auckland SSCC males than existed for OSCC males, and particular attention was given to those scoring a ratio of 2 or higher. This formula has similarities to that published by Black et al. (2002). The resulting "ratio map" revealed a clumped rather than scattered residential distribution. The inner city district boundary finally established constituted 16 out of the 100 area units, and was largely delineated by geographical features (such as motorways, waterfront and other unambiguous topography) that also demarcated widely agreed suburban divisions (this was further verified using two commonly available Auckland City street maps). This exercise made it clear that Male Call self-report locations could be reliably matched with these 16 combined census area units.[2]

Once again there was a high degree of congruence between the census SSCC and Male Call data. Over 40% of both sets of Auckland Central zone homosexual male respondents lived in this inner city district (Table 3) compared to 10% of OSCC males and 14% of the Auckland male population over 15. Nationally, around one in eight of all homosexual respondents in each data set (12.2% in census; 13.3% in Male Call) lived inside this Auckland inner city area, compared to 0.8% of all OSCC males and 1.3% of all males over the age of 15.

Preliminary data from the 2001 New Zealand Census were also available at the time of writing. Between 1996 and 2001, the number of SSCC males identified increased from 2,883 to 4,572, or by 59%. Significantly, the distribution of SSCC males in 2001 mirrored the findings from the previous census: 44.9% resided in Auckland in 2001 as compared to 45.0% in 1996, although the clustering inside the inner-city Auckland boundary was slightly less pronounced (10.0% of the 2001 SSCC males lived inside the Auckland inner city area compared to 12.2% in 1996; it is possible that the concentration remained but was defined by different boundaries in 2001). These subsequent census data support the findings reported above.

DISCUSSION

Men who indicated to the national census that they were in a same-sex cohabiting relationship, and men who participated in a national study of men who have sex with men, had a substantially different geographic profile compared to the general male population aged 15 and over. Furthermore, homosexual men in each of the data sets demonstrated very similar geographic clustering to the micro-level.

2 Using census area unit definitions, the inner city district comprised Herne Bay, St Mary's Bay, Auckland Central, Ponsonby West, Ponsonby East, Freeman's Bay, Westmere, Grey Lynn West, Grey Lynn East, Newton, Grafton, Surrey Crescent, Arch Hill, Eden Terrace, Newmarket and Kingsland. The only exception to this was the area of Mt Eden, on the southern edge of the inner city district. An above average number of Male Call respondents reporting living here, but there is a vague lay notion of where its boundaries are. This area was excluded because it was impossible to define a boundary that enabled a reliable comparison to be made between Male Call and census data.

These results can be triangulated with other sources of data on homosexual men in New Zealand. The 2004 Lavender Islands project (Henrickson et al. in press) which surveyed 2,276 gay, lesbian or bisexual-identified residents online and offline, found that 42% of male participants lived in Auckland (M. Henrickson, personal communication, September 2005). Information provided by the AIDS Epidemiology Group indicates that 53% of all HIV diagnoses resulting from male homosexual contact from 1985 to the end of 2004 were diagnosed within the Auckland Area Health Board boundary (Sue McAllister, personal communication, September 2005). Both these findings are consistent with the census and Male Call data on homosexual men.

Conversely, the only New Zealand random telephone survey on sexual behaviour, the New Zealand Partner Relations Survey (Davis et al. 1993), found that just 25% of the sample of 24 men reporting homosexual experience lived in Auckland (P. Davis and R. Lay-Yee, personal communication, December, 2000). This is similar to the census distribution of the general male population rather than to the census SSCC males. However, it is important to note that this study was designed to examine heterosexual rather than homosexual relationships (Paul et al. 1995), and the number of homosexual men that participated was small, decreasing the reliability of data on that subgroup as well as increasing the chance that small homosexual-dense localities would have been missed via random sampling. Also, the definition of "homosexuality" used in that survey included any lifetime same-sex experience rather than recent experience, identity or attraction, increasing the probability that the findings reflected the geographic profile of "incidental" or opportunistic homosexuality as compared to a more profound, enduring homosexual orientation.

The findings from both data sets identifying specific suburbs where gay men are clustered in greater numbers, in particular the greater detail provided by the census area unit, will improve the cost effectiveness of sampling this group, increase the precision of estimates, and generally make quality research on this population more feasible. For New Zealand, using 1996 figures, omitting the Auckland Central zone "inner city district" from a national sampling frame would exclude only 1.3% of all males aged 15 and over but 12–13% of the estimated male homosexual population.

Similarly, accurate information on the location of homosexual men will assist decisions regarding the allocation of resources and the delivery of health and social services to this population group. The high congruence between the New Zealand Census and Male Call findings on place of residence to the micro-level also supports the use of the census as a means of gathering geographic information for the population of homosexual men.

A feature of the analysis presented here is that many of the specific biases of each survey method are somewhat counterbalanced by qualities of the other (Table 1). Hence, any geographic gaps in Male Call's recruitment strategy must be weighed against the fact that virtually every homosexual male completed the census (though not all of those eligible disclosed their homosexuality), minimising recruitment bias. Anonymity fears in relation to census are likewise offset by the complete anonymity of the Male Call data collection process, which will have minimised participation concerns. We believe the micro-clustering results are therefore robust for the groups studied.

In fact, by comparing 1996 and 2001 census data one can ascertain whether an increase in the disclosure rate for homosexual men exposes a significantly different homosexual population with a different pattern of residence. The number of SSCC males identified in the census rose 59% between 1996 and 2001, which represents an increase in classification or willingness to disclose, as opposed to a rise in the actual population prevalence of male same-sex relationships. Notably, the geographic distribution of SSCC couples remained the same (45% lived in Auckland in both years).

Of course, consistent findings do not necessarily guarantee accuracy, and although there may be some compensating effect achieved through the use of two distinct data collection methods, there are still some limitations that are held in common. An unknown proportion of the target population could have declined to report accurately in the case of the census, or not have been aware of the opportunities to do so in the case of Male Call. The census in particular returned a low number of SSCC responses given its near complete coverage of the total population, and it is possible that census non-disclosing participants differed in their geographic distribution to disclosing participants. Also, even though the level of sexual conservatism and homophobia appear to be lower in New Zealand than in many other countries whose data we have examined (Dickson et al. 2003, Widmer et al. 1998), homosexuality is still socially stigmatised and this will have inevitably affected disclosure in subtle ways.

This paper has not examined potential explanations for the geographic variation in homosexuality. These range from population trends such as mobility, to methodological issues such as survey eligibility criteria. Both the census and Male Call provide data on these factors, and these will be published separately.

Underlining these results is the importance of considering the census for gathering geographic information in order to improve sampling and interpretation of probability and purposive research on homosexual populations. The almost inevitable inclusion of a more direct census question on same-sex cohabiting couples in many countries, propelled by recent legal recognition of same-sex civil partnerships, should gradually increase the proportion of such relationships identified in the census due to greater question clarity, as well as a greater sense of social legitimacy and therefore willingness to disclose.

Further extensions of the census to include a direct question on sexual orientation for each individual will require considerable care and testing as more complex issues are involved. These include the appropriate dimension of sexuality measured (homosexual identity or orientation?), question terminology, public acceptability, controls over the release of data regarding small communities, and respondent privacy and confidentiality (Saxton and Hughes 2003, Turcotte et al. 2003). Because the New Zealand Census contains an individual as well as a household form, privacy concerns may already be less significant than in other countries, and technological advances such as online participation in the 2006 Census (Statistics New Zealand 2004) may also increase disclosure rates and therefore reduce uncertainty regarding data accuracy.

Initial evaluation of a direct question on sexual orientation has been favourable among gay and lesbian individuals in New Zealand (Statistics New Zealand 2003b) and 87% of gay, lesbian and bisexual respondents to the Lavender Islands survey indicated they were willing to complete a sexual orientation question in the census honestly (Henrickson et al. in press). The social policy implications of better information on gay, lesbian and bisexual New Zealanders are considerable and the inclusion of sexual orientation questions in census and other social surveys ought to be further explored.

REFERENCES

ACSF Investigators (1992) "AIDS and sexual behaviour in France" *Nature*, 360:407–409.

Australian Parliamentary Library (2004) "Same-sex couples by commonwealth electoral division" *Research Note*, No.61.

Badgett, M.V.L. and M.A. Rogers (2003) *Left Out of the Count: Missing Same-Sex Couples in Census 2000*, Institute for Gay and Lesbian Strategic Studies, Amherst, MA.

Bagley, C. and P. Tremblay (1998) "On the prevalence of homosexuality and bisexuality, in a random community survey of 750 men aged 18 to 27" *Journal of Homosexuality*, 36:1–18.

Bancroft, J. (ed.) (1997) *Researching Sexual Behavior: Methodological issues*, Indiana University Press, Bloomington, IN.

Binson, D., S. Michaels, R. Stall, T. Coates, J. Gagnon and J. Catania (1995) "Prevalence and social distribution of men who have sex with men: United States and its urban centres" *Journal of Sex Research*, 32:245–254.

Binson, D., J. Moskowitz, T. Mills, K. Anderson, J. Paul, R. Stall, and J. Catania (1996) "Sampling men who have sex with men: Strategies for a telephone survey in urban areas in the United States" *Proceedings of the Section on Survey Research Methods, American Statistical Association*, Alexandria, Virginia, American Statistical Association, pp.68–72, www.amstat.org/Sections/Srms/Proceedings/papers/1996_010.pdf.

Birrell, B. and V. Rapson (2002) "How gay is Australia?" *People and Place*, 10:59–67.

Black, D., G. Gates, S. Sanders and L. Taylor (2000) "Demographics of the gay and lesbian population in the United States: Evidence from available systematic data sources" *Demography*, 37:139–154.

Black, D., G. Gates, S. Sanders and L. Taylor (2002) "Why do gay men live in San Francisco?" *Journal of Urban Economics*, 51:54–76.

Blair, J. (1999) "A probability sample of gay urban males: The use of two-phase adaptive sampling" *Journal of Sex Research*, 36:39–44.

Butler, A. (2000) "Trends in same-gender sexual partnering, 1988–1998" *Journal of Sex Research*, 37:333–343.

Byrne, J. (1998) *What the 1996 Census Tells Us About Lesbians*, Women's Studies Association 1998 Conference Papers, Wellington.

Catania, J. (1999) "A framework for conceptualising reporting bias and its antecedents in interviews assessing human sexuality" *Journal of Sex Research*, 36:25–38.

Catania, J., D. Gibson, D. Chitwood and T. Coates (1990) "Methodological problems in AIDS behavioral research: Influences on measurement error and participation bias in studies of sexual behavior" *Psychological Bulletin*, 108:339–362.

Catania, J., D. Osmond, R. Stall, L. Pollack, J. Paul, S. Blower, D. Binson, M. Canchola, T. Mills, L. Fisher, K-H. Choi, T. Porco, C. Turner, J. Blair, J. Henne, L. Bye and T. Coates (2001) "The continuing HIV epidemic among men who have sex with men" *American Journal of Public Health*, 91:907–914.

Davis, P., R. Lay-Yee, J. Chetwynd and N. McMillan (1993) "The New Zealand Partner Relations Survey: Methodological results of a national telephone survey" *AIDS*, 7:1509–1516.

Dean, L., I. Meyer, K. Robinson, R. Sell, R. Sember, V. Silenzio, D. Bowen, J. Bradford, S. Rothblum, M. Scout, J. White, P. Dunn, A. Lawrence, D. Wolfe and J. Xavier (2000) "Lesbian, gay, bisexual, and transgender health: Findings and concerns" *Journal of the Gay and Lesbian Medical Association*, 4:101–51.

Dickson, N., C. Paul and P. Herbison (2003) "Same-sex attraction in a birth cohort: Prevalence and persistence in early adulthood" *Social Science & Medicine*, 56:1607–1615.

Donovan, J. (1992) "Homosexual, gay, and lesbian: Defining the words and sampling the populations" *Journal of Homosexuality*, 24:27–47.

Dunne, M. (1998) "Sex surveys: What does it mean when thirty to forty percent don't participate?" *Venereology*, 11:33–37.

Fay, R., C. Turner, A. Klassen and J. Gagnon (1989) "Prevalence and patterns of same-gender sexual contact among men" *Science*, 243:338–348.

Fenton, K., A. Johnson, S. McManus and B. Erens (2001) "Measuring sexual behaviour: Methodological challenges in survey research" *Sexually Transmitted Infections*, 77:84–92.

Gates, G. and J. Ost (2004) *The Gay and Lesbian Atlas*, The Urban Institute Press, Washington, D.C.

Gribble, J., H. Miller, S. Rogers and C. Turner (1999) "Interview mode and measurement of sexual behaviors: Methodological issues" *Journal of Sex Research*, 36:16–24.

Grierson, J., M. Pitts, M. Whyte, S. Misson, A. Hughes, P. Saxton and M. Thomas (2004) "Living with HIV in New Zealand: Balancing health and quality of life" *New Zealand Medical Journal*, 117, www.nzma.org.nz/journal/117-1200/1011/content.pdf.

Groves, R., R. Cialdini and M. Couper (1992) "Understanding the decision to participate in a survey" *Public Opinion Quarterly*, 56:475–495.

Grulich, A., R. de Visser, A. Smith, C. Rissel and J. Richters (2003) "Sex in Australia: Homosexual experience and recent homosexual encounters" *Australian and New Zealand Journal of Public Health*, 27:155–163.

Harry, J. (1986) "Sampling gay men" *Journal of Sex Research*, 22:21–34.

Henrickson, M., S. Neville, C. Jordan and S. Donaghey (in press) "Lavender Islands: The New Zealand study" *Journal of Homosexuality*.

Hyman, P. (2003) "Lesbians and gay men flirting with/disengaging from vital statistics: Same sex relationships and the New Zealand census 1971/2001" *Hecate*, 29:248–260.

Johnson, A. and A. Copas (1997) "Assessing participation bias" in J. Bancroft (ed.) *Researching Sexual Behavior*, Indiana University Press, Bloomington, IN.

Johnson, A., C. Mercer, B. Erends, A. Copas, S. McManus, K. Wellings, K. Fenton, C. Korovessis, W. Macdowall, K. Nanchahal, S. Purdon and J. Field (2001) "Sexual behaviour in Britain: Partnerships, practices, and HIV risk behaviours" *Lancet*, 358:1835–42.

Kippax, S., J. Crawford, P. Rodden and K. Benton (1994) *Report on Project Male-Call,* Australian Government Publishing Service, Canberra.

Laumann, E., J. Gagnon, R. Michael and S. Michaels (1994) *The Social Organization of Sexuality: Sexual Practices in the United States*, University of Chicago Press, Chicago.

Laumann, E., S. Ellingson, J. Mahay, A. Paik and Y. Youm (2004) *The Sexual Organization of the City*, University of Chicago Press, Chicago.

McLean, C. and W. O'Connor (2003) *Sexual Orientation Research Phase 2: The Future of LGBT Research – Perspectives of Community Organisations*, Scottish Executive, Edinburgh.

McManus, S. (2003) *Sexual Orientation Research Phase 1: A Review of Methodological Approaches*, Scottish Executive, Edinburgh.

Meyer, I. (2001) "Why lesbian, gay, bisexual, and transgender public health?" *American Journal of Public Health*, 91:856–859.

Mills, T., R. Stall, L. Pollack, J. Paul, D. Binson, J. Canchola and J. Catania (2001) "Health-related characteristics of men who have sex with men: A comparison of those living in "gay ghettos" with those living elsewhere" *American Journal of Public Health*, 91:980–983.

Ministry of Health (2004) *Health Behaviours Survey: Sexual and Reproductive Health Objectives Document (Draft)*, Public Health Intelligence, Wellington.

New Zealand AIDS Foundation (1996) *Male Call/Waea Mai, Tane Ma: Recruitment Campaign Evaluation Report*, New Zealand AIDS Foundation, Auckland.

Office for National Statistics (2004) *Census 2001: CD Supplement to the National Report for England and Wales*, [CD ROM], Office for National Statistics, Newport, UK.

Paul, C., N. Dickson, P. Davis, R. Lay-Yee, J. Chetwynd and N. McMillan (1995) "Heterosexual behaviour and HIV risk in New Zealand: Data from a national study" *Australian Journal of Public Health*, 19:13–18.

Phua, V.C. and G. Kaufman (1999) "Using the census to profile same-sex cohabitation: A research note" *Population Research and Policy Review*, 18:373–386.

Plumb, M. (2001) "Undercounts and overstatements: Will the IOM report on lesbian health improve research?" *American Journal of Public Health*, 91:873–875.

Prestage, G. (2002) *Investigating Sexuality: A Personal Review of Homosexual Behaviour, Identities and Subcultures in Social Research*, doctoral dissertation, University of New South Wales, Australia.

Rogers, S. and C. Turner (1991) "Male–male sexual contact in the U.S.A.: Findings from five sample surveys, 1970–1990" *Journal of Sex Research*, 28:491–519.

Ross, M., R. Tikkanen and S. Månsson (2000) "Differences between internet samples and conventional samples of men who have sex with men: Implications for research and HIV interventions" *Social Science & Medicine*, 51:749–758.

Sandfort, T. (1997) "Sampling male homosexuality" in J. Bancroft (ed.) *Researching Sexual Behavior*, Indiana University Press, Bloomington, IN.

Sandfort, T. (1998) "Homosexual and bisexual behaviour in European countries" in M. Hubert, N. Bajos and T. Sandfort (eds.) *Sexual Behaviour and HIV/AIDS in Europe: Comparisons of National Surveys*, UCL Press, London.

Saxton, P., N. Dickson and A. Hughes (2004) *GAPSS 2004: Findings From the Gay Auckland Periodic Sex Survey*, New Zealand AIDS Foundation, Auckland.

Saxton, P. and A. Hughes (2003) *Submission to Statistics New Zealand on 2006 Census of Population and Dwellings: Preliminary Views on Content*, New Zealand AIDS Foundation, Auckland.

Saxton, P., A. Hughes, H. Worth, A. Reid, E. Robinson and C. Aspin (1997) *Male Call/ Waea Mai, Tane Ma Report Five: Sexual Identity*, New Zealand AIDS Foundation, Auckland.

Saxton, P., H. Worth, A. Hughes, A. Reid, E. Robinson, R. Segedin and C. Aspin (1998) *Male Call/Waea Mai, Tane Ma Report Seven: Gay Community Involvement*, New Zealand AIDS Foundation, Auckland.

Schneider, R. (2000) "The people gay and the ten percent debate" *The Gay & Lesbian Review*, 7(Spring): 4; 61–62.

Sell, R. and J. Becker (2001) "Sexual orientation data collection and progress toward healthy people 2010" *American Journal of Public Health*, 91:876–882.

Sell, R., J. Wells and D. Wypij (1995) "The prevalence of homosexual behavior and attraction in the Unites States, the United Kingdom and France: Results of national population-based samples" *Archives of Sexual Behavior*, 24:233–248.

Smith, D. and G. Gates (2001) *Gay and Lesbian Families in the United States: Same-Sex Unmarried Partner Households*, Human Rights Campaign, Washington, D.C.

Smith, A., C. Rissel, J. Richters, A. Grulich and R. de Visser (2003) "Sex in Australia: Sexual identity, sexual attraction and sexual experience among a representative sample of adults" *Australian and New Zealand Journal of Public Health*, 27:138–145.

Statistics Canada (2002) *Profile of Canadian Families and Households: Diversification continues*, Statistics Canada, http://www12.statcan.ca/english/census01/products/analytic/companion/fam/pdf/96F0030XIE2001003.pdf [accessed 30/7/04].

Statistics Canada (2004) "Canadian Community Health Survey" *The Daily*, June 15.

Statistics New Zealand (2002) *A Report on the Post-Enumeration Survey 2001*, Statistics New Zealand, Wellington.

Statistics New Zealand (2003a) *2006 Census of Population and Dwellings: Preliminary Views on Content*, Statistics New Zealand, Wellington.

Statistics New Zealand (2003b) *Sexual Orientation Focus Group Research: A Qualitative Study*, UMR Research and Statistics New Zealand, Wellington.

Statistics New Zealand (2004) *Media Release 13 October: On-Line Option for 2006 Census*, Statistics New Zealand, www.stats.govt.nz/census/2006-census.htm [accessed 7/3/05].

Sudman, S. (1985) "Efficient screening methods for the sampling of geographically clustered special populations" *Journal of Marketing Research*, 22:20–29.

Sudman, S., M. Sirken. and C. Cowan (1988) "Sampling rare and elusive populations" *Science*, 240:991–996.

Turcotte, P., V. Renaud and R. Cunningham (2003) "Same-sex relationships and sexual orientation in Canada: Data, concepts and methodological issues" paper presented at the annual meetings of the Population Association of America, Minneapolis, 1–3 May.

Wadsworth, J., M. Hickman, A. Johnson, K. Wellings and J. Field (1996) "Geographic variation in sexual behaviour in Britain: Implications for sexually transmitted disease epidemiology and sexual health promotion" AIDS, 10:193–199.

Wellings, K., J. Field, A. Johnson and J. Wadsworth (1994) *Sexual Behaviour in Britain: The National Survey of Sexual Attitudes and Lifestyles*, Penguin, London.

Widmer, E., J. Treas and R. Newcomb (1998) "Attitudes toward nonmarital sex in 24 countries" *Journal of Sex Research*, 35:349–358.

Worth, H., P. Saxton, A. Hughes, A. Reid and R. Segedin (1997) *Male Call/Waea Mai, Tane Ma Report One: Methodology and Demographic Characteristics*, New Zealand AIDS Foundation, Auckland.