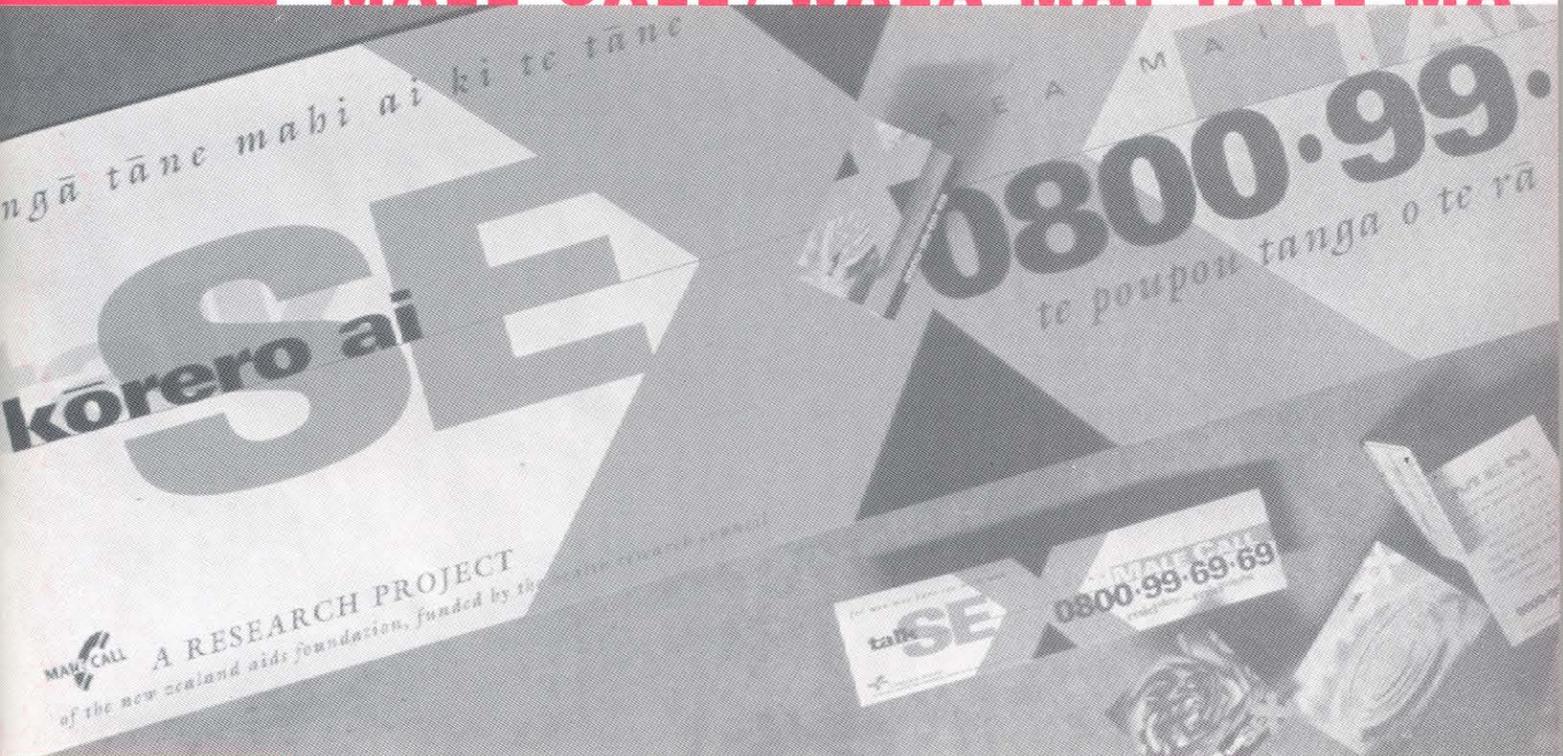


MALE CALL / WAEA MAI TANE MA



*A study of New Zealand
men who have sex with men*

**Report ten:
sexually transmitted diseases
and hepatitis**

*A research project of the
New Zealand AIDS Foundation
funded by the Health Research
Council of New Zealand.*

MALE CALL

Waea Mai, Tane Ma

<p>Report Ten Sexually Transmitted Diseases and Hepatitis</p>

Peter Saxton
Tony Hughes
Rosemary Segedin
Elizabeth Robinson

Male Call/Waea Mai, Tane Ma is a research project of the New Zealand AIDS Foundation. Correspondence about the study should be sent to the Research Director, and copies of this or any other report from this series may be obtained by writing to:

Male Call/Waea Mai, Tane Ma
New Zealand AIDS Foundation
PO Box 6663
Wellesley Street
Auckland

Ph: (09) 303 3124
Fax: (09) 309 3149
Email: nzaf@iconz.co.nz

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Male Call/Waea Mai, Tane Ma Report Series:

- Report 1: Methodology and Demographic Characteristics*
- Report 2: Men in Relationships with Men*
- Report 3: Maori Men who have Sex with Men*
- Report 4: Casual Sex between Men*
- Report 5: Sexual Identity*
- Report 6: Regions*
- Report 7: Gay Community Involvement*
- Report 8: Men who have Sex with Men and Women*
- Report 9: HIV Testing and Sero-status*
- Report 10: Sexually Transmitted Diseases and Hepatitis*

Report 10: Sexually Transmitted Diseases and Hepatitis is the last in the Male Call/Waea Mai, Tane Ma report series. Remaining data of interest will be submitted for publication as papers.

Investigators

Heather Worth ^a
Tony Hughes
Clive Aspin ^b

Analysis Team

Alison Reid
Peter Saxton

Steering Group

Jane Chetwynd
Charlotte Paul
Andrew Sporle

Statistical Analysis

Elizabeth Robinson
Rosemary Segedin

Data Collection and Management

AGB McNair

Recruitment Team

Russell Holmes
Bunny Thompson
Adrian Knowles
Brendon Hickey

^a Now at the Institute for Research on Gender, University of Auckland.

^b Now at the Australian Research Centre in Sex, Health and Society at La Trobe University.

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Sexually Transmitted Diseases and Hepatitis

Peter Saxton, Tony Hughes, Rosemary Segedin, Elizabeth Robinson

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Overview

Male Call/Waea Mai, Tane Ma was the first nationwide survey of men who have sex with men (msm) in New Zealand. The project was undertaken because no large scale baseline data on this population was available. While a number of other groups are affected by HIV in this country, the virus is most significantly present amongst msm, who account for over 80% of those with AIDS. As there is still no vaccine or cure for HIV infection, behaviour change remains the only strategy available to manage the HIV epidemic. In order to develop effective and efficient HIV prevention programmes, it was recognised that there was an urgent need for up to date, accurate data on the socio-sexual characteristics of men who have sex with men. The aims of the survey were to:

- describe men who have sex with men's HIV and AIDS knowledge and their sexual practices with a special focus on the adoption of safer strategies;
- examine the ways in which HIV and AIDS knowledge and safe sex practice are related to a number of important demographic and contextual variables;
- provide baseline data on the sexual behaviour of men who have sex with men which can be used to assist in the planning and development of HIV prevention programmes; and
- to develop a core set of baseline questions which could be used in future surveys of men who have sex with men.

The method used was a nationwide telephone survey which was conducted over a six week period between May and June 1996. All men who had sex with another man in the previous five years were eligible to participate. Respondents called an 0800 toll-free phone number and answered a questionnaire, which took approximately forty minutes to complete. Respondents were able to terminate the call at any time. This method ensured that participants could remain anonymous, and encouraged a wide range of msm to participate. The questionnaire was developed by modifying and expanding the original Australian Project Male Call instrument, which was first used in 1992.

The questionnaire was completed in full by 1852 men. Male Call/Waea Mai, Tane Ma attracted a broad cross section of msm through a successful recruitment campaign that spanned both mainstream and gay media.

Section I: Introduction

Over the last fifteen years HIV/AIDS has dominated the territory where health and sexuality intersect for gay and bisexual men. Limiting the spread of HIV remains the central priority for those working in sexual health promotion amongst men who have sex with men (msm) because infection is permanent and the resulting syndrome is usually fatal.

Since the HIV/AIDS epidemic began in New Zealand, major changes have occurred in the repertoire of sexual behaviours engaged in by msm. AIDS organisations worldwide have encouraged a shift away from unprotected anal sex, and towards practices which are either safer in terms of HIV transmission (protected anal sex, oral sex) or which carry no HIV risk (mutual masturbation and other tactile practices). It is clear that although these activities are safe for HIV transmission they can still pass on other sexually transmissible diseases. Such risks are usually perceived to be less problematic by gay and bisexual men themselves because in many cases these infections are treatable.

Little attention has been given to the possibility that some STDs could increase in frequency if HIV/AIDS safe sex guidelines are followed correctly. Also, many of these infections are the cause of considerable physical and emotional discomfort in their own right, and no data on their burden amongst msm in New Zealand has been reported on a large scale to date. Specific interventions that may reduce the incidence of several of these STDs do exist, and transmission can be reduced if awareness is raised and the sexually active msm population is encouraged to seek treatment or vaccination.

Finally, recent research has demonstrated that a number of STDs actually facilitate HIV transmission. STDs can make an individual who is HIV negative more susceptible to HIV infection, and may also increase the likelihood of positive msm passing HIV on to others. For those involved in HIV prevention this means that certain STDs must now be considered when designing future HIV prevention strategies.

These four factors have framed the rationale and design of this report. Specifically, the aims of this report are to:

- report the basic frequencies of self reported STD and hepatitis amongst the sample;
- test for and discuss associations between a history of STD and demographic, social milieu, and behavioural variables;
- test for and discuss associations between a history of hepatitis and demographic, social milieu, and behavioural variables;
- test for and discuss associations between going for a sexual health checkup or treatment and demographic, social milieu, and behavioural variables.

Section II: Basic Frequencies of Self-Reported History of Sexually Transmitted Diseases and Hepatitis

This Section summarises the various methods of gathering data on sexually transmitted infections, together with the relevant information that is available in New Zealand. The basic Male Call/Waea Mai, Tane Ma findings on STDs are then presented alongside data from previous New Zealand research and other large-scale surveys from overseas.

The surveillance and reporting of sexually transmitted diseases and hepatitis

The number of diagnosed HIV infections will always underestimate the actual number of people infected, because for example not all infected individuals will have been tested. Similarly, data on STDs must be interpreted with caution and in light of the many factors that can influence the reported figures. Most STD data can be readily categorised by method of collection (clinic-based, cohort-based, population-based) and further by potential biases ("sample" bias, "information" bias).

Clinic-based data, such as specific studies of clinic attenders or routine collection of diagnoses, gives us information on people who have attended a sexual health clinic for a general sexual health check or for treatment of STD symptoms. Benefits of this data are that it is usually of high quality and relates to people who have self-identified as being at risk. Many infections are asymptomatic or are difficult to diagnose, and this data may identify a greater amount of exposures than would have otherwise been evident, especially if obtained through unlinked anonymous tests on blood samples. However, while this type of data can tell us much about those who have visited an STD clinic over a given time period, it is a biased sample and can tell us less about the incidence in the

entire population (which includes people who do not go to a clinic). Also it cannot account for people who have been exposed but show no signs of infection, or who have had symptoms that have disappeared without requiring treatment, since such individuals may not have presented at a clinic. Data sent routinely by sentinel sites such as sexual health clinics in public hospitals to regional or national health agencies (such as the Ministry of Health) can also give an indication of the number of new infections (incidence) diagnosed at the sentinel clinics, and can be used to track changes over time. However, these are also likely to underestimate the incidence in the total population and only certain STDs are required to be reported.

Cohort studies collect information on a group of individuals who are usually selected on the basis of some pre-determined criteria, such as belonging to a particular population of interest (e.g. community attached gay men). Participants are interviewed at the initial time of recruitment, and then examined again at various points over time. These studies can yield rich data on risk factors since participants who report new occurrences of an STD can be compared to those who were not infected, and the set of behaviours distinguishing them can then be identified. Depending on how participants were selected (e.g. through representative sampling or not) and the response rate, findings on risk factors may or may not be generalisable to larger populations. It may also be possible to determine STD incidence if the cohort is followed up prospectively.

A third source of information on STDs are general population and other cross-sectional surveys. These differ from cohort studies since data on respondents is collected as a snapshot rather than over time. Preferably, these surveys employ random sampling so that findings are generalisable to the wider population, although for some populations (such as msm) this is not always possible and other methods designed to attract a broad cross-section of respondents are sometimes used. However, there are two main drawbacks of this type of data. First, this method relies on self-reported information and as pointed out above, many people might not be aware that they have been exposed, or they may under-report an infection if it is perceived to be especially stigmatised and/or if they feel uncomfortable about anonymity or confidentiality issues (see for example Reid 1999). Second, the data gleaned is retrospective as opposed to prospective and therefore it may be difficult to determine the temporal sequence of infection vis a vis reported behaviours. The costs involved with such large-scale studies, combined with the very personal nature of the questions, also mean that there is only a small amount of data of this type published internationally.

The Male Call/Waea Mai, Tane Ma survey did not use random sampling to attract its participants as many population surveys do. The reasons for this are related to the specific methodological problems inherent in social research on msm and HIV/AIDS, and include difficulties in identifying and selecting respondents as well as the unknown distribution of msm amongst the general population.¹ It is therefore possible that sampling biases exist in this dataset. However, lengthy efforts were made to minimise barriers to participation in the survey and to encourage truthful and accurate responses (these issues are outlined in *Male Call/Waea Mai, Tane Ma Report No.1: Methodology and Demographic Characteristics* in more detail). The approach employed was also considered to be the best option then available, as underlined by the fact that the original Project Male Call survey, on which this survey was based, was conducted for a second time in Australia in 1996 (Crawford et al. 1998). Because of the high publicity generated by the recruitment campaign, the broad range of demographic characteristics illustrated by the respondents, and other data yet to be reported, we have confidence in the general applicability of our findings to sexually active msm in New Zealand.

New Zealand data on sexually transmitted diseases and hepatitis

In New Zealand, in-depth information on STDs and hepatitis infections is limited (Reid 1997). With one exception (the NZ Partner Relations Survey), most data relates only to specific populations (cohort and clinic studies) or is reported without account of risk factors (sentinel sexual health site data). The majority of information on STDs and hepatitis in New Zealand comes from the following sources:

- the NZ Partner Relations Survey (Davis and Lay-Yee 1996; Paul et al. 1995), a nationwide general population survey focussing on the sexual behaviour of 18-54 year olds;
- sentinel site incidence data from public sexual health clinics, published in the *New Zealand Public Health Report* and in the *Progress on Health Outcome Targets* (Ministry of Health 1998);
- unlinked anonymous seroprevalence study of public sexual health clinic data from August 1991 to August 1992 (Connor et al. 1997; Perkins et al. 1996; Dickson et al. 1993);
- the Dunedin Multidisciplinary Health and Development Study birth cohort interviewed at age 18 and 21 which included questions on sexual practice and infection (Eberhart-Phillips et al. 1998; Dickson et al. 1996; Dickson, Paul and Herbison 1993);

¹ By the "unknown distribution of msm" we mean that the geographic distribution of msm is difficult to establish scientifically (e.g. through a census). This means that sampling strategies for msm have to be developed with less certainty compared to many other population groups.

- data from clients seeking HIV testing at the New Zealand AIDS Foundation's Burnett Centre (Chetwynd, Chambers and Hughes 1992a);
- a variety of other studies which include data on STDs or hepatitis (e.g. Kemp and MacDonald 1999; Kemp et al. 1998; Chetwynd et al. 1995; Gane 1998; Blakely, Salmond and Tobias 1998).

Only two of these studies have directly addressed rates of sexually transmitted diseases amongst msm. Davis and Lay-Yee (1996) examined the behavioural determinants of self-reported incidents of sexually transmitted infection, and, despite the small sample of msm in the survey (2%), found that history of same-gender sex was the strongest predictor for men alongside five or more lifetime sex partners.² Over half (54.0%) of the msm in their sample reported ever having an STD, compared to a total male rate of 10.4% (Peter Davis and Roy Lay-Yee, personal communication). In the Burnett Centre study (Chetwynd, Chambers and Hughes 1992a), 47.7% of the gay and bisexual male sample reported a history of STD.³ However, this figure was similar to that reported by the rest of the (heterosexual) sample, and is probably more reflective of the rate amongst sexual health clinic attenders (due to previous risk behaviour), as opposed to the general sexually active population.

Male Call/Waea Mai, Tane Ma data on history of disease

Respondents to Male Call/Waea Mai, Tane Ma were asked two questions relating to sexually transmitted diseases:

- a) *"I am going to read out a number of sexually transmitted diseases and I'd like you to tell me whether or not you have ever had each one?"* and;
- b) *"Have you been for a checkup or treatment in the last 12 months for any sexually transmitted diseases?"*

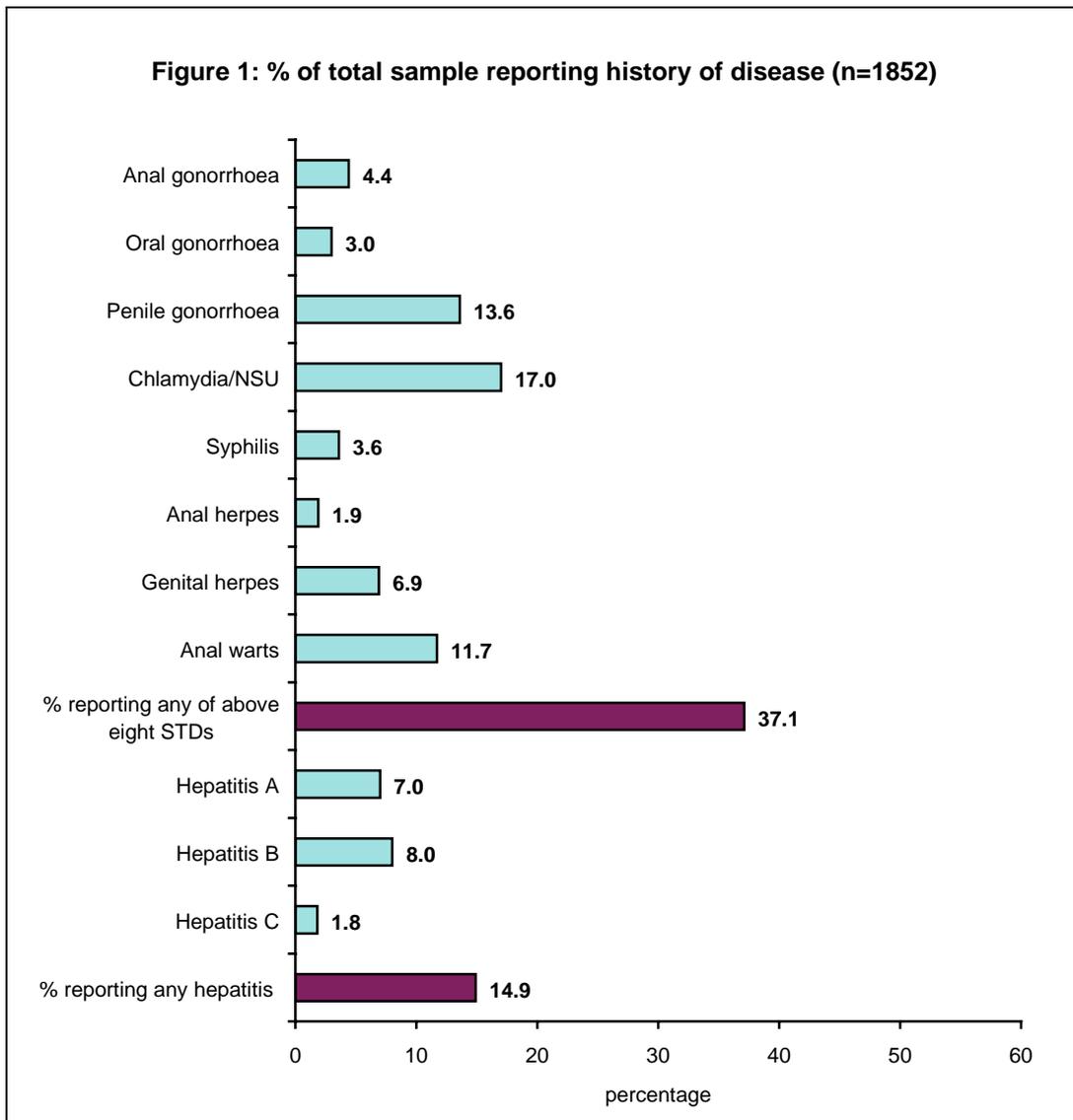
A list of eleven conditions were then read out to respondents, and all respondents were asked the second question regardless of whether they reported a history of infection.⁴ The results for the first question are summarised below:⁵

² Both predictors gave an adjusted odds ratio of 3.64 for the male sample. See Davis and Lay-Yee (1996:229).

³ Figure derived from Chetwynd, Chambers and Hughes (1992a), Table 1, p.445 (see Section V).

⁴ Separate questions were read out relating to HIV infection and testing, and are not part of this analysis. See *Male Call/Waea Mai, Tane Ma Report No.9: HIV Testing and Sero-status* for an analysis of this data.

⁵ Results relating to the second question on checkups or treatment for STDs are outlined in Section V.



As Figure 1 illustrates, the most common STD was chlamydia/NSU, with around one in six respondents (17.0%) reporting a history of this infection.⁶ Slightly fewer reported a history of penile gonorrhoea (13.6%), while just over one in ten (11.7%) said that they had a history of anal warts. All of the other infections were reported by fewer than 10% of the sample, although some have a very low prevalence in the general male population and their rate amongst this sample may therefore still be of significance.

While knowledge of the biological characteristics and mode of transmission of HIV is high amongst NZ msm, less information has been disseminated about other sexually transmitted infections. In order to understand the concepts introduced in this report, we

⁶ It is likely that most of the non-gonococcal urethritis reported is NSU rather than chlamydia specifically, since the latter is unusual in msm unless they have also had sex with women (or their male partners have).

have presented some of the key features of the infections included in the survey, summarised in Figure 2 below.

Figure 2: Type, main manifestations and mode of transmission of STDs and hepatitis

Infection	Type (and abbrev.)	Most common manifestation	Mode of transmission between homosexual men
Gonorrhoea (penile, oral, anal)	Bacterial	Discharge	Direct sexual contact with the mucosal surfaces or secretions from the site of infection from an infected person: urethra (penis); pharynx (throat); anus. In homosexual men, penile gonorrhoea is acquired through unprotected insertive anal or oral sex; oral gonorrhoea through unprotected receptive oral sex, and anal gonorrhoea through unprotected receptive anal sex (Hook and Handsfield 1999).
Chlamydia/ NSU	Bacterial	Discharge	Similar to Gonorrhoea
Syphilis	Bacterial	Ulceration	Direct sexual contact with moist mucosal or cutaneous lesions (sores/ulcers) from an individual with active infection. In homosexual men lesions usually occur in the penile or anal area, although oral lesions are also possible.
Herpes (genital, anal)	Viral (HSV)	Ulceration	Close contact (direct sexual or skin contact) with an infected individual who is shedding the virus through moist mucosal surfaces near genital or anal site.
Anal warts	Viral (HPV)	Warts	Skin-to-skin contact with infected area.
Hepatitis A	Viral (HAV)	Liver damage	Almost always due to faeco-oral contact. Sexual transmission is therefore facilitated by oral-anal sex, digital-anal sex, and unprotected insertive anal intercourse.
Hepatitis B	Viral (HBV)	Liver damage	Primarily present in blood, therefore sexual transmission is usually limited to unprotected anal intercourse. Other body fluid exposure can be implicated.
Hepatitis C	Viral (HCV)	Liver damage	HCV is not transmitted efficiently through sexual contact. Research evidence points to a very limited role for the sexual transmission of HCV.

NB. Figure 2 provides generalised notes only relating to the transmission of infection amongst msm. Chart based on information in Holmes et al. 1999, Reid 1999 and Brook 1998.

Perhaps the most basic biological difference between the above infections is whether they are caused by viral or bacterial pathogens. Bacterial infections can usually be cured with appropriate treatments, and the period of infectiousness is usually time limited. Most of the viral infections cannot be cured once acquired, although if managed properly they may only be infectious at certain times. Hepatitis A virus and hepatitis B virus are the only infections listed above for which a commercial vaccine currently exists. They are therefore preventable through medical intervention.

Without going into detail, it is also useful to point out that it is clear that there is not a one-to-one relationship between an infectious pathogen and the symptoms it causes (Figure 2). A variety of symptoms are common to msm who are infected, including urethral or rectal discharge (pus from penis or anus), genital or anal ulceration (sores on penis or around anus), genital or anal warts (warts on head, foreskin or shaft of penis or around anus), and painful defecation or urination. Urethritis for example (painful urination or discharge) may be caused by infection with gonorrhoea or chlamydia.

Grouping the infections

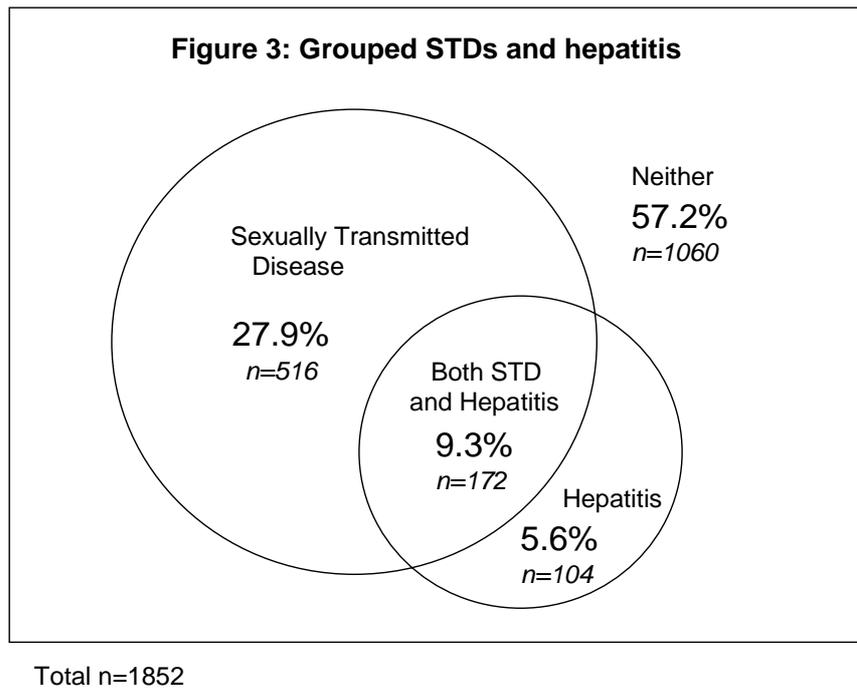
Apart from reporting the frequencies of each individual infection, we also decided it was valuable to see what proportion of our sample reported a history of any STD. Grouping the data has two basic benefits: first, it provides a simple measure of the overall health burden placed by STDs on msm; second, it has been used when reporting the results of other similar studies and therefore provides the easiest method of comparison.

In grouping the data, diseases were separated into those which are almost certainly transmitted sexually (the first eight diseases in Figure 1, which are subsequently described as Sexually Transmitted Diseases, or STDs), and those for which there is some ambiguity as to the likely mode of transmission (the hepatitis virus infections A, B and C). Although these latter viruses are sexually *transmissible*, other non-sexual risk factors exist (see Section IV).

It was decided that this distinction was the most important because if the findings from further statistical analyses are to be of any use, this would require that there was a clear logic to the chosen groupings. All of the first set of infections are contracted from sexual behaviour, which means that by addressing the sexual behaviour of msm demonstrating the particular "predictor" characteristics, reductions in incidence are possible. It is less obvious what to do with analyses which identify the predictors of infections that are potentially transmitted non-sexually.

Nevertheless, Brandt and Jones (1999) have pointed out that the category of sexually transmitted infections is still a problematic one. It is not always completely clear which infections belong in the category of STD, nor is it obvious which of these infections have sufficient in common to be considered a meaningful combination (e.g. STDs can be grouped by biological characteristics such as bacterial or viral infections, yet not all bacterial infections share common modes of transmission). Some further information about how we chose to group the infections is provided in Section III.

Grouping the data as above reveals that 37.1% of the sample reported a history of STD, with 14.9% reporting a history of hepatitis (Figure 1). However there was significant overlap, as Figure 3 illustrates, with two-thirds of those reporting hepatitis also reporting an STD. In total 42.8% of the sample reported a history of at least one type of STD or hepatitis.



It is difficult to draw robust conclusions about these lifetime occurrence figures, since Male Call/Waea Mai, Tane Ma is the first in-depth large scale research on New Zealand msm,. The net figure of 37.1% for lifetime occurrence of an STD is lower than the figure of 54.0% from Davis and Lay-Yee's (1996) small sample of msm, although the same survey found a rate of just 10.4% for the total male sample. While it is possible that there are differences in sexual health screening practices - thus increasing the likelihood that STDs will be detected - these Male Call/Waea Mai, Tane Ma results support previous findings indicating that msm in New Zealand are disproportionately affected by STDs compared to the heterosexual male population.

Comparison with overseas findings

Despite the merits of gaining information on STDs amongst the broader population of msm (ie. other than those who visit sexual health clinics), data on STDs other than HIV is

absent from the majority of large-scale surveys even outside New Zealand.⁷ For example, neither of the two other nationally representative surveys similar to the NZ Partner Relations Survey (Laumann et al. 1994 in the United States; Johnson et al. 1994 in the United Kingdom) provides information specifically addressing the incidence of STD amongst their msm sub-samples. However, there are a small number of other studies which allow for interesting comparisons, and these are outlined below and in Figure 4.

Hubert, Bajos and Sandfort (1998) compared sexuality-related findings from sixteen cross-sectional surveys of eleven European countries conducted between 1989-93. Three countries reported lifetime STD data for msm, recording proportions of 14.3%, 25.0% and 34.6% for Finland, the Netherlands and Norway respectively (Warszawski 1998).⁸ In Australia, both the SMASH cohort study (Prestage et al. 1995a:24) and the Project Male Call survey (Crawford et al. 1998:180-89) report data on STD and hepatitis infections. SMASH recorded the highest occurrence of infections, with around 70% of cohort participants reporting a history of STD and a third stating they have had hepatitis A, B or C.⁹ Although the question about sexually transmitted infections differed slightly between Male Call Australia and Male Call/Waea Mai, Tane Ma, again the similarity in findings is striking.¹⁰ The net figure for history of STD (not including hepatitis) was found to be 37.4%, with 14.5% of their sample reporting a history of hepatitis A, B or C.¹¹

Figure 4: Lifetime rates of STD amongst msm, findings from international surveys							
Reported occurrence	Finland	Netherlands	Norway	NZ Partner Relations	SMASH Aus	Male Call Aus '96	Male Call NZ
Lifetime STD	14.3%	25.0%	34.6%	54.0% ^o	69.3%	37.4%	37.1%
Lifetime Hepatitis	n/a	n/a	n/a	n/a	33.3%	14.5%	14.9%

⁷ See Ku et al. (1997) for a discussion of difficulties concerning surveys on STDs.

⁸ In Finland, "self-reported STD" included a history of gonorrhoea, chlamydia, syphilis, genital warts and genital herpes, while for the other two countries it was not explicitly defined. Any lifetime homosexual experience was used to define the male homosexual/bisexual sample in each case. No difference was found between the reported STD history rates between the msm and non-msm male samples in the Finnish study, although statistically significant differences were found in the Netherlands (Relative Risk=3.8) and in Norway (Relative Risk=1.7) (Warszawski 1998).

⁹ Data reported here is from a report focussing on HIV sero-status (Prestage et al. 1995a). The sample has a relatively high proportion of HIV positive men (21.8%) and also consists mainly of gay community attached msm who live in Sydney. These factors are consequently likely to bias these STD results upwards. Infections inquired about were: gonorrhoea, syphilis, hepatitis A, B, C, herpes, and "other". An analysis of STD based on sexual identity was conducted on the cohort at a later stage, with a larger sample (n=1037) and found a slightly reduced lifetime STD occurrence (66.8%) (Prestage et al. 1995b:51).

¹⁰ In Male Call Australia 1996, the question asked about "infections" rather than "sexually transmitted infections", inquired when the respondent last had the infection, and organised the categories of infections in a slightly different manner (see Figure 5).

¹¹ The similarity of these figures to that of Male Call/Waea Mai, Tane Ma was not tested statistically because of a combination of subtle differences in the STD questions and different recruitment techniques between the two surveys (e.g. the New Zealand survey was advertised prominently on national television news which was not done for either of the Australian surveys). Percentages in Figures 4 and 5 used n=3039 rather than n=3026 as a base to be consistent with the calculation of Male Call/Waea Mai, Tane Ma rates.

n=	753 ^a	359 ^a	1636 ^a	1051 ^a	903	3039	1852
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^a Total sexually active male sample size aged 18-49 (18-54 in the case of NZ Partner Relations Survey). Proportions of male sample reporting same-sex experience ever are 4.9%, 13.4%, and 5.2% (Sandfort 1998:83) and 2.0% (Davis and Lay-Yee 1996; Paul et al. 1995) respectively.

^b Peter Davis and Roy Lay-Yee, personal communication.

As Figure 5 illustrates, detailed data on specific diseases is also available from the 1996 Project Male Call survey in Australia. This shows similar figures for lifetime occurrence of all infections to those found in the New Zealand study.¹²

Figure 5: Lifetime rates of disease, Male Call Australia 1996 and Male Call New Zealand 1996		
STD	Male Call Australia 1996 % (n=3039)	Male Call New Zealand % (n=1852)
Anal gonorrhoea	4.5	4.4
Penile gonorrhoea	12.0	13.6
Oral gonorrhoea	3.7	3.0
Syphilis	4.1	3.6
Non-Specific Urethritis ^a	18.9	17.0
Genital Herpes	5.9	6.9
Anal Herpes	-	1.9
Anal warts ^b	-	11.7
Anal/Genital warts ^c	13.0	-
Other STD ^c	5.4	-
Hepatitis A	8.2	7.0
Hepatitis B	7.5	8.0
Hepatitis C	2.1	1.8

^a Question asked as Chlamydia/NSU in MC NZ

^b Question asked in MC NZ

^c Question asked in MC AUS '96

A further comparison of msm STD diagnoses between these two countries would be required to confirm these results. However, because of differences in reporting requirements and information collection protocols between New Zealand and Australia, and even between the various Australian States, such a comparison would be difficult in practice.

Summary of basic frequency data in Male Call/Waea Mai, Tane Ma

It is appropriate to discuss in brief some possible influences and limitations on the Male Call/Waea Mai, Tane Ma figures presented here. Firstly, the cross-sectional design and reliance on self-reporting of STD infection must be borne in mind at all times. This could mean that a degree of under-reporting occurred in the sample and this would particularly bias against those infections which are more difficult to diagnose. Some infections, for example herpes simplex virus (HSV) or human papilloma virus (HPV) may remain

¹² The original Project Male Call in Australia (Kippax et al. 1994) asked about a much smaller range of infections and data from this survey is therefore not included here.

asymptomatic and exposure can only then be determined through clinical tests. Misclassification of diseases can also occur from incorrect recall by respondents but also through inaccurate diagnosis in the absence of diagnostic tests (this is most likely to occur in the case of urethritis (gonorrhoea versus NGU)). Symptoms linked with diseases such as gonorrhoea may disappear after a few weeks even without treatment, and may not have been recognised by the respondent. As mentioned earlier, these are unavoidable problems in surveys of this kind.

Another issue related to the research design is that an unknown proportion of these infections may have happened some time ago. Certain infections may have occurred at a time when the patterns of sexual behaviour in the msm population were quite different to those today, and when awareness about means of transmission and access to sexual health services was minimal. Therefore it is not appropriate to use lifetime data to gauge the current incidence rate of each infection, especially if it was the case that a large proportion of the sample had been infected with a particular pathogen during a short outbreak (e.g. as in the case of hepatitis A amongst msm in various cities). Nevertheless, the persistence of viral as opposed to bacterial infections in a population (due largely to the ability of viruses to remain infectious for longer periods) is still of significance. The inclusion of temporal data for STDs (e.g. infections in the last year) would have allowed a rough analysis of prior or post infection with an STD or hepatitis in relation to HIV. This information would also have been of use in assessing the (sexual) health issues confronting positive msm, though of course it would not be as accurate as cohort data designed for that specific purpose.

Thirdly, while it should have been obvious to respondents from the context of the questions that we were concerned about infections acquired sexually through male partners, 71.1% of the sample reported that they had had sex with a woman at least once in their life (see *Male Call/Waea Mai, Tane Ma Report No. 8: Men who have sex with men and women*), and it is possible that a minority of the reported infections are not a result of male-male sex.

It is also important to comment on the inclusion of hepatitis A, B and C in this report. While the question specifically asked respondents about sexually transmitted diseases, it is possible that some may have reported hepatitis infections that were acquired through

other means.¹³ While there is no way to be certain about the extent of such potential misreporting, our analysis of the grouped hepatitis diseases suggests that sexual transmission is probably responsible for a significant amount of infection (see Section IV).

It is difficult to estimate the impact of these issues on the STD rates reported in Male Call/Waea Mai, Tane Ma. However, it seems likely that any self-reporting effects should be consistent across all the cross-sectional surveys outlined earlier, and therefore each of the figures should be biased in broadly similar ways. In the absence of a scientific survey design which lends itself to direct international comparison, the similarity of the self-reported rates of the Male Call/Waea Mai, Tane Ma sample to those of Project Male Call Australia especially appears to be more than coincidental.

The findings presented here for history of STD argue that msm in New Zealand have an increased burden of the full range of sexually transmitted infections and not just HIV/AIDS. While there has been some limited data on msm collected in this country, this is the first large-scale research which corroborates earlier findings and which suggests that heightened confidence can be placed in them.

Section III: Associations with History of STD in the Male Call/Waea Mai, Tane Ma Sample

This section presents the results of statistical analyses designed to identify associations between certain demographic, social milieu, sexual behaviour and related variables and a reported history of STD in the Male Call/Waea Mai, Tane Ma dataset. A brief summary of factors relating to STD transmission is presented first, followed by some general points explaining how the analysis was conducted. The results of the analysis are then summarised, along with a more in-depth discussion of the independent associations of STD history found in this survey.

Predictors of the spread of STDs

An understanding of what influences the probability of spread of STDs within a population can be derived from mathematical epidemiological models. These incorporate a set of biological and behavioural parameters which determine the transmission of STDs in a given population, the effect of which is expressed as a "reproductive rate", or

¹³ In the case of infections such as hepatitis A, B and C that can be acquired through means other than sexual transmission, it may in fact be difficult to determine the likely source of infection, particularly if patients

R_0 (which is defined as the "average number of secondary cases generated by one primary case in a defined population of sexually active individuals" (Anderson 1999:25). A basic formulation of this rate is $R_0 = \beta Dc$, where β is the average probability of transmission per sexual contact, D is the average duration of infectiousness, and c is the average number of sexual partners per unit of time. Each of these three parameters is in turn influenced by a number of other component factors (Anderson 1999). The behaviours at the level of the individual will also reflect the risk of spread within a population.

Mathematical models of this sort are complemented by recent empirical evidence from scientific research. Population-based studies have already demonstrated that a history of male same-sex behaviour is itself an independent risk factor for STD acquisition (see previous section). Independent predictor variables commonly cited in large-scale studies on reported history of infection include gender, higher education, place of residence, age, ethnicity, marital/relationship status, number of partners, ever paid for sex, age of first sexual experience, and particular sexual practices (e.g. anal sex, oral sex) (see Warszawski 1998; Laumann et al. 1994; Davis and Lay-Yee 1996). Smaller-scale studies have also found variables such as drug use, prior history of STDs and HIV status, patterns of sexual mixing and multi-partner networks, and particular modalities of sexual practices (e.g. insertive/ receptive anal and oral sex) to be associated with the presence or history of sexually transmitted infections (see Aral and Holmes 1999 for a discussion of some of this research).

Both univariate and logistic regression analyses were used to identify whether a number of demographic, social milieu, and behavioural variables were associated with the dependent variable, which was set as "ever reported a history of STD". This did not include respondents who only reported a history of hepatitis infection, as an analysis of hepatitis is reported separately (see Section IV).

In setting the dependent variable in this way, we discarded a number of options which were considered too problematic. These alternatives were to group the infections by mode of transmission; to group the infections by type (ie. bacterial or viral); and to run a separate analysis for each infection. In the first case, difficulties arose over inconsistencies between the modes of transmission (eg. anogenital and oral secretions) and questions concerning individual sexual acts (oral sex would not transmit all the

acknowledge several risk factors.

infections covered under these modes), resulting in problematic outcomes. The second option was not appropriate for this survey since the questionnaire did not provide sufficient data on recent sexual networks that would be necessary if we wanted to explore the different risks posed by bacterial versus viral infections (in terms of duration of infectiousness; c.f. Laumann et al. 1994). Grouping together 'similar' diseases in either of these two ways also obscures inconsistencies in terms of the infectiousness of different pathogens (gonorrhoea for example appears more transmissible than chlamydia, see Brunham and Plummer 1990). The third option, while preserving the biological differences between the individual pathogens, was impractical given the small number of respondents reporting certain infections and the limitations of the survey instrument itself.

Within the constraints of the questionnaire, variables included in the two analyses were constructed from standard demographic characteristics, predictors that had been established in previous research, variables that were associated with the mathematical models described above, as well as a handful of variables hypothesised by the authors likely to have an effect on the acquisition of STDs. The following discussion lists these variables and highlights statistically significant associations.

Univariate associations

Chi-squared tests of association were used to determine whether particular variables were related to a reported history of STD. These included demographic (age group, ethnicity, income, education, under-class status, residence, been paid for sex), social milieu/ attitudinal (gay community attachment, physical and emotional attachment to anal sex, HIV-related knowledge), sexual behaviour (age of first sexual experience with a male, lifetime number of male and female partners, sites visited to look for male sexual partners, whether respondents had a casual and/or regular sexual partner in the previous six months, anal sex and condom use with casual and/or regular partners over this period), and other variables (HIV test status, injecting drug use status).

Several demographic variables were found to be related to STD history. Respondents who were older ($p < 0.0001$), were NZ European/Pakeha ($p = 0.0001$), had an income of over \$20,000 ($p < 0.0001$), had higher education ($p = 0.02$), or were either from Auckland, Wellington, or rural centres ($p < 0.0001$) were more likely to report a history of disease. It is interesting to note that there were no statistically significant differences in reported STD rate between respondents who had been paid for sex in the previous six months and those who had not. While sex work increases the likelihood of having sex with large

numbers of partners - an established risk factor for STD - this finding appears to concur with previous research into the sex industry in New Zealand which suggests a lower level of protective practices by clients compared to their (female) sex workers (Chetwynd and Plumridge 1994).

All of the social milieu/ attitudinal variables were related to STD history. Msm who were gay community attached ($p < 0.0001$), who stated that anal sex was the most physically satisfying ($p < 0.0001$) and emotionally satisfying ($p = 0.0006$) sexual practice, and who correctly answered questions relating to the HIV risks of sex between HIV positive men ($p = 0.05$) and oral sex ($p = 0.0005$) were more likely to report an STD than those not exhibiting these characteristics.

Reported history of STD increased with lifetime number of male ($p < 0.0001$) and female ($p = 0.01$) sexual partners, and with a younger age of first sexual experience with a male ($p < 0.0001$). For the more recent measures of sexual activity, respondents who had engaged in casual sex ($p < 0.0001$), casual anal sex ($p = 0.02$), who had a regular male partner ($p = 0.0007$), who had sex outside their regular relationship ($p = 0.0001$), or who had recently been to a gay sauna ($p < 0.0001$) or public toilet ($p < 0.0001$) to look for male sexual partners were more likely to report an STD.

HIV test status was also related to STD history, with respondents who had tested HIV positive most likely to report ever having an STD ($p < 0.0001$). This particular result is difficult to interpret, because of issues concerning temporal sequence (ie. whether the STDs may have facilitated HIV infection or whether STD history amongst positive respondents is a marker for HIV-related immunosuppression), past sexual behaviour which created the potential for acquisition of multiple infections, and because of the complexities of epidemiological synergy (see results of multivariate analysis following this). Given the importance of this issue we also tested each particular STD for association with HIV status. Figure 6 below illustrates in more detail these results.

Figure 6: % reporting a history of infection for each STD by HIV test status						
	Tested positive		Tested negative		Untested	
	<i>n</i> =55	%	<i>n</i> =1220	%	<i>n</i> =549	%
Anal gonorrhoea	12	21.8	58	4.8	10	1.8
Oral gonorrhoea	10	18.2	38	3.1	4	0.7
Penile gonorrhoea	25	45.5	175	14.3	49	8.9
Chlamydia/NSU	20	36.4	247	20.2	43	19.0
Syphilis	11	20.0	44	3.6	8	1.5
Anal herpes	8	14.5	25	2.0	3	0.5
Genital herpes	16	7.8	95	4.8	13	2.4
Anal warts	22	40.0	162	13.3	27	4.9

Each STD was found to have a statistically significant association with HIV test status ($p < 0.0001$ for all STDs), and it is clear that respondents who had tested HIV positive reported the highest rate of disease. By looking down the columns of Figure 6 we can see that proportionately more penile gonorrhoea (45.5%) and anal warts (40.0%) were reported by HIV positive respondents compared to chlamydia/NSU (36.4%), whereas the latter infection is the commonest reported by other respondents. Also, looking across the rows in Figure 6 can tell us what proportion of the total diagnoses of a given infection are from HIV positive respondents. For example, although only 3% of the total Male Call/Waea Mai, Tane Ma sample had tested HIV positive, positive respondents account for 15.0% of the total amount of anal gonorrhoea reported (12 out of 80).

Multiple STDs

From the responses given to the question on STDs, we are also able to calculate how many different infections were reported by participants in the survey over their lifetime. Due to the ambiguity surrounding the mode of infection for hepatitis infections, hepatitis A, B and C were not included in this analysis. As Figure 7 illustrates, the majority of respondents reported only one type of STD over their lifetime.

Figure 7: Total sample by number of STDs (excluding hepatitis)		
Number of STDs	n=1852	%
None	1164	62.9
One	419	22.6
Two	154	8.3
Three	63	3.4
Four	33	1.8
Five	15	0.8
Six	3	0.2
Seven	1	0.1

While mathematical models plot the biological and behavioural components influencing the transmission of infection, for intervention purposes it is often more effective to identify people of strategic importance in the chain of transmission (Thomas and Tucker 1996). Grouping individuals into a "core group" on the basis of some observable characteristic such as repeated or multiple incidents of infection with STDs is one way of achieving this (Over and Piot 1993). Examining the characteristics of the Male Call/Waea Mai, Tane Ma sample who reported infection with multiple STDs may therefore help to identify other markers of core group membership and to focus intervention efforts (Brunham 1991).

In order that findings would lend easily into intervention efforts, we restricted the analysis of association to places where men went to look for or meet male sexual partners, and

used as a base msm who had casual sex in the previous six months (n=1362). The sample of msm who reported a history of STD was further subdivided into "no history of STD", "only one type of STD", and "a history of two or more STDs". Figure 8 illustrates the results of this analysis listing all statistically significant univariate associations.¹⁴

Figure 8: % been to site to look for/ meet male sexual partners by number of reported lifetime STDs			
	No STDs (n=815)	1 STD (n=325)	2 or more STDs (n=222)
Gay sauna	54.1	68.9	70.7
Bog/Public toilet	28.7	39.7	51.4
Park/ street	22.7	32.3	46.4
Gay dance party	41.7	44.0	54.5
Cruise club/ sex-on-site venue	33.1	47.7	64.0
Beach	33.4	40.6	56.3

As these data show, a large proportion of respondents reporting a history of two or more STDs had been to a gay sauna (70.7%) or a cruise club/sex-on-site venue (64.0%) in the previous year. They were also around twice as likely to have been to a public toilet/bog or a park/street (a "beat") to look for a sexual partner compared to respondents who reported never having had an STD. Targeting msm who frequent such sites and increasing their awareness of the risks of STDs as well as HIV may therefore reach the majority of "core group" members, since these sites are likely to have a relatively high proportion of core group members as patrons (Thomas and Tucker 1996).

Multivariate associations

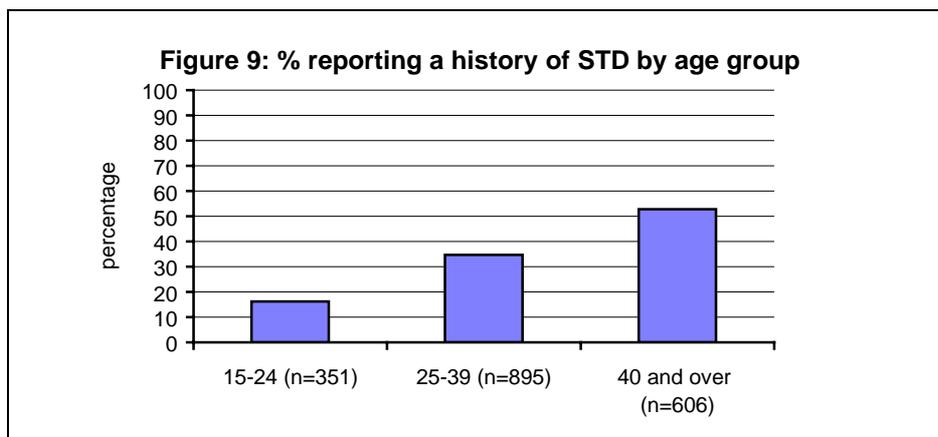
Variables were then entered into a multivariate logistic regression to determine the effect of each variable over and above the effects of others. In doing so, the construction of several variables was altered slightly. This primarily affected the sexual practice variables which changed from having two categories to three or more (see Appendix I for full details). Four variables were found to be independently associated with a history of STD. These were age group, HIV test status, number of lifetime male partners, and having been to a bog/public toilet to look for sexual partners in the previous year. These are discussed below in more detail, with the most statistically significant associations presented first.¹⁵

Age group

¹⁴ Simple univariate analysis revealed statistically significant associations for each site (gay dance party p=0.003, the rest p<0.0001).

¹⁵ By "most statistically significant" we are not referring to the strength of the association. Odds ratios indicating relationship strength have been reserved for later publication.

Intuition suggests that lifetime exposure to an STD should increase with age. Factors such as the higher rate of condom use since the mid 1980s and the decrease in prevalence of some diseases (Wasserheit 1994) will reinforce this observation, since older respondents who were having sex prior to 1980 are more likely to have been exposed to certain pathogens.¹⁶ Our data supports this basic idea. Male Call/Waea Mai, Tane Ma found that respondents aged over 40 were significantly more likely to report a history of STDs ($p < 0.0001$) (Figure 9). Over half of those aged 40 and over (52.8%) reported a history of STD, compared to 34.7% of those aged 25-39, and 16.2% aged 24 and under.



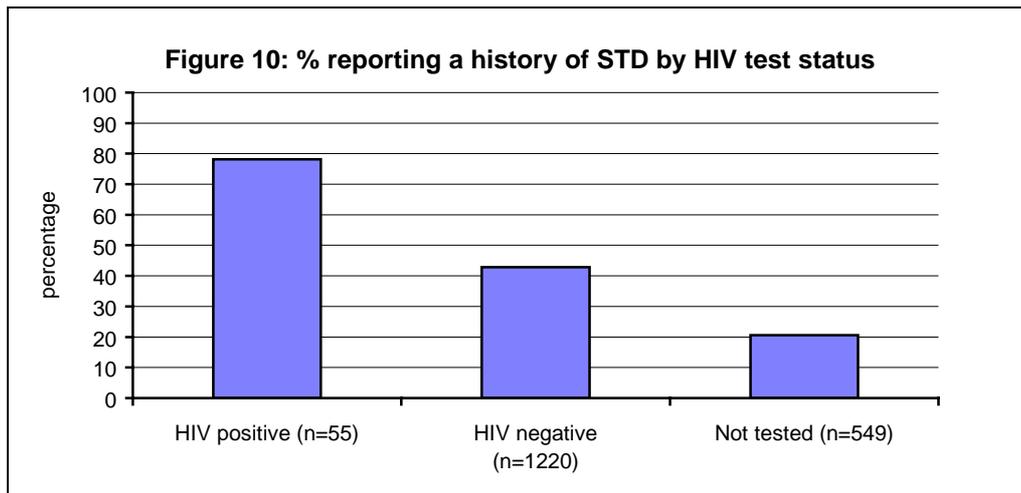
Dickson et al. (1996) report that of the sexually experienced male cohort participants aged 21, 8.6% reported a history of STD. Because our information was collected as age-group rather than as exact age, it is difficult to compare the Male Call/Waea Mai, Tane Ma data to this figure. Respondents in the age group of 15-19 reported a rate of 9.4%, while those in the 20-24 age group appeared to report a higher figure of 18.8%.

HIV test status

Along with age, HIV test status was the most significant independent predictor of STD history in the Male Call/Waea Mai, Tane Ma sample ($p < 0.0001$). Almost 80% (78.2%) of respondents who had tested HIV positive reported a history of STD infection, compared to 42.8% of those who had tested HIV negative at their last test, and 20.6% of those who had never tested for HIV (Figure 10).¹⁷

¹⁶ Of course Wasserheit's observations on the ecological nature of STDs means that these trends may change over time. For example, some diseases are making a resurgence and new infections such as HIV have only recently appeared in some communities. Therefore in some cases the reverse is true - respondents who have been highly sexually active in recent years may be more likely to have been exposed to a given infection.

¹⁷ Twenty-eight respondents reported that they had no result yet, they did not know their test status, or declined to answer the question. Of these, 10 (35.7%) reported a history of STD.



Although the logistic regression analysis controlled for number of lifetime partners and non-use of condoms in anal sex in the previous six months, it is possible that the independent association between history of both HIV and STDs is a marker for episodes of unprotected anal sex which the analysis could not control for (ie. those which occurred more than six months ago), or for differences in HIV testing patterns which were not included.

However, a growing body of literature has highlighted the existence of important inter-relationships between STDs and HIV (Fleming and Wasserheit 1999; Cohen 1998; Dickerson et al. 1996; Wasserheit 1992). These studies have tended to focus on three possible inter-relationships in particular:

- 1) the increased risk of acquiring HIV when infected with STDs;
- 2) the increased risk of transmitting (shedding) HIV when infected with STDs;
- 3) alterations in the natural history (progression of disease) of either HIV or STDs in individuals with dual infection.

Independent associations between HIV positive status and reported STD history might therefore be due to the greater susceptibility to HIV infection for individuals with certain STDs (ie. affecting the β coefficient), or occur because HIV sero-converters experience recurring and exaggerated symptoms of previously acquired viral STDs. In addition, immune suppression caused by HIV infection would also make people more susceptible to STDs in the same way as other opportunistic infections. Wasserheit (1992) has labelled these inter-relationships 'epidemiological synergy', partly because of the way HIV and STDs appear to amplify the effects of each other, but also because it has been difficult to establish through research exactly what the nature of these relationships are

for each given STD. However, reviews of the research have pointed out evidence for certain connections, and these are summarised below.

HIV and 'ulcerative' STDs

The strongest evidence in the research literature for a synergistic relationship exists for individuals with an 'ulcerative' STD (in developed countries most commonly herpes, but also syphilis - see Figure 2). For example, genital ulcer disease (GUD) has been shown to increase the risk of acquiring HIV by between 1.2 and 8.5 times (Dickerson et al. 1996; Wasserheit 1992). Possible explanations for this are that the effectiveness of genital mucosa in preventing the entry of HIV is compromised, or that GUD effects various biological mechanisms inside the body such as the immune response (Dickerson et al. 1996). Some evidence exists to suggest increased expression of herpes lesions and resistance to treatment in individuals with HIV (Dickerson et al. 1996), while other studies suggest the possibility of increased shedding of HIV amongst individuals with GUD (Cohen 1998).

HIV and 'discharge' STDs

Although no study has shown that HIV positive individuals are more likely to transmit HIV if they also have an STD (Weatherburn et al. 1999), there is evidence of increased HIV virus shedding by HIV-infected individuals with a 'discharge' STD (ie. gonorrhoea and chlamydia/NSU - see Figure 2).¹⁸ Cohen (1998) has therefore suggested that early treatment of gonorrhoeal infections amongst HIV positive individuals may have an impact on the rate of new HIV infections. The data on whether the 'discharge' STDs increase the risk of acquiring HIV is even more limited (Weatherburn et al. 1999; Dickerson et al. 1999; Wasserheit 1992). However, these reviews suggest that the much higher prevalence of 'discharge' infections in developed countries means that this effect may still be important to consider.

HIV and HPV

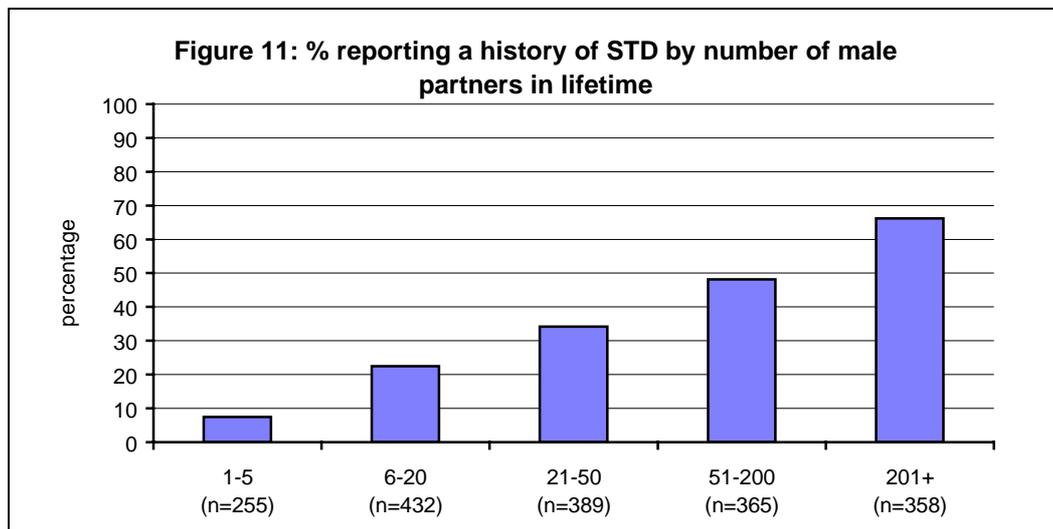
Finally, research has indicated that the relationship between the effect of HIV infection on the expression of other STDs is strongest for genital or anal warts (HPV) (Wasserheit 1992). The reasons for this are unclear, and HPV could simply be viewed like many opportunistic infections acquired by HIV-positive individuals in that its progression or severity is augmented.

¹⁸ The relationship suggested here is therefore indirect. There is evidence of increased excretion of HIV in the semen of individuals with a discharge syndrome, and other research suggests that HIV viral load (ie. how much is shed through an exposure) may be associated with infectiousness (Weatherburn et al. 1999).

Separate logistic regressions would have to be performed on each infection in order to address these issues further (particularly if we wanted to estimate the relative risk associated with HIV status), and that is beyond the scope of this overview report.

Number of male partners in lifetime

Number of lifetime partners has obvious associations with lifetime occurrence of STDs, and Male Call/Waea Mai, Tane Ma found that number of lifetime male sexual partners was independently associated with a history of STD ($p < 0.0001$) (Figure 11). Around two-thirds (66.2%) of those respondents who had more than 200 lifetime male sexual partners at the time of interview reported a history of STD, compared to 48.2% of those with 51-200 partners, 34.2% of those with 21-50 partners, 22.5% of those with 6-20 partners, and 7.5% of respondents reporting 1-5 lifetime male partners.



The importance of high partner numbers in the transmission of STDs is perhaps most clearly illustrated within the mathematical model presented earlier (the parameter "c", or the average rate of partner change). Firstly, the distribution of partner numbers in almost all sexually-active populations is heterogeneous, that is, most individuals have few partners, but a few individuals have many (Brunham and Plummer 1990) (see for example Figure 3 in *Male Call/Waea Mai, Tane Ma Report No.4: Casual Sex between Men*).¹⁹ Taking this skewed distribution into account, this means that even with a low average number of partners in a population, the existence of a small number of individuals with high partner numbers over a given period (a "core group") can ensure that transmission of infection continues (Anderson and May 1988; Anderson 1999).

The significance of high partner numbers is further illustrated by two concepts - mixing within and between risk groups, and concurrent partnerships. Because engaging in sex with large numbers of partners over a brief period of time normally requires organised sexual meeting places, there is an increased likelihood that the sexual partners whom highly sexually active men encounter in these settings will also be individuals who are highly sexually active. It is clear that this phenomenon, known as "within-group" or "assortative" mixing, will facilitate the spread of STDs within a core group of sexually active people since pathogens are more likely to encounter new hosts during their period of infectivity (Anderson 1989; Gupta, Anderson and May 1989; Garnett et al. 1996).

Multiple partnerships can also imply behaviours such as concurrency, or having two or more simultaneous sexual partners. This is particularly relevant to the transmission of bacterial infections which may only have a short duration of infectivity, or those which are highly infectious early on in the incubation period. This is because secondary transmission can still occur even when an individual acquires no new partners if they have several sexual relationships "on the boil" at once. Furthermore, there is evidence from Male Call/Waea Mai, Tane Ma that respondents who do not necessarily demonstrate high partner numbers but who are in non-monogamous regular relationships (ie. have two concurrent sexual partners at least) are also at increased risk.²⁰

Having said this, the use of number of sexual partners as an indicator of risk may not necessarily work in exactly the same way for msm as it does for heterosexual men. "Sex" was defined in Male Call/Waea Mai, Tane Ma as "any intimate physical contact that involves sexual excitement", since many "sexual sessions" (see Coxon 1996) between men do not involve intercourse. Given that much of this "sex" may have been non-penetrative or tactile, it is less likely that certain STDs would be transmitted than would be the case with high numbers of heterosexual partners, where intercourse might be more common (Dr. Murray Reid, personal communication).

Went to a bog/public toilet in the previous year to meet or look for male sexual partners

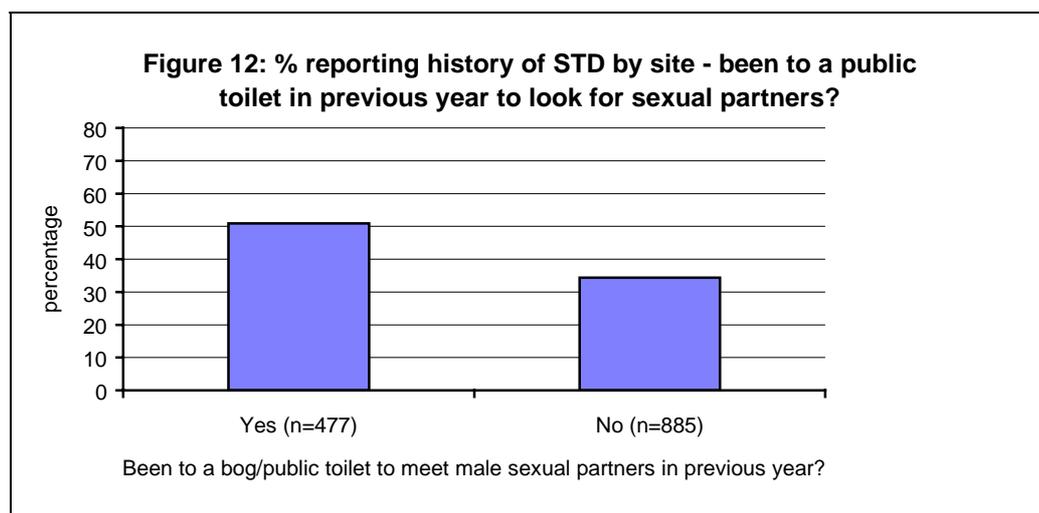
¹⁹ Brunham and Plummer (1990) demonstrate that a Poisson distribution best approximates the acquisition of partner numbers per unit of time.

²⁰ Univariate analysis by Chi-squared test indicated that the proportion of respondents in non-monogamous regular relationships who reported a history of STD (49.8%) was significantly larger than the proportion reporting STDs in monogamous regular relationships (32.3%) ($p < 0.0001$). However, this was not found to be an independent predictor in the regression analysis.

Respondents to the survey were asked "[i]n the last 12 months, which of the following places have you been to meet or look for male sexual partners?", and were then read out a list of 20 sites. Of the men who reported that they had had casual sex, 60.6% (n=826) reported that they had been to a gay bar to look for sexual partners, 60.4% (n=822) had been to a gay sauna, and 35.0% (n=477) reported that they had been to a bog/public toilet to look for or meet male sexual partners. Out of the 20 sites read out to respondents, these three were chosen as proxies for the broadly different locations commonly connected with sexual partner acquisition amongst msm:

- a) places where one can meet men but can't easily have sex on site (gay bars, gay nightclubs, gay dance parties);
- b) places where one can meet men and have sex on site (gay saunas, cruise clubs, sex-on-site venues);
- c) places where one can meet men, where it is possible (although illegal) to have sex, and where sexual identities can be blurred and "sexual motivation masked" (Flowers et al. 1996) (public toilets, parks/streets, beaches).

In the ensuing analysis, we found a strong independent association between going to a public toilet/bog and having a history of STDs, with half (50.9%) of these men reporting STDs compared to 34.4% of those who did not go to look for partners at such sites (p=0.01) (Figure 12).



As mentioned above, the presence of organised sexual meeting places provides men who seek high numbers of male partners with the opportunities to do so relatively easily. Informal sites such as known beats and public toilets, and also commercial businesses such as gay saunas and sex-on-site venues, are primary examples and are a common

part of the male-male sexual landscape throughout New Zealand (see *Male Call/Waea Mai, Tane Ma Report No.4: Casual Sex between Men* for more details).

In terms of the transmission of infection, venues such as bogs/public toilets are also implicated in the facilitation of "disassortative" sexual mixing, or like with unlike. Just as individuals can seek sex with many partners in these venues, these sites also fulfil the needs of individuals who only seek a single partner. Thus those working in the field of AIDS education have long recognised the importance of public toilets, and also saunas and sex-on-site venues, for contacting men who are distanced from other msm (in addition to those who are gay community attached). This may be because they are from rural communities, they do not identify as gay, or because they are on the fringes of the gay community in other ways due to their ethnicity or social class. Sexual mixing between such individuals - who would normally be at low risk of infection - and "core group" members is therefore facilitated in these venues. This has important implications for prevention, since previously released data points to the high use of such meeting places by members outside the highly targeted gay communities (see *Male Call/Waea Mai, Tane Ma Report No.6: Regions*). This presents the real risk that STDs will not be confined only to those who are highly sexually active.

Section IV: Associations with History of Hepatitis in the Male Call/Waea Mai, Tane Ma Sample

This Section follows the same format as Section III, beginning with a brief discussion of established risk factors, followed by a summary of the statistical analysis and a more in-depth discussion of the independent associations found in this survey.

Predictors of infection with hepatitis A, B and C

As mentioned in Section II, while gonorrhoea, genital/anal herpes, syphilis and anal warts have sexual transmission as their main mode of infection, this is not necessarily true for hepatitis. Hence the term sexually *transmissible*, as opposed to sexually *transmitted*, applies here. The hepatitis viruses A, B and C share a common name from the fact that they have similar clinical manifestations (causing damage to the liver), however as pathogens they are quite different from each other especially with respect to their viral characteristics and mechanisms of spread. A variety of transmission modes exist for each of these three viruses, and it is only through the intersection of these modes and the sexual practices of msm that the possibility of sexual transmission arises.

For example, hepatitis A virus is almost always spread through faeco-oral contact (see Figure 2), and while this means that sexual acts that involve the anus are implicated, most transmission in the general population is through poor hygiene (e.g. contaminated food or water). Young children are therefore also at increased risk, and an unknown proportion of our respondents reporting infection with hepatitis A could have acquired it non-sexually at this age (Dr. Murray Reid, personal communication).²¹ Some limited evidence exists for transmission through injecting drug use, due to the physical robustness of the virus (Lemon and Alter 1999).

In the case of HBV, blood is the major source of infection, with four general modes of transmission known: percutaneous (skin punctures), sexual, perinatal, and 'horizontal' (anything other than these modes or unexplained transmissions) (ibid). Transmission in New Zealand is also largely through non-sexual means with children at high risk prior to the advent of comprehensive vaccination programmes. However, a recent review of the research on the sexual transmission of HBV amongst msm showed that duration of sexual activity (in years), number of partners, and engagement in oral-anal sex or unprotected anal sex were risk factors (Brook 1998). Due to the predominance of sexual

transmission of HBV amongst msm, injecting drug use has emerged as a less important risk factor for this population (Lemon and Alter 1999).

The least likely candidate for sexual transmission is hepatitis C virus. Almost all transmission of HCV is related to injecting drug use, with mucosal exposures playing a limited role. While mucosal exposures leave open the possibility of sexual transmission, and some such associations have been reported, this mode appears to be very inefficient (*ibid*). For example, a cohort study specifically assessing the sexual transmission of HCV amongst msm found no such association when controlling for IDU and HIV status (Bodsworth et al. 1996).

It is worth noting again that because there is an effective vaccine available for both hepatitis A and B, infection through this mode of transmission is preventable by medical intervention as well as behaviour change. Almost a half (47.1%) of msm in a study in the United Kingdom reported that they had completed a vaccination course for hepatitis B (Hickson et al. 1998), and although childhood immunisation programs now exist, it is unknown what proportion of New Zealand msm have immunity to this virus.

In New Zealand, a large amount of research on hepatitis has focussed on injecting drug use (see for example Kemp and MacDonald 1999; Kemp et al. 1998; Chetwynd et al. 1995; although see Blakely, Salmond and Tobias 1998 for example for a general prevalence study). Difficulties in obtaining data on msm are probably the result of a combination of factors, such as low numbers in general studies of injecting drug users (only 2% of 223 respondents in Kemp and MacDonald 1999 were msm), the non-inclusion of hepatitis viruses in studies of STDs amongst msm, and the fact that both msm and IDU status have social histories of stigma and illegality.

As in the previous Section, the following analysis is based on grouped data. Again this is not a perfect solution, but it is done in order to make the analysis manageable, because hepatitis infections have been grouped together elsewhere (see Crawford et al. 1998), and because it overcomes problems with recall bias inasmuch as the type of hepatitis may not be remembered correctly. This report series also focuses on sexual behaviour, so it is appropriate that any investigations use the idea of sexual transmission as a framework. However, because of the dearth of available data mentioned above, and because the likelihood of the sexual transmission of HCV is slim, further details

²¹ However see p.5 which highlights the sexual transmission context regarding the hepatitis question.

regarding univariate associations between each type of hepatitis and HIV test status and IDU status are also presented.

Both univariate and logistic regression analyses were used to identify variables associated with a reported history of hepatitis. Variables tested were the same as for Section III. The results of these analyses are given below.

Univariate associations

Chi-squared tests of association were used to determine whether particular variables were related to a reported history of hepatitis. Variables chosen were the same as those used in the previous Section, and measured a range of demographic, social milieu/attitudinal, sexual behaviour, and other characteristics.

Age group and place of residence were the only demographic variables associated with history of hepatitis, with older respondents ($p < 0.0001$) and those living in Auckland and Wellington ($p = 0.0001$) more likely to report this.

Fewer social milieu/attitudinal variables were found to be associated with hepatitis history as compared with history of STDs. Respondents who were gay community attached ($p = 0.002$), who stated that anal sex was the most physically satisfying sexual practice ($p < 0.0001$), and who correctly answered questions relating to the HIV risk associated with oral sex ($p = 0.05$) were more likely to report a history of hepatitis compared to those not exhibiting these characteristics.

Interestingly, associations were also found between the sexual behaviour variables and hepatitis. Reported history of hepatitis was higher amongst those with large numbers of lifetime male partners ($p < 0.0001$), as well as those who had recent casual sex ($p = 0.008$), casual anal sex ($p = 0.002$), and who reported that they had engaged in "highly unsafe sex" in the previous six months ($p = 0.01$; see multivariate results for a discussion of this variable). Significantly higher rates of hepatitis history were also found amongst respondents who had sought sexual partners in public toilets ($p = 0.004$) or gay saunas ($p = 0.0001$) in the previous year, and who had sex outside their regular relationship ($p = 0.01$) in the previous six months.

Respondents who had tested HIV positive were significantly more likely to report a history of hepatitis ($p < 0.0001$). Figure 13 provides further information on the pattern of hepatitis infection by HIV test status.

	Tested positive		Tested negative		Untested	
	n=55	%	n=1220	%	n=549	%
Hepatitis A	15	27.3	93	7.6	20	3.6
Hepatitis B	15	27.3	109	8.9	20	3.6
Hepatitis C	6	10.9	23	1.9	2	0.4

Hepatitis A, B and C were found to be associated with HIV test status ($p < 0.0001$ in each case). Issues such as past sexual behaviour which placed the respondent at risk of acquiring multiple infections, HIV positive men's level of immune suppression, or the fact that testing for HIV may also have revealed past hepatitis infections, all need to be considered when interpreting these figures.

Recent illegal drug injecting was also found to be associated with hepatitis history ($p = 0.0004$). However, when each type of hepatitis was examined, statistically elevated rates were reported for both hepatitis A ($p = 0.02$) and C ($p < 0.0001$), but not for hepatitis B, amongst those who have injected drugs. The high rate of reported infection with hepatitis C amongst the IDU respondents matches with the high presence of HCV markers recorded in three New Zealand studies (Kemp and MacDonald 1999; Kemp et al. 1998; Chetwynd et al. 1995). There is little New Zealand data relating to hepatitis rates amongst male IDUs who also have sex with men.

	Injected illegal drugs in previous 6 months		No recent illegal injecting drug use	
	n=45	%	n=1802	%
Hepatitis A	7	15.6	122	6.8
Hepatitis B	4	8.9	143	7.9
Hepatitis C	7	15.6	27	1.5

The rates for hepatitis A and C in this IDU sub-group are somewhat similar to those found in the Australian 1996 Project Male Call sample (Crawford et al. 1998:186), with figures of 13.0% and 13.7% respectively. However, the Australian study reported a higher rate for hepatitis B (15.0%).²²

Multivariate associations

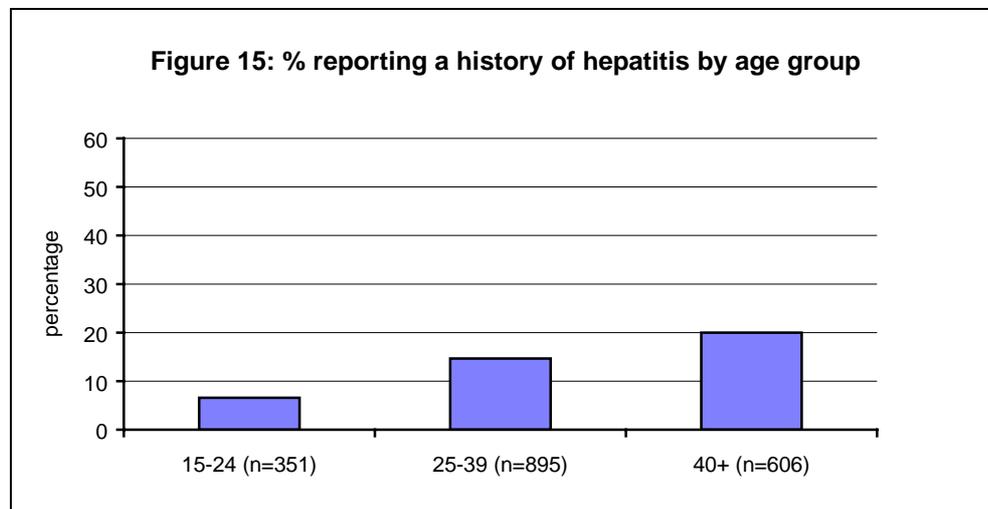
Variables were then entered into a logistic regression to determine which had an effect over and above the effects of other variables in the model. Similar changes were made to several variables in the transition from univariate to multivariate analysis as outlined in

²² The question in the 1996 Australian Project Male Call instrument asked about the use of needles "for non-medical purposes". Their data used lifetime IDU behaviour as a base, and in a simple univariate analysis found that the injecting group were more likely to report each hepatitis infection compared to the non-injecting group (all $p < 0.001$).

the previous section (see Appendix I for full details). Six variables were found to be independently associated with a history of hepatitis infection. These were age group, HIV test status, number of male partners in lifetime, "highly unsafe sex", IDU status, and ethnicity. These are discussed in more detail below, with the most statistically significant predictors presented first.

Age group

Age was found to be independently associated with a history of hepatitis infection ($p < 0.0001$), with a reported history of hepatitis rising with age (Figure 15). Twenty percent of respondents aged 40 or over reported a history of hepatitis, compared to 14.7% of those aged 25-39, and 6.6% of those aged under 25.



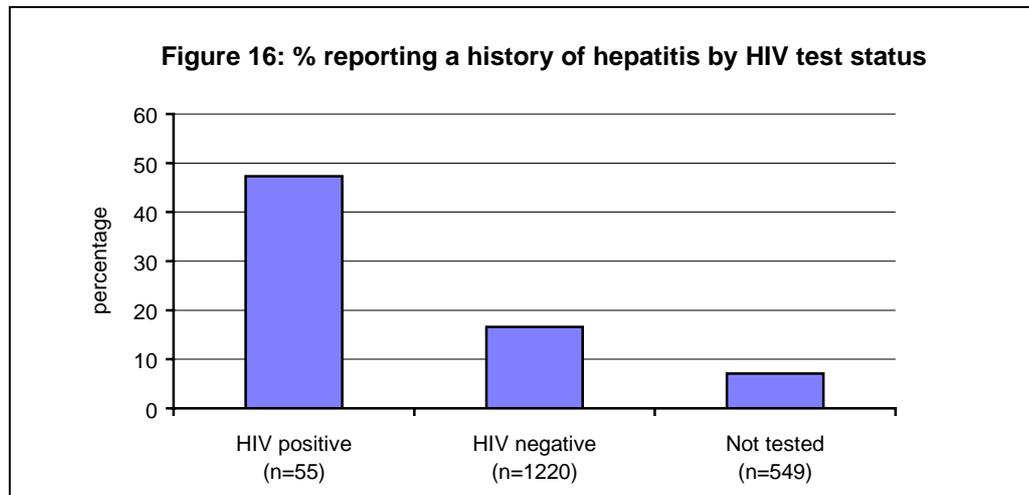
This result parallels that found with reported STD history as in both cases the likelihood of exposure increases with time. We might not expect the current young generation to report the higher rates of older respondents as they age, however, since effective vaccines are now available (particularly through school-based vaccination programmes for HBV) and different patterns of sexual behaviour pre-AIDS would have exposed more of the older cohort to infection with hepatitis A and B.²³

HIV test status

Alongside age, HIV test status was the most statistically significant predictor of a history of hepatitis infection ($p < 0.0001$) (Figure 16). Just under half (47.3%) of the HIV positive

²³ This observation is tempered by the possibility that because younger generations have had less exposure to hepatitis viruses, fewer may have developed natural immunity and more are therefore susceptible.

respondents reported a history of hepatitis infection, compared to 16.6% of those whose last test was negative, and 7.1% of those who have never tested for HIV.²⁴



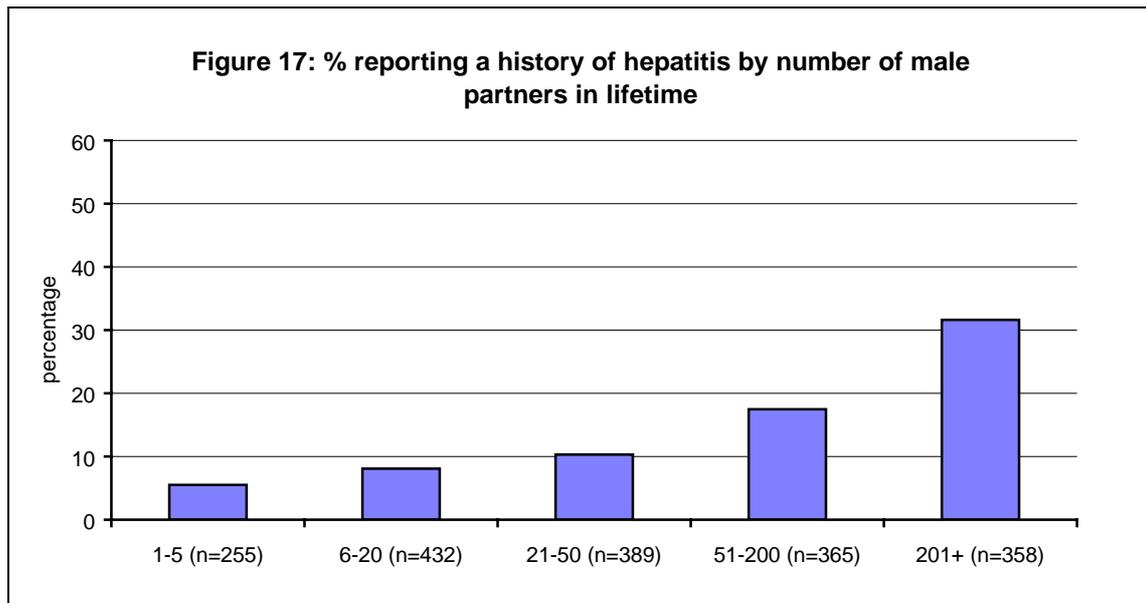
Reflecting on the discussion on HIV and STD synergy presented earlier, there is some limited evidence that dual infection with HIV and HBV or HCV increases the amount of shedding of these hepatitis viruses (Lemon and Alter 1999). However, there is little evidence to suggest synergy in the form of increased risk of acquiring HIV or either of the hepatitis viruses.

Other explanations for this independent association include risky sexual behaviour prior to the last six months. It is known that the hepatitis B virus shares a similar mode of transmission with HIV (unprotected anal sex), and although this is less true for HAV and unlikely for HCV, some degree of sexual transmission not controlled for in the regression analysis may be responsible. A similar argument could be made in the case of HIV and HCV (and possibly HBV) and injecting drug use, since only injecting drug use in the previous six months was controlled for in the multivariate analysis.

Number of male partners in lifetime

Respondents who had fewer lifetime male sexual partners were less likely to report a history of hepatitis ($p=0.001$) (Figure 17). Few of those with 1-5 lifetime partners (5.5%), 6-20 partners (8.1%), or 21-50 partners (10.3%) reported a history of hepatitis, however this increased to 17.5% of men reporting 51-200 partners and almost a third (31.6%) of respondents reporting more than 200 lifetime sexual partners.

²⁴ In addition, twenty-eight respondents reported that they had no result yet, they did not know their test status, or declined to answer. Of these, 9 (32.1%) reported a history of hepatitis infection.

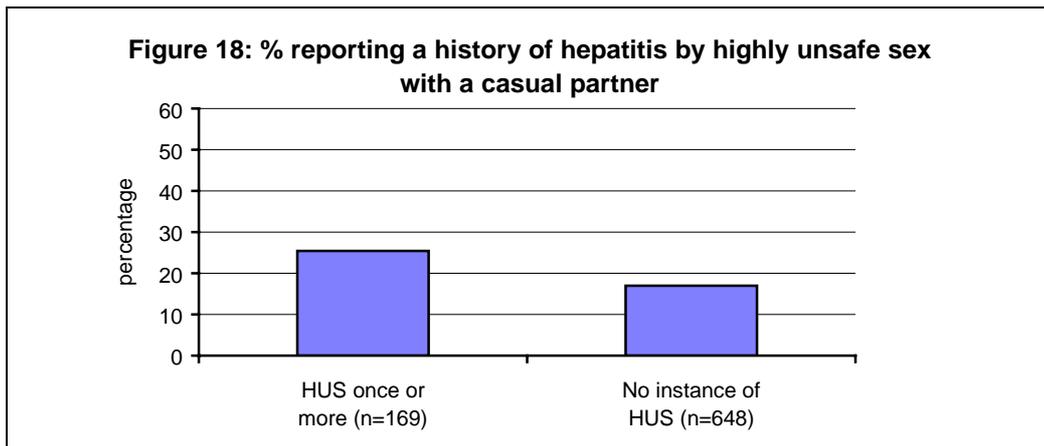


The high rate of hepatitis amongst respondents reporting large numbers of sexual partners provides strong evidence for the role of sexual acquisition for this sample. This finding is of course based on grouped hepatitis data, and inspection of the individual hepatitis diseases suggests that the rate of both hepatitis A and B rises similarly with increases in partner numbers, but hepatitis C appears to be somewhat static. Individual regression analysis for each type of hepatitis would be necessary to confirm this observation, since there also appears to be an association between number of lifetime partners and recent IDU status.

It is worth pointing out that the 358 respondents who reported over 200 lifetime partners represents almost 20% of the total sample. This is a sizeable proportion, and has important intervention implications since commercial vaccines exist for both hepatitis A and B.

"Highly unsafe sex" with a casual partner in the previous six months

Highly unsafe sex (HUS) was defined in this study as being at least one reported occasion of anal sex without a condom in the previous six months with a man whose HIV status was unknown or different to that of the respondent. Individuals who reported one or more occasions were also asked with what type of partner HUS had occurred. Of the 169 respondents who reported at least one instance of highly unsafe sex with a casual partner, 25.4% also reported a history of hepatitis, compared to 17.0% of those who had casual anal sex but reported no HUS ($p=0.01$) (Figure 18).



Initially there was some doubt over whether the questionnaire sufficiently emphasised the fact that the hepatitis infection had to be acquired sexually. This result, coupled with the previous finding relating to number of sexual partners, should ease these concerns. This finding is also interesting because no specific sexual behaviour other than number of partners was found to be independently associated with a history of STD (see Section III). Other NZ research has found relationships between anal sex and STDs (Davis and Lay-Yee 1996; Chetwynd, Chambers and Hughes 1992b), although the hepatitis viruses were not considered to be STDs for the purpose of these analyses.

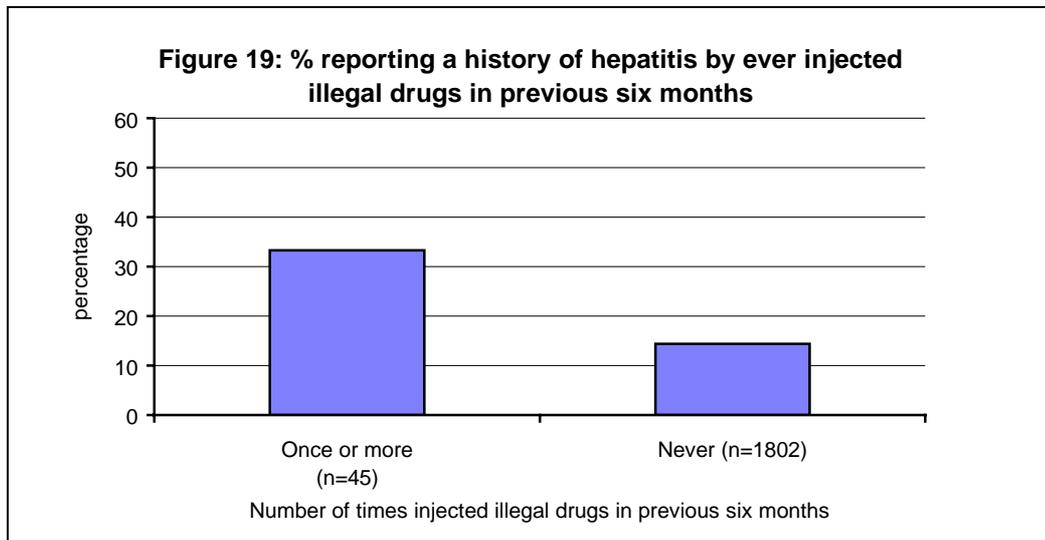
One possibility is that highly unsafe sex with a casual partner is a marker for other risk activities for acquiring a hepatitis infection, such as active oral - anal contact (rimming). Anal-sexual behaviour other than intercourse was not included in this analysis due to issues of specificity and sequence. That is, not all of the infectious pathogens have the same mode of transmission so the effect of one particular mode could be lost when the STDs are grouped. Also in the majority of cases the reported infections are likely to have been acquired more than six months ago.²⁵

On the other hand, hepatitis B is associated with unprotected anal intercourse, and it may simply be that respondents who have reported HUS in the previous six months have also engaged in it a number of times before that, placing them at a higher level of risk over time.

Injecting drug use

Injecting drug use was found to be independently associated with hepatitis history. A third (33.3%) of respondents who stated that they had injected illegal drugs at least once

in the previous six months reported a hepatitis infection, compared to 14.4% of those who had not injected in this period ($p=0.01$) (Figure 19).

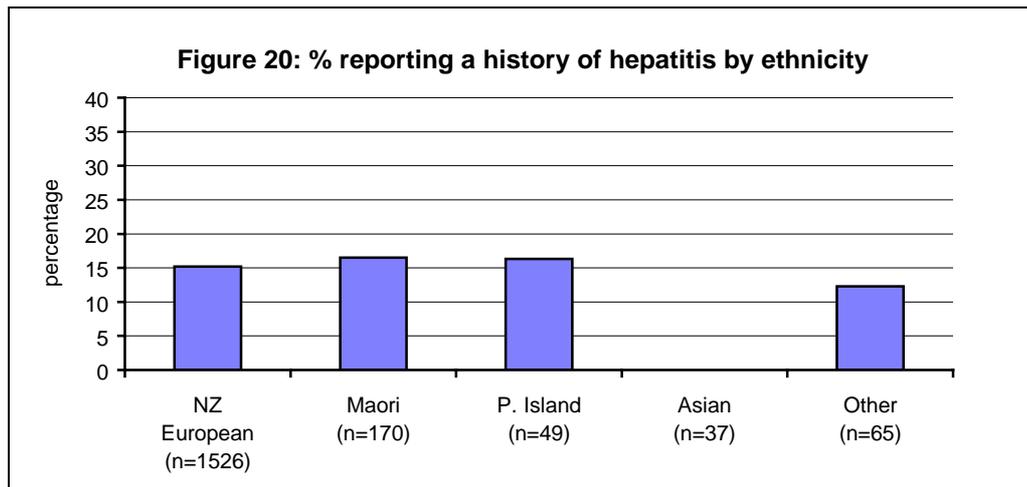


As the questionnaire only asked about injecting history in the previous six months, we cannot test for the association between lifetime injecting and hepatitis. A greater proportion of the reported hepatitis, in particular hepatitis C, might be able to be explained if this were possible. However, the Australian 1996 Project Male Call (Crawford et al. 1998) did use lifetime injecting as their IDU risk measure and found a similar rate (30.9% of their sample who had injected drugs at least once reported a history of hepatitis infection).

Ethnicity

Ethnicity was found to be independently associated with hepatitis, with respondents who identified as Asian being less likely to report a history of hepatitis ($p=0.01$) (Figure 20). None of the thirty-seven respondents reporting an Asian ethnicity gave a history of hepatitis infection, compared to 15.2% of NZ European/Pakeha, 16.5% of Maori respondents, 16.3% of Pacific Island respondents, and 12.3% of respondents of other ethnicities.

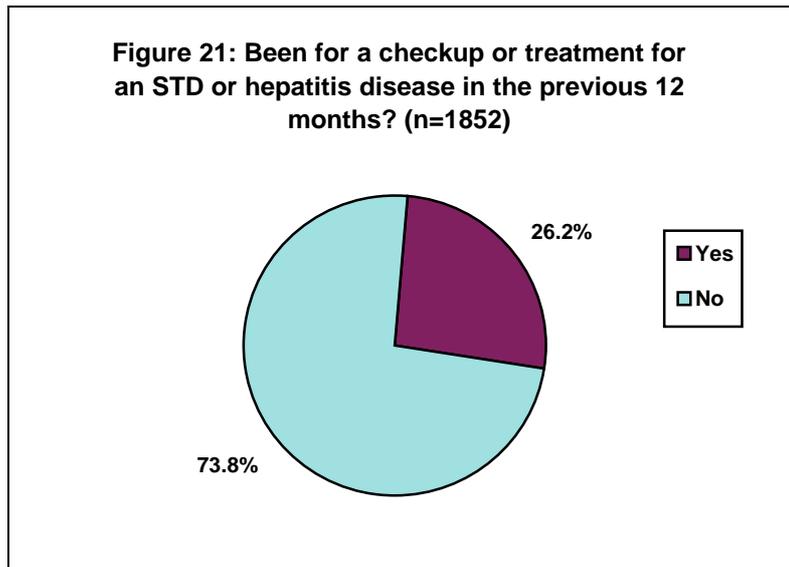
²⁵ It is possible that someone who acquired an infection such as hepatitis A through active rimming some time ago might have avoided that activity since. Anal intercourse was kept in the analysis, since one can continue to engage in it with minimal risk of infection by using condoms.



This finding is unusual given that hepatitis B disease is relatively common not only amongst Asian communities but also amongst Maori and Pacific Islanders in this country (Blakely, Salmond and Tobias 1998; Gane 1998; Dr Chris Moyes, personal communication). The most likely explanation of this result might be that respondents were asked to disclose sexual acquisition of hepatitis as opposed to other modes.

Section V: Sexual Health Checkup and Treatment

In addition to being questioned on specific diseases, respondents were also asked whether they had been for a checkup or treatment in the last 12 months for any STDs. As Figure 21 illustrates, 26.2% of the total sample reported that they had done this in the previous year.



There are few data with which to compare this figure. In 1996 the Australian Project Male Call (Crawford et al. 1998) asked whether respondents had contacted a sexual health clinic in the previous six months, with 24.2% reporting that they had done so. However, this question differed from Male Call/Waea Mai, Tane Ma in terms of the time frame, the type of place visited (sexual health clinic only vs non-specified place), and the nature of the contact (any contact vs physically visiting). Johnson et al. (1994) found that 8.3% of the sexually active male participants in their nationwide representative survey reported visiting an STD clinic at least once in their lifetime, with a rate of around 30% amongst participants who reported ever having a homosexual partner. This figure suggests a higher rate of contact with sexual health services by homosexually-active men compared with non-msm. This is a possible explanation for the elevated rate of STDs observed amongst msm in surveys, since the level of STDs reported by a population is dependent to some degree upon their level of screening. However, it is more likely that higher screening rates are related to the higher occurrence of infection amongst this group, since there are no programmes which selectively screen msm for STDs in New Zealand.

This information on STD checkup history also enables us to compare more closely the STD rates experienced by New Zealand msm obtained from studies of clinic attenders, as opposed to the rate amongst broader populations. Working from data collected from the Burnett Centre in Auckland, a reported history of STD infection of around 47.7% can be calculated (Chetwynd, Chambers and Hughes 1992a; Chetwynd, Chambers and Hughes 1992b).²⁶ Although the information was collected in 1988-9, this is still the only study in New Zealand which provides data on sufficient numbers of msm clinic attenders to allow for comparisons. Figure 22 presents the Male Call/Waea Mai, Tane Ma data on history of STD, this time by those who sought sexual health services (SHS) in the previous 12 months, and there appears to be some congruence in reported STDs between the two samples.

Figure 22: % reporting history of STD - Burnett Centre, Male Call/Waea Mai, Tane Ma data			
	Msm in Burnett Centre study (n=222)	Male Call - SHS sample (n=485)	Male Call - non SHS sample (n=1367)
Self-reported history of STD	47.7	50.1	32.6

The final statistical analysis in this report examines which demographic, social milieu and behavioural variables predict the usage of sexual health services in our sample. This information is important since it could point to differences or inequalities in access to sexual health services which are unrelated to the experience of infection with an STD.

Both simple univariate and logistic regression analyses were used to examine the effect of variables on whether or not respondents had been for a checkup or treatment for an STD in the previous 12 months. Although a number of studies give information on demographic and other social and behavioural characteristics of sexual health clinic attenders in NZ (e.g. Dickson, Paul and Herbison 1998; Connor et al. 1997), these present localised data and there is little research focussing on how the general clinic-attending population differs from the rest of society. A different set of variables were tested for association here compared to the previous two analyses. Because of the limited amount of research available for comparison we have relied more heavily on hypothesised rather than demonstrated predictor variables. Note that both HIV test status and STD or hepatitis history were not included in this analysis due to their extremely high correlation. The variables that were included and the results of statistical tests are given below.

²⁶ Since no direct rate was quoted for the homosexual and bisexual male sample, this figure was determined by calculating the number of male homosexual and bisexual respondents who reported one or more infections (n=106) (Chetwynd, Chambers and Hughes 1992a: 445, Table 1) and using Chetwynd, Chambers and Hughes (1992b: 262, Table 1) to more accurately calculate the denominator (n=222).

Univariate associations

Chi-squared tests of association were used to determine whether particular variables were related to having been for a sexual health checkup or treatment in the year prior to interview. These included demographic (age group, ethnicity, income, education, under-class status, place of residence, been paid for sex in last six months), social milieu/attitudinal (sexual identity, gay community attachment, HIV-related knowledge, number of people respondent knows who are HIV positive or have AIDS, self-assessed risk of contracting HIV), sexual behaviour (number of lifetime male partners, whether respondent had a casual and/or regular sexual partner in the previous six months, anal sex and condom use with casual and/or regular partners over this period, had sex outside regular relationship, experienced condom breakage in previous six months), and needle injecting variables (injecting drug use status previous six months).

Younger respondents ($p < 0.0001$), those who were Maori or Pacific Islanders ($p = 0.03$), who were not in the under-class category ($p = 0.04$), and who had been paid for sex in the previous six months ($p = 0.001$), were more likely to have been for a sexual health checkup or treatment than those not exhibiting these characteristics. Since respondents who had been paid for sex recently did not demonstrate statistically different rates of STD history than other participants, their higher level of screening or treatment suggests increased awareness of sexual health issues.

A number of the social milieu/attitudinal variables were related to seeking sexual health services. Respondents who identified as either gay ($p = 0.03$), queer ($p = 0.0003$), or takataapui ($p = 0.01$), who were gay community attached ($p < 0.0001$), who correctly answered questions relating to the risk of sex between HIV positive men ($p < 0.0001$), who knew someone with HIV ($p < 0.0001$) or AIDS ($p = 0.04$), and who had a higher self-assessed risk of contracting HIV ($p = 0.0002$) were more likely to state that they had been for a checkup or treatment.

Interestingly, unprotected anal sex was not found to be associated with recent sexual health checkups. However, respondents who had higher numbers of lifetime partners ($p < 0.0001$), who had casual sex ($p < 0.0001$) and casual anal sex ($p = 0.0002$) in the previous six months, who were in a recently formed regular relationship with a man ($p = 0.05$), who had sex outside their regular relationship ($p < 0.0001$), and who had experienced condom breakage in the previous six months ($p = 0.02$) were more likely to have been for a checkup or treatment in the last year.

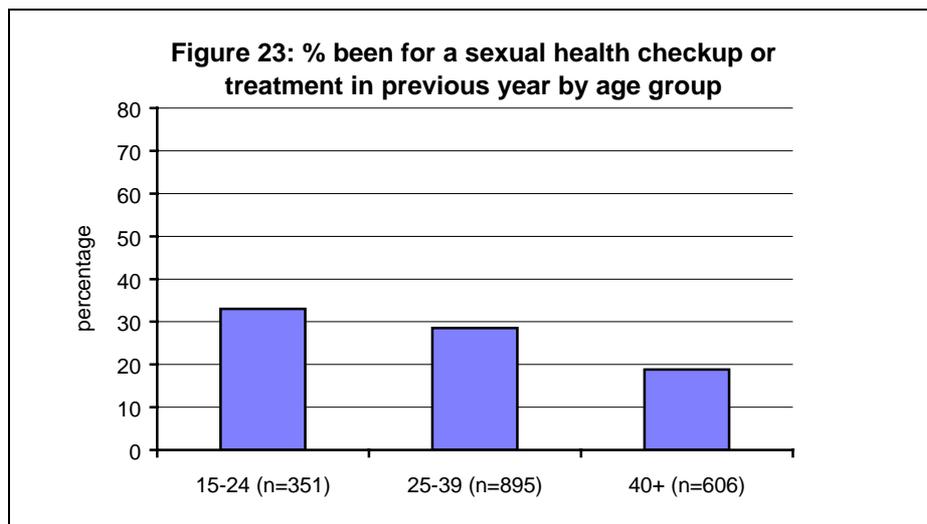
In addition, those who reported injecting illegal drugs in the previous six months were also more likely to have been for a sexual health checkup ($p=0.04$).

Multivariate associations

Variables were then entered into a multivariate logistic regression to determine the effect of each variable over and above the effects of others. As in the previous sections, in the transition from univariate to multivariate analysis the construction of several variables was altered slightly. Seven variables were found to be independently associated with having been for a sexual health checkup or treatment in the previous year. These were age group, number of lifetime male sexual partners, knowing someone with HIV, gay community attachment, income, self-assessed HIV risk, and education. These are discussed in more detail below, with the most statistically significant associations presented first.

Age group

Age group was found to be independently associated with going for a sexual health checkup or treatment ($p<0.0001$). However, it was younger respondents who were more likely to have done this, with 33.0% of respondents aged 15-24, 28.5% of those aged 25-39, and 18.8% of those aged 40 or over having gone for a sexual health checkup or treatment in the previous year (Figure 23).

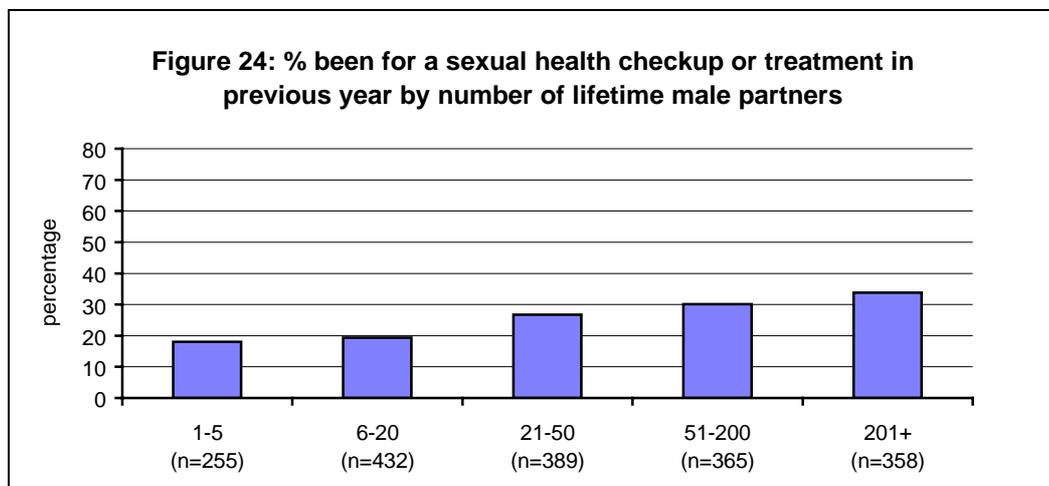


While the previous two analyses revealed that history of infection with STDs and hepatitis increased with age, this result is likely to be related to the higher rates of recent sexual activity amongst younger msm, and therefore both a higher number of potential transmissions (ie. risk) as well as a higher incidence of infection. Younger people in

general are also more likely to have encountered school-based sexuality programmes which promote the utilisation of sexual health services.

Number of male partners in lifetime

As we might expect, number of lifetime male partners was also found to be independently associated with sexual health service usage ($p=0.0006$). Of the respondents who had over 200 lifetime male sexual partners, 33.8% had been for a checkup or treatment, compared to 30.1% of those who had 51-200 partners, 26.7% of those who had 21-50 partners, 19.4% of those who had 6-20 partners, and 18.0% of those who had 1-5 lifetime male sexual partners (Figure 24).

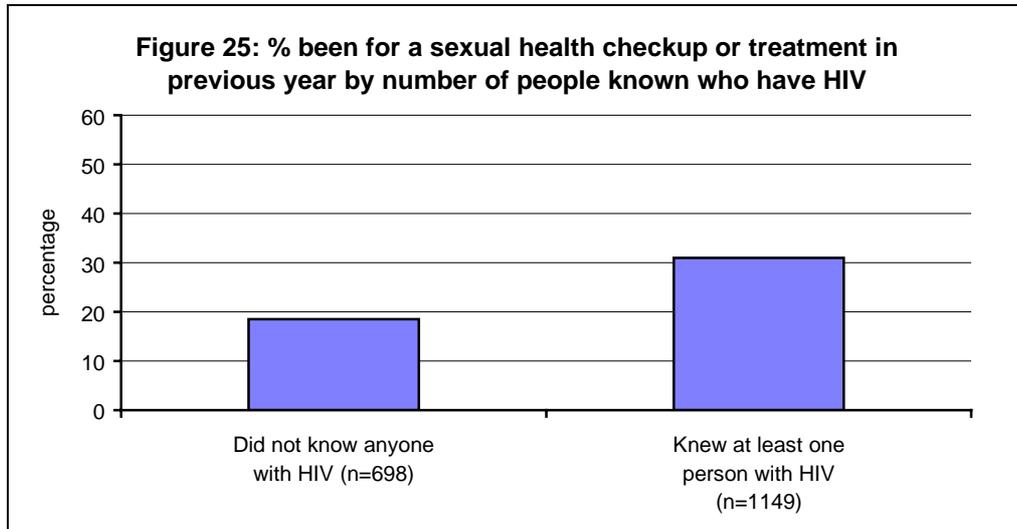


We cannot tell from this analysis to what extent the high usage of sexual health services by those with large numbers of sexual partners is related to recent infection (our data shows that those with many lifetime partners are also likely to have high numbers of recent sexual partners, although this will be influenced for example by age and current relationship status). It is possible that msm who have high number of partners are also more likely to regularly obtain sexual health screening as part of a strategy for both the early detection and treatment of infections, as well as for concurrent or future partner protection (especially since some infections like HPV or gonorrhoea may be asymptomatic while still being able to be transmitted).

Know someone who is HIV positive

Respondents were asked how many people they knew who were HIV positive. Knowing one or more people with HIV was found to be independently associated with sexual health service usage in the previous year ($p=0.01$). Just under a third (31.0%) of respondents who knew someone with HIV had been for a checkup or treatment,

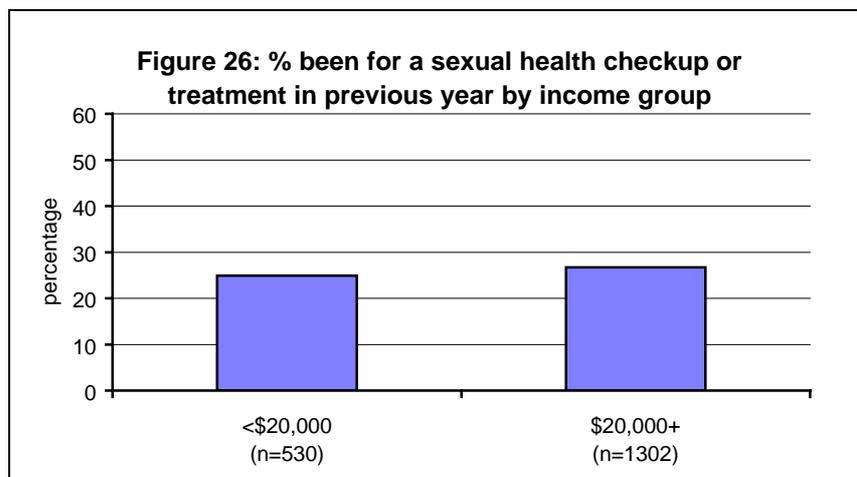
compared to 18.5% of respondents who reported that they did not know anyone with HIV (Figure 25).



This result further supports the existence of a relationship between "contact with the epidemic" (Kippax et al. 1994:94) and the uptake of sexual health screening. This is supported by evidence from the Male Call/Waea Mai, Tane Ma data of an association between knowing someone with HIV and having tested for HIV at least once.

Income group

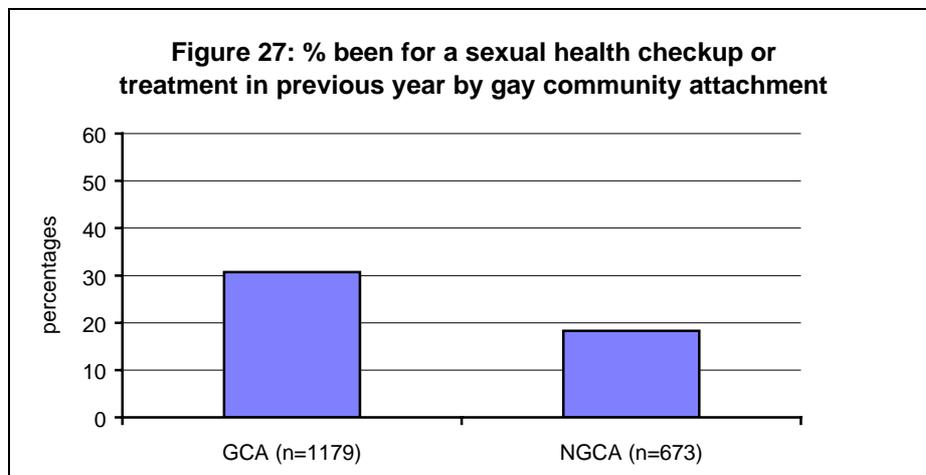
Although the effect was small, income was independently associated with having had an STD checkup or treatment ($p=0.02$). Just over a quarter (26.7%) of respondents with an income of \$20,000 or greater had been for a checkup or treatment, compared with 24.9% of those with an income of less than \$20,000 (Figure 26).



The differences here between the two income groups are not large. Warszawski's (1998:237) review of European national population-wide studies suggests that issues such as higher education and income may be associated with increased access to STD screening through greater awareness and recourse to services. The small effect of income on utilisation of sexual health services in this study may in part be due to the provision of free treatment at public sexual health centres to date (Ministry of Health 1997).

Gay community attachment

Respondents were classified as 'gay community attached' (GCA) or 'non-gay community attached' (NGCA) according to how many of their friends were gay and where they went to socialise with their gay friends (see *Male Call/Waea Mai, Tane Ma Report No.7: Gay Community Involvement*). This variable was designed to measure the effect of particular gay community norms on the beliefs, attitudes and practices of msm in our sample. Gay community attachment was found to be independently related to having sexual health checkups or treatment in the previous year ($p=0.02$). Respondents who were GCA were significantly more likely to have been for a checkup or treatment (30.7%) compared to those who were NGCA (18.3%) (Figure 27).

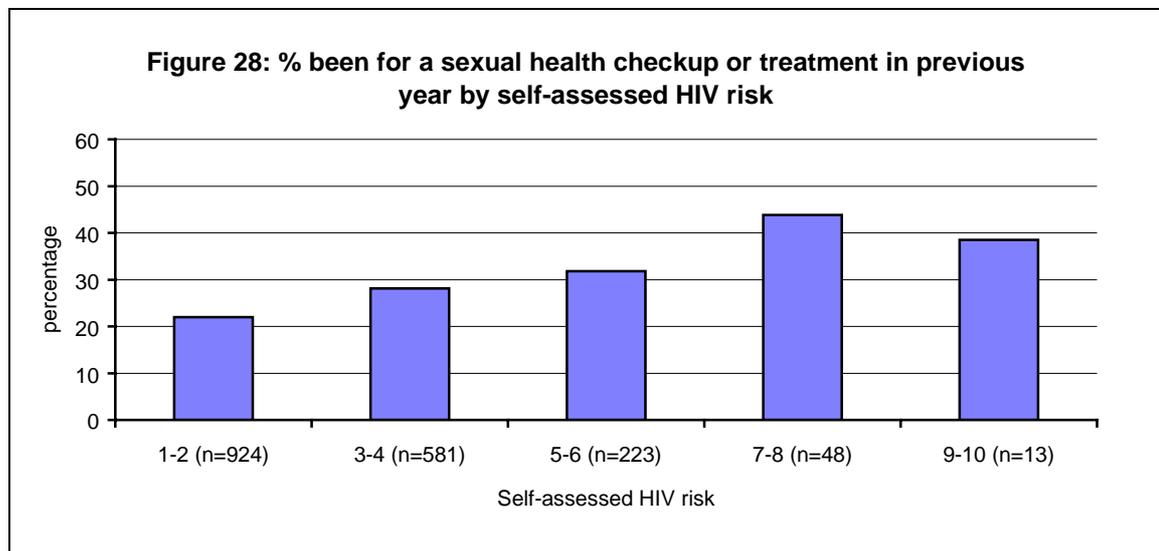


While the gay community attached men in our sample demonstrated slightly higher numbers of sexual partners than NGCA respondents, and were more likely to have sex outside their regular relationship (see *Male Call/Waea Mai, Tane Ma Report No.7: Gay Community Involvement*), these factors were controlled for in the regression analysis so this result suggests an effect more related to a personal acceptance of the need for sexual health screening. Again, this supports other findings such as a higher rate of HIV testing amongst GCA respondents (ibid), results from the 1996 Australian Project Male

Call (Crawford et al. 1998:187), and the findings relating to contact with the epidemic cited above.

Self-assessed HIV risk

Respondents who had not tested HIV positive were asked to rate on a scale of 1 to 10 how likely they thought they were to become infected with HIV (1 being "impossible" and 10 being "certain"). Giving a high score on this scale was independently associated with having been for a checkup or treatment ($p=0.04$). As Figure 28 shows, 38.5% of those who scored themselves as a 9-10 and 43.8% of those scoring 7-8 had been for a checkup or treatment compared to 31.8% of those scoring 5-6, 28.1% of those scoring 3-4, and 22% of those scoring themselves as a 1-2 on this scale.



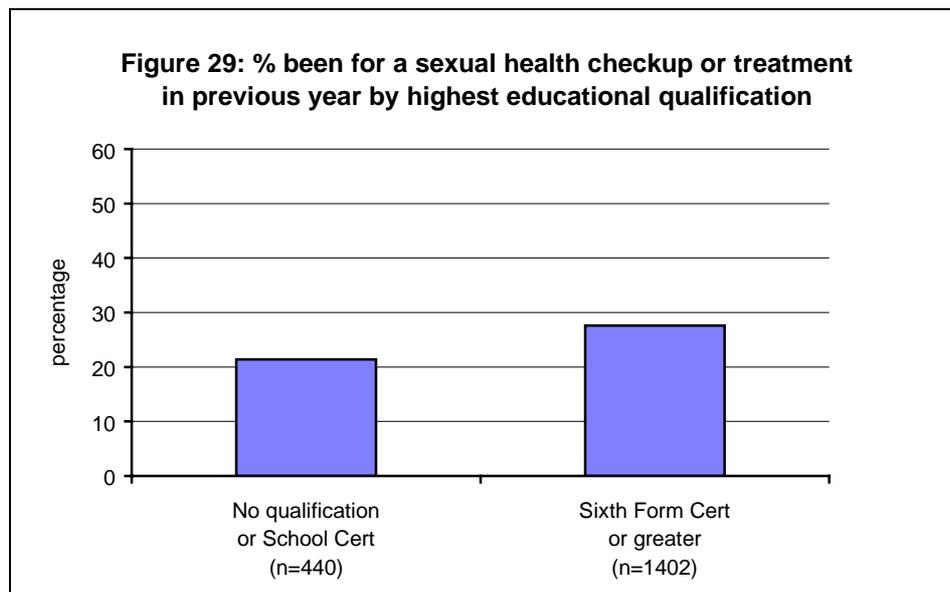
Although respondents were told that the question regarding sexual health services did not include HIV tests, in many instances a general sexual health checkup will have occurred simultaneously. Therefore many msm who felt they had placed themselves at risk of HIV and who subsequently took an HIV test would have been encouraged to obtain further sexual health screening.

We cannot tell from this analysis what distinguishes those who rated themselves as a 1-2 as opposed to a 5-6 in level of HIV risk. What is potentially interesting however is the presence of respondents who rated themselves as 1-2 ("impossible" on the scale provided) yet who nevertheless still visited an STD clinic. One possible explanation is that these men may not have exposed themselves to HIV risk, but have correctly understood that there are still risks in terms of other STDs. Alternatively, it could also

suggest the engagement in sexual risk taking behaviour which they believe is unrelated to HIV infection but which may not in fact exclude this possibility.

Educational qualification

Higher educational qualifications were independently associated with seeking checkups or treatment ($p=0.05$). Over a quarter (27.6%) of respondents whose highest educational qualification was Sixth Form Certificate or greater had been for a sexual health checkup or treatment in the previous year, compared to 21.4% of those whose highest qualification was School Certificate or who had no school qualification (Figure 29).



As with the effect of income on sexual health service utilisation, higher education may result in a greater awareness of the importance of sexual health screening and more knowledge of the range of services available.

Conclusion

STDs and HIV share common modes of transmission, and information on the epidemiology of STDs is now considered to be integral to the control of HIV (Connor et al. 1997). Male Call/Waea Mai, Tane Ma is the first large-scale survey containing data on a range of STDs affecting gay and bisexual men in New Zealand, and is relevant not only for the prevention of traditional STDs but also for strategic responses to the HIV epidemic.

The most common diseases reported by respondents were chlamydia/NSU (17.0%), penile gonorrhoea (13.6%), and anal warts (11.7%). A history of each of the other diseases was reported by less than 10% of the sample, although many of these may have a very low prevalence in the general male population and the rate found amongst this sample may therefore still be significant. It is difficult to draw conclusions about the rates for specific infections reported by respondents due to the limited amount of published data on STDs in New Zealand.

Grouping the infections enabled us to make some baseline comparisons and this was done by separating infections which were primarily sexually transmitted (STDs) from those for which there is some ambiguity as to the most likely mode of transmission (the hepatitis viruses A, B and C). These grouped infections were tested for association against other variables, and summaries of these statistical analyses are given below.

History of STD

Around two out of five respondents (37.1%) stated that they had a history of at least one of the eight STDs included in the questionnaire (other than hepatitis). Because it is impossible to obtain a representative sample of the msm population, we do not know how accurate this estimate is for all sexually active msm in New Zealand. It is less than the rate of 54.0% derived from the small sample of msm in the NZ Partner Relations Survey (Davis and Lay-Yee 1996), but consistent with the figure of 37.4% found in the 1996 Australian Project Male Call sample which employed a similar method of data collection (Crawford et al. 1998). Furthermore, the STD rate amongst respondents who had been for a sexual health checkup or treatment in the previous year (50.1%) was similar to that found amongst a sample of msm clinic attenders (47.7%) (Chetwynd, Chambers and Hughes 1992a).

These findings support the idea that msm in New Zealand experience a disproportionate burden of STDs compared to the rest of the sexually active male population. Davis and Lay-Yee (1996) found a rate of just 10.4% for their total male sample, and higher rates of lifetime STDs amongst msm were also found in several European surveys (Warszawski 1998). Some of the difference in these results may be due to a higher degree of sexual health awareness amongst msm communities, leading to greater levels of STD screening as well as a greater openness to disclose episodes of infection. However, this differential is hard to quantify, and to our knowledge has not been investigated in population-based research. A more likely explanation is that the difference is real, and is attributable to a higher prevalence of risky sexual behaviour including multiple sexual contacts (Warszawski 1998), the fact that a greater proportion of gay and bisexual men's partners also demonstrate high-risk activity (Ostrow 1990), and engagement in sexual practices such as anal sex which facilitate the transmission of certain infections.

A large number of associations were found between reporting a history of STD infection and various demographic, social milieu, sexual practice and related variables. However, four were found to be predictors of STD history over and above the effects of other variables. These were older age, having tested HIV positive, higher numbers of lifetime male partners, and having been to a public toilet in the previous year to look for male sex partners.

History of hepatitis

Around one in seven respondents (14.9%) reported a history of hepatitis. The most commonly reported were hepatitis B (8.0%) and hepatitis A (7.0%), with 1.8% reporting hepatitis C. The net rate for a reported history of hepatitis was also similar to that found in Male Call Australia 1996 (14.5%), although there is little comparable data available in New Zealand.

A large number of associations were also found between history of hepatitis and various demographic, social milieu, sexual practice and related variables. Independent predictors for hepatitis were older age, having tested HIV positive, number of lifetime male partners, reporting an episode of 'highly unsafe sex' with a casual male partner, having injected illegal drugs in the previous six months, and a non-Asian ethnicity.

Sexual health checkup or treatment

Respondents were also asked whether they had been for a checkup or treatment for sexually transmitted diseases in the year prior to the survey. A quarter (26.2%) of the

respondents reported that they had done so. Again a lack of comparable published data means that it is difficult to say whether this rate is higher than for non-msm males in New Zealand. An elevated rate of screening for STDs among msm would, as noted above, result in more infections being diagnosed and this could result in slightly higher STD rates being reported for msm.

Having been for a sexual health checkup or treatment in the previous year was found to be related to a number of different variables. Independent predictors of a checkup or treatment could roughly be divided into those associated with risky sexual behaviour and those associated with awareness of issues surrounding sexual health. These were young age, greater number of lifetime male sexual partners, knowing someone who is HIV positive, being attached to the gay community, having an income of \$20,000 or greater, a higher self-assessed HIV risk, and higher education.

Comments on main findings of interest

Extensive discussion of each of the independent predictor variables mentioned above is given in the main body of the report. However, four specific findings are highlighted here as they are of special interest.

Positive HIV status was associated with a history of STD and a history of hepatitis. This effect still held when controlling for the typical sources of correlation (ie. number of lifetime sexual partners, recent anal sex and recent injecting drug use). It is unclear whether this is due to immune suppression, a synergistic effect between HIV and other infections, or shared risk behaviours which were unable to be controlled for in the regression model (specifically unsafe sexual and injecting behaviour more than six months ago). Separate analyses for each infection would be required to properly estimate the strength of associations as this is likely to vary with different pathogens. This finding accords with an increasing amount of published research pointing to the important role of STDs in the transmission of HIV. The detection and treatment of STDs amongst HIV positive msm to reduce their level of viral shedding, similar measures for HIV negative msm to reduce their susceptibility to HIV infection, and generally raising awareness of the spectrum of problems presented by STDs and how to avoid acquiring them would be effective intervention targets (Cohen 1998). The treatment of STDs for HIV prevention purposes has already been trialed in rural Tanzania (Grosskurth et al. 1995) and Uganda (Wawer et al. 1999). The Tanzanian study recording a 42% reduction in HIV incidence after two years given a situation of low initial HIV prevalence, while few effects were observed in the "mature, generalised" epidemic in Uganda (Gray et al.

1999). Rothenberg, Wasserheit and St. Louis (1998) favourably assessed the potential impact of such interventions amongst HIV positive clinic attenders in the United States, although there is no published data relating specifically to developed countries or msm.

The importance of partner acquisition sites is emphasised by the HIV synergy evidence. Using bogs/public toilets to find sexual partners was independently found to increase the likelihood of exposure to STDs. Univariate analysis also revealed associations between multiple STD history and having been to places such as cruise clubs or beats. Because these sites attract men who are seeking immediate sexual encounters, it is likely that issues of sexual partner mixing and multiple-partnerships co-exist. These practices will amplify the transmission of infections amongst populations linked to these sites. Since the transmission of HIV is also likely to be augmented under these conditions, msm who use these places to look for sexual partners need to be aware of the higher level of past (and present) infection amongst these populations, as well as how to minimise the risks associated with these STDs.

No relationship was found between unsafe sex and STD history, a result which can be explained by the time differences between variables (ie. the uncertain association between recent risky behaviour and lifetime history of disease) and perhaps even more complicated issues (see for example Turner and Miller 1997 for a discussion of Zenilman's anomaly). In the context of some doubt surrounding the degree of sexual transmission of each hepatitis infection, it was therefore especially interesting to find that highly unsafe sex in the previous six months was independently associated with hepatitis history, although this effect may not hold for the individuals hepatitis infections separately. Potentially confounding factors such as other recent "sensation seeking" practices (e.g. injecting drug use) were controlled for, however highly unsafe sex could still be a marker for risk behaviours such as oral-anal sex which were not in the regression and are more likely to transmit hepatitis A than other STDs.

Finally, the findings of the analysis of sexual health checkup reinforce the importance of maintaining awareness and safer sex norms within the gay-identified community. Gay community attachment, knowing someone with HIV, and self-assessed HIV risk were independently associated with seeking a sexual health checkup in the previous year. Previous analyses have revealed that gay community attachment was independently associated with lower levels of unsafe sex and higher levels of HIV testing (see *Male Call/Waea Mai, Tane Ma Report No. 7: Gay Community Involvement*).

Periodic surveillance of STDs amongst msm in New Zealand is limited compared to that available in some other countries. In Australia large increases in gonorrhoea have been detected over the last five years (National Centre in HIV Epidemiology and Clinical Research 1999) with the highest concentration of cases believed to be amongst inner Sydney gay men (O'Donnell 1999). Although many msm may have traditionally viewed STDs as an "occupational hazard", the connections between STDs and HIV transmission present new concerns but also shared intervention opportunities. It is recommended that information systems be further developed in New Zealand so that STD infection amongst msm can be more closely monitored and the effectiveness of prevention and treatment programs properly evaluated.

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Appendix I: Statistical Analysis

Both simple univariate and multivariate logistic regression analyses were used to identify associations within the Male Call/Waea Mai, Tane Ma sample. In the simple univariate analysis, Chi-squared tests were used to test the hypothesis that two variables (e.g. history of STD and age group) are unrelated in the sample population. A low p-value suggests that the two variables are unlikely to be unrelated in our sample, and therefore that there is likely to be some association between them both. In this report we have used a cut-off point of $p=0.05$, and variables which returned p-values above this were not considered to have a statistically significant association.

In the logistic regression analysis, the effect of each variable on the outcome (e.g. self-reported history of STD) is measured whilst controlling for the effects of other variables in the model. Statistically significant variables identified in the logistic regression are subsequently defined as 'predictor' variables, since these have an effect over and above that (ie. independently) of other variables. The p-values associated with predictor variables can give some indication of which variables in the model are likely to have the strongest independent effect ("relative risk"). However, the Beta coefficients from which we can derive estimates of relative risk are not provided here.

This appendix gives more complete results of the logistic regression analyses relating to Sections III, IV and V. This includes fuller details of the variables used in the models, the p-values of the predictor variables, and direction of the results.

1. Self-reported history of STD

A logistic regression was used to investigate the effect of demographic, social milieu and behavioural variables on whether msm in the sample reported a history of STD. A total of 1657 respondents had complete information on all the variables and were included in the model. Of these 617 reported at least one STD.

Respondents who were more likely to report a history of STD were: those aged 40 or over, those who have tested HIV positive, those who had higher numbers of lifetime male partners, and those who looked for male sexual partners in a bog / public toilet (see Table 1).

Also, there was a marginally significant relationship between lower income and not reporting a history of STD ($p=0.07$), however this was above the cut-off point of $p=0.05$.

Table 1: Potential explanatory variables for history of STD and results of logistic regression analysis			
Variable	Details	P-value	
Age group	15-24, 25-39, 40+	<0.0001	
Ethnicity	NZ European, Maori, Pacific Island, Asian, Others	ns	
Income	<\$20,000 vs \$20,000+	ns	
Education	School Certificate or no school qualification vs higher	ns	
Place of residence	Main urban area vs other	ns	
Been paid for sex in last six months	Yes / no	ns	
Age of first sexual experience with a male	<12, 12-15, 16-19, 20-24, 25+	ns	
Gay community attachment	Score < 5, score 5+	ns	
Physical satisfaction from anal sex	Agree, disagree, no anal sex	ns	
Emotional satisfaction from anal sex	Agree, disagree, no anal sex	ns	
HIV-related knowledge	Correct / incorrect	ns	
Number of male partners in lifetime	1-5, 6-20, 21-50, 51+	<0.0001	
Number of female partners in lifetime	0, 1, 2-5, 6+	ns	
Sites been to to look for sexual partners: gay sauna	Yes / no	ns	
Sites been to to look for sexual partners: bogs	Yes / no	0.01	
Sites been to to look for sexual partners: gay bar	Yes / no	ns	
Had casual sex last six months	Yes / no	ns	
Had casual 'highly unsafe sex' last six months	Yes / no	ns	
Condom use for casual anal sex	No casual anal sex, sometimes or always used condoms, never used condoms	ns	
Have a regular male partner	Yes / no	ns	
Had sex outside regular relationship last six months	Yes / no	ns	
Condom use with regular partner	No regular anal sex, sometimes or always used condoms, never used condoms	ns	
HIV test status	Negative, positive, not tested	<0.0001	
Injecting drug use status last six months	Yes / no	ns	

2. Self-reported history of hepatitis infection

A logistic regression was used to investigate the effect of demographic, social milieu and behavioural variables on whether msm in the sample reported a history of hepatitis infection. A total of 1657 respondents had complete information on all the variables and were included in the model. Of these, 244 reported a history of hepatitis infection.

Respondents who were more likely to report a history of hepatitis infection were: those who were aged 40 or over, those who had tested HIV positive, those who reported highly unsafe sex with a casual partner, and those who have injected illegal drugs in the previous 6 months.

Respondents who were less likely to report a history of hepatitis infection were those of an Asian ethnicity and those reporting fewer lifetime male sexual partners (see Table 2).

Table 2: Potential explanatory variables for history of hepatitis and results of logistic regression analysis

Variable	Details	P-value
Age group	15-24, 25-39, 40+	<0.0001
Ethnicity	NZ European, Maori, Pacific Island, Asian, Others	0.01
Income	<\$20,000 vs \$20,000+	ns
Education	School Certificate or no school qualification vs higher	ns
Place of residence	Main urban area vs other	ns
Been paid for sex in last six months	Yes / no	ns
Age of first sexual experience with a male	<12, 12-15, 16-19, 20-24, 25+	ns
Gay community attachment	Score < 5, score 5+	ns
Physical satisfaction from anal sex	Agree, disagree, no anal sex	ns
Emotional satisfaction from anal sex	Agree, disagree, no anal sex	ns
HIV-related knowledge	Correct / incorrect	ns
Number of male partners in lifetime	1-5, 6-20, 21-50, 51+	0.001
Number of female partners in lifetime	0, 1, 2-5, 6+	ns
Sites been to to look for sexual partners: gay sauna	Yes / no	ns
Sites been to to look for sexual partners: bogs	Yes / no	ns
Sites been to to look for sexual partners: gay bar	Yes / no	ns
Had casual sex last six months	Yes / no	ns
Had casual 'highly unsafe sex' last six months	Yes / no	0.01
Condom use for casual anal sex	No casual anal sex, sometimes or always used condoms, never used condoms	ns
Have a regular male partner	Yes / no	ns
Had sex outside regular relationship last six months	Yes / no	ns
Condom use with regular partner	No regular anal sex, sometimes or always used condoms, never used condoms	ns
HIV test status	Negative, positive, not tested	<0.0001
Injecting drug use status last six months	Yes / no	0.01

3. Been for a sexual health checkup or treatment in previous 12 months

A logistic regression was used to investigate the effect of demographic, social milieu and behavioural variables on whether msm in the sample reported a history of hepatitis infection. A total of 1653 respondents had complete information on all the variables and were included in the model. Of these, 429 had been for a checkup or treatment.

Respondents who were more likely to have been for a checkup or treatment in the previous year were: those who were younger, those who had higher lifetime male sexual partners, those who knew one or more people with HIV, those with an income of \$20,000 or greater, those who were gay community attached, those with a high self-assessed HIV risk, and those with higher education (see Table 3).

Also, Maori and Pacific Island respondents were marginally more likely to have been for a checkup or treatment ($p=0.06$), although this was above the cut-off point of $p=0.05$.

Table 3: Potential explanatory variables and results of logistic regression analysis for been for a checkup or treatment in last 12 months		
Variable	Details	p-value
Age group	15-24, 25-39, 40+	<0.0001
Ethnicity	NZ European, Maori, Pacific Island, Asian, Others	ns
Income	<\$20,000 vs \$20,000+	0.02
Education	School Certificate or no school qualification vs higher	0.05
Place of residence	Main urban area vs other	ns
Been paid for sex in last six months	Yes / no	ns
Sexual identity includes heterosexual	Identified as heterosexual or not	ns
Sexual identity includes bisexual	Identified as bisexual or not	ns
Sexual identity includes gay	Identified as gay or not	ns
Sexual identity includes queer	Identified as queer or not	ns
Sexual identity includes takataapui	Identified as takataapui or not	ns
Gay community attachment	Score < 5, score 5+	0.02
HIV-related knowledge	Correct / incorrect	ns
Number of male partners in lifetime	0-1, 2-5, 6-10, 11+	0.0006
Had casual sex in last six months	Yes / no	ns
Had casual 'highly unsafe sex' last six months	Yes / no	ns
Condom use for casual anal sex	No casual anal sex, sometimes or always used condoms, never used condoms	ns
Have a regular male partner	Yes / no	ns
Condom use with regular partner	No regular anal sex, sometimes or always used condoms, never used condoms	ns
Had sex outside regular relationship last six months	Yes / no	ns
Experienced condom breakage last six months	Had one or more breaks in last 6 months, had 0 breaks, had not used condoms	ns
Number of people know who are HIV positive	One or more, none	0.01
Number of people know who have or have had AIDS	One or more, none	ns
Self assessment of risk of contracting HIV	Score 1-2, 3-4, 5-6, 7-8, 9-10	0.04
Injecting drug use status last six months	Yes / no	ns