# REVERSING A DANGEROUS TREND: REDUCING THE RISK OF HIV TRANSMISSION AMONG MSM IN VANCOUVER

by

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# APPROVAL

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# Abstract

This study considers policy alternatives aimed at reducing sexual risk-taking among men who have sex with men (MSM) in Vancouver. Using both quantitative data and qualitative research, the study identifies factors that influence sexual risk-taking and the relevant policy instruments for intervention. Using data collected in the *2007 Sex Now Survey*, a statistical analysis demonstrates that MSM under 30, those with more than five sexual partners and those who believe that antiretroviral treatment has made sex less worrisome have a higher probability of risk-taking, on average. Epidemic knowledge is found to decrease the probability of risk-taking, on average. Findings are used to determine the effectiveness of four policy alternatives, which are then ranked according to cost, equity and ease of implementation. Policy recommendations include: (i) the creation of a Research and Health Promotion Centre and (ii) the formation of an inter-agency working group.

**Keywords:** HIV; AIDS; MSM; Vancouver; risk-taking; public policy

**Subject Terms:** HIV Infections – Government Policy – British Columbia; HIV Infections – Risk Factors; HIV Infections - Prevention

# Dedication

To Barbara Jean, with her strength and support anything is possible.

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# 1: Introduction

It has been almost 30 years since the first cases of Acquired Immune Deficiency Syndrome (AIDS) were discovered among men who have sex with men (MSM). Three decades of research, education and prevention have slowed the spread of the Human Immunodeficiency Virus (HIV), the virus that causes AIDS, however, MSM continue to be disproportionately affected and infected. Large-scale prevention campaigns appear to have reduced the sexual behaviours that lead to HIV-transmission, however evidence shows that those reductions were not sustained. Sexual risk-taking is again on the rise among MSM in the developing world, specifically in Vancouver, British Columbia, where after a period of stability, the proportion of men reporting activities which could transmit HIV has increased from about 25% to 37% in 2007 (Trussler, 2008).

This study employs a literature review, elite interviews and a quantitative analysis to better understand the causes of sexual risk-taking among MSM in Vancouver and then proposes four policy alternatives for reducing that risk. A set of criteria are used to assess and compare the alternatives before recommendations are made.

My study is organized in the following way: Section Two presents the historical relationship that has existed between HIV and MSM locally and in the North American setting. Section Three defines sexual risk-taking as a policy problem that is contributing to HIV transmission. In Section Four, I conduct a literature review to explore contemporary research on sexual risk-taking, while Section Five presents the findings of expert interviews conducted with public health officials and community activists who work with HIV/AIDS. Section Six outlines the procedure for quantitative analysis, while Section Seven presents the findings from that analysis. In Section Eight, four policy alternatives are discussed, and then assessed and compared

in Section Nine. Section Ten concludes the study with policy recommendations for reducing

sexual risk-taking among MSM in Vancouver and as a result, reducing the transmission of HIV.

# 2: Historical Background of HIV & MSM

Since the first AIDS diagnosis in 1981, the disease and the virus that causes it, HIV, has disproportionately affected homosexuals and MSM, more than any other population in North America. In British Columbia, the number of new diagnoses appears to be declining or remaining stable among most at-risk populations such as injecting drug users (IDU), but statistics on MSM show an increased number of new infections (Haag, 2008). This section details the history of HIV and its continued impact on the MSM community.

## 2.1 The Origins of HIV

In the late 1970s and early 1980s, doctors in New York and California started noticing an increase of young gay men with rare cancers and pneumonias that were traditionally associated with the elderly and immune-compromised (MMWR Weekly, 1981). In June of 1981, the Centre for Disease Control (CDC) published a report documenting the unexplained cases and created a task force to study the causes (Sepkowitz, 2001). This new disease affecting homosexuals was originally known as the 'gay cancer', 'gay compromise syndrome', and then 'GRID' or 'Gay Related Immune Deficiency' (Brennan & Durack, 1981). Seven months after the creation of the CDC task force, in December 1981, officials started to acknowledge that the disease affected other population groups, as the first cases of Pneumocystis Carinii Pneumonia (immuno-compromised related pneumonia) were reported in injecting drug users (Robertson, 2005). Despite evidence that this new disease was not limited to MSM, the actual number of infections showed that AIDS was very much a gay disease. By the end of 1981, there were 180 reported cases of AIDS, 92% were MSM (Robertson, 2005).

In early 1982, medical professionals began referring to the new condition as AIDS - Acquired Immune Deficiency Syndrome (Sepkowitz, 2001). In 1983, AIDS Vancouver became the first AIDS service organization in Canada (AIDS Vancouver, 2009). As the pathological and epidemiological understanding of AIDS developed, the virus found to cause AIDS was isolated and eventually titled Human Immunodeficiency Virus (HIV) in 1986 (Robertson, 2005). As risk factors were determined, HIV prevention campaigns targeting gay men and MSM proved to be effective in increasing testing uptake and reducing behaviours that risked HIV transmission (Stall et al, 2000).

Despite a growing number of HIV infections and AIDS cases, there were very few public health policies initiated and funding for research and prevention was scarce. In 1983, Health and Welfare Canada set up an Ad Hoc Task Force on AIDS (Roberston, 2005). That same year Canadian doctors and community activists began to seek funding for research in Toronto, Montreal and Vancouver. As the epidemic in the US grew, thousands of Americans died. By the time President Ronald Reagan addressed HIV/AIDS at the 1987 AIDS Conference in Washington, more than 36,000 Americans had been diagnosed, over 20,000 had died, and the disease had spread to 113 countries (White, 2004). That same year, British Columbia reported 929 new HIV infections, the highest number of new infections ever experienced in this province (Haag et al, 2008).

## 2.2   HIV & MSM in Canada

At the end of 2005, Health Canada estimates that 58,000[1] people were living with HIV infection (including AIDS) in this country. Of this number, 29,600 were MSM, making up 51.0% of the total number of people living with HIV. Of those newly diagnosed, MSM accounted for

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[1] Since surveillance data can only describe the diagnosed portion of individuals with HIV, modelling and additional sources of information were used to estimate the number of undiagnosed Canadians. It is estimated that 15,800 Canadians, 27% of those infected, are undiagnosed and unaware (Boulos et al, 2005).

45.0% of new infections, up from 42.0% in 2002 (Boulos et al., 2006). This is a significant decrease from the 1980s, when MSM accounted for 75.0% of new infections, however, the HIV/AIDS epidemic continues to disproportionately impact the MSM community in Canada.

## 2.3 HIV and MSM in British Columbia

According to the *2007 Annual AIDS Report* by the BC Centre for Disease Control, the number of HIV tests performed in BC grew steadily, and sometimes dramatically, between 1985 and 1996 (Haag et al, 2008). In 1985, the number of performed HIV tests totalled 1362; by 1996, that number had grown to 138,022. During this period, HIV testing became a regular part of sexual health for many informed MSM. As the number of tests performed increased, so did the number of new HIV diagnoses. In 1985, there were 220 HIV infections reported in BC, by 1996 this number had reached 702 (Haag et al, 2008). A sharp decrease occurred between 1996 and 1999, when the number of HIV diagnoses dropped to 416 and remained stable for the next seven years. In 2007 there were 395 new HIV diagnoses in BC (Haag et al, 2008).

Between 1985 and 2007, there were 13,003 HIV infections reported in BC. Of those, MSM accounted for 47.0% (6056) of those infections, followed by injecting drug users (IDU) at 21.0% (2794) and heterosexual contact at 11.0% (1434) (Haag et al, 2008). Similar to other risk categories, the number of MSM who became HIV-positive decreased sharply between 1996 and 1999, but unlike other risk categories (IDU and heterosexual contact), the decrease was not sustained. Figure 1 shows that since 1999, the number of new HIV diagnoses among MSM has resumed an upward trend, while others have remained stable. In 1999, MSM accounted for 25.0% (105) of total infections, in 2007 that same risk category accounted for 43.0% (171) of total infections (Haag et al, 2008).

*Figure 1       Number of New HIV Diagnoses in BC by Risk-Category (1996 – 2007)[2]*
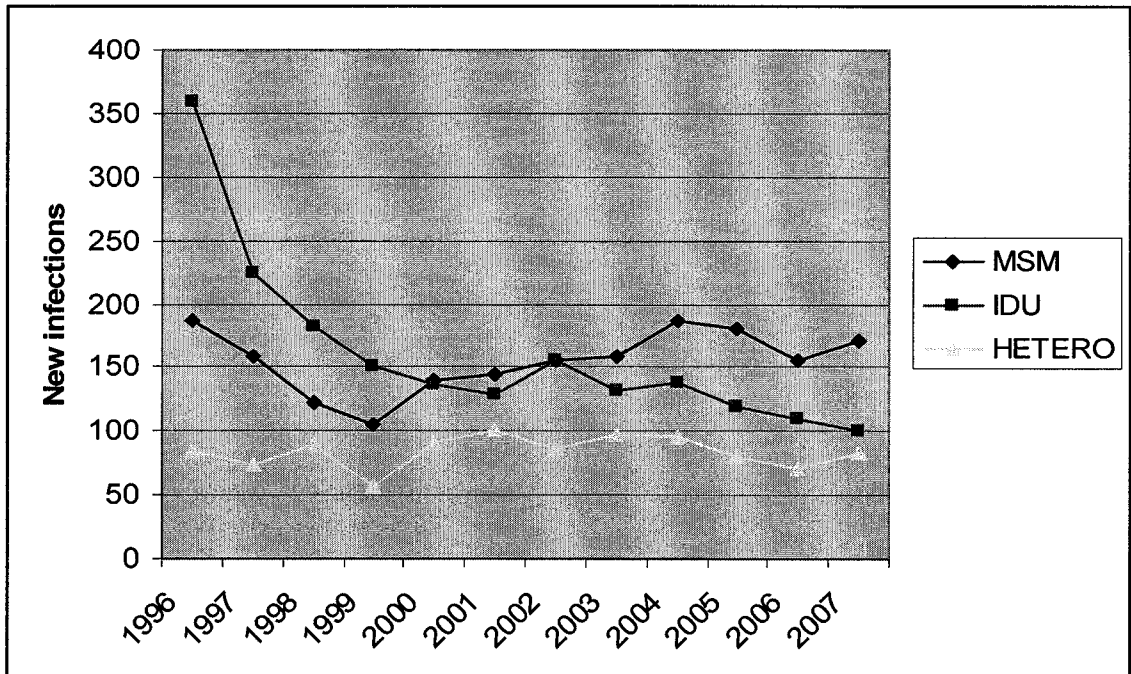


A study of MSM in Vancouver conducted in the 1990s showed HIV prevalence among gay and bisexual men in Vancouver to be somewhere between 15.0 - 20.0% (Strathdee et al, 2000). Results from a more recent study conducted in Vancouver indicate that 16.1% of those surveyed self-identify as being HIV-positive (Gilbert et al, 2009). These percentages, while restricted to a sub-group of the Canadian population, are comparable to HIV statistics in Sub-Saharan Africa, where countries like South Africa and Zimbabwe have prevalence levels of 15.0% or more (UNAIDS, 2009).

In terms of AIDS (the result of advanced HIV infection), there have been 4169 cases reported in BC since 1983, of those, MSM accounted for 66.0% with 2761 reported AIDS cases (Haag et al, 2008). Injecting drug users make up the second largest risk category, with a total of 530 reported AIDS cases and heterosexual contact accounting for 289. According to the *2004 Health Canada Community Health Survey*, 1.9% of adult males identify as homosexual or

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[2] Statistics reported in Figure 1 were obtained using the 2007 Annual AIDS Report (BC CDC).

bisexual, yet in 2007, MSM accounted for 43.0% of new HIV infections and 66.0% of total AIDS cases in BC (Haag et al, 2008).

**Lessons from the late-1990s**

The sharp decrease of HIV infections in the late 1990s led to a belief that HIV was under control among MSM (Gilbert, 2009). Prevention messaging had been effective, the number of newly diagnosed was down and new treatments meant that fewer people were dying of AIDS (Stall et al, 2000). The period between 1996 and 1999 is an important time in the fight against HIV/AIDS, as it is the only time since the discovery of HIV that the number of new MSM infections decreased for four consecutive years. Table 1 provides an overview of the number of new HIV diagnoses among MSM in BC since 1996.

*Table 1:    Number of New HIV Diagnoses among MSM*

|  | 1996 | 1997 | 1998 | 1999 | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MSM | 160 | 143 | 116 | 95 | 129 | 128 | 145 | 145 | 168 | 169 | 142 | 161 |
| MSM/Injecting Drug Users | 27 | 15 | 6 | 10 | 10 | 17 | 11 | 14 | 18 | 12 | 14 | 10 |
| **Total MSM** | **187** | **158** | **122** | **105** | **139** | **145** | **156** | **159** | **186** | **181** | **156** | **171** |
| Total Number of New HIV Diagnoses | 702 | 519 | 471 | 416 | 400 | 420 | 418 | 409 | 441 | 400 | 357 | 395 |
| **% of Total Diagnoses who were MSM** | **26%** | **31%** | **26%** | **25%** | **35%** | **35%** | **37%** | **39%** | **42%** | **45%** | **44%** | **43%** |

**Source: BC CDC, 2007 Annual AIDS Report**

In order to replicate the success of the late-1990s, it is important to understand the factors that led to the steep decline in newly diagnosed infections, and the subsequent increase. By the

late 1980s, MSM had greatly reduced their high-risk sexual behaviour, however researchers had started describing the difficulties of maintaining sexual risk reduction over a long period. The notion of 'condom fatigue' was discussed around this time and by the end of the 1990s, reports showed that risk-taking was again on the rise among MSM (Stall et al, 2000).

How could sexual risk-taking be increasing, but rates of new diagnoses decreasing? Most researchers point to the widespread use of antiretroviral (ARV) medications as a possible explanation (Anema et al, 2008). ARVs reduce the count of HIV in the blood stream, known as the viral load. Individuals on ARVs have a reduced and sometimes 'undetectable' viral load. Low and undetectable viral loads mean the individual is much less contagious and the chances of infecting another with HIV are reduced (Cohen et al, 2007). When many members of the community are on ARVs, their 'community viral load' is reduced, as fewer people are infectious. When ARVs were first introduced, most MSM with HIV started the treatment (Trussler, 2009), reducing the community's viral load.

Another explanation is that as public health officials were promoting condom use, MSM began employing their own harm reduction and prevention techniques. Two tactics include sero-sorting, where persons choose a partner who status is the same as theirs, in order to prevent transmission (Cairns, 2006) and sero-positioning, where persons choose to be the insertive or receptive partner based on their HIV status (Philip et al, 2008). Both of these harm reduction techniques reflected a shift in decision-making among MSM where condom use could be negotiated, and depending on specific contextual factors, could be abandoned altogether.

# 3:    Sexual Risk-taking as a Policy Problem

While the number of new HIV diagnoses among MSM in British Columbia continues to rise, so has the reported incidence of risk-taking behaviour among this population. Data suggests that the risk reduction gains that were achieved through large-scale prevention campaigns were not sustained (Strathdee et al., 2000). A 2007 survey of MSM in BC found that 42.0% of gay men under the age of 30, and 35% of those 30 and over, have had sex that risked transmission for HIV in the past twelve months (Trussler, 2008).

Given the high prevalence of HIV in this community, why are some men who have sex with men in Vancouver engaging in sexual risk-taking? Sexual risk-taking among MSM is problematic for a number of reasons, including the economic and social costs, as well as the individual's reduced quality of life and premature death. With such a high number of MSM engaging in sexual risk-taking, this study will focus on why some MSM are engaging in risk taking and then offer policy alternatives to reduce that risk, and consequently, the number of new HIV infections.

As mentioned, the economic and social costs associated with HIV infection are many. The Human Immunodeficiency Virus (HIV) develops into Acquired Immune Deficiency Syndrome (AIDS), a chronic, terminal illness of the immune system. On an individual level, AIDS-related infections, known as opportunistic infections, can be painful and dehabilitating, resulting in premature loss of life. From a community perspective, HIV has negatively affected the MSM population, contributing to an existing stigma and further stereotyping gay men as sick and diseased. As a nation with universal health care, HIV infection and eventually AIDS is very expensive to treat and results in shortened working life spans, high health care costs and of course, devastating impacts on individuals, families, and communities. In 1999, Health Canada

estimated the cost of HIV/AIDS treatment in Canada to be $560 million dollars that year, not including the $40 million spent on the Canadian AIDS Strategy for prevention and community support (Dodds et al, 2001). Social costs such as loss of productivity, absence from work, sick days, and long or short-term disability, were estimated to be 2.4 times the amount of treatment costs, totalling 1.4 billion. By these estimates, HIV/AIDS cost Canadians over 2 billion dollars in 1999 (Dodds et al, 2001). With inflation and rising treatment costs, this amount would have certainly increased since 1999. Antiretroviral medications reduce the cost of HIV/AIDS by allowing patients to live more productive lives, but they also increase treatment costs by prolonging the number of years a patient needs treatment. Every year hundreds of new infections occur in BC alone, requiring a larger portion of an already extended health care budget. Men who have sex with men (MSM) make up over 40 percent of those new infections (Haag et al, 2008).

In 1999, the province of British Columbia recorded its lowest number of new HIV infections among the MSM risk category. With only 105 new HIV infections, the epidemic seemed under control among MSM. I would argue that even at this low point, 105 new HIV infections is still too high and too costly, but since it is the lowest number in the history of HIV testing in the province, it should be used as a baseline for achievement or an objective of policy-makers.

The HIV epidemic has far-reaching consequences that are all felt by all Canadians. It is therefore in the interests of policy-makers to address the problem of increased sexual risk-taking among MSM in Vancouver in order to reduce the number of new HIV infections. Using a literature review, elite interviews, and quantitative analysis, this study will look at policy alternatives for reducing sexual risk-taking, with the long term objective of reducing new HIV infections among this population.

# 4:    Literature Review

Despite large-scale and widespread HIV-prevention campaigns in the 1980s and 1990s, sexual risk-taking among men who have sex with men is on the rise (Trussler, 2008). This section examines scientific and policy-oriented public health articles in order to better understand the causes of sexual risk-taking, as well as proposed measures to reduce that behaviour. I cover academic articles and draw information from specialized websites. Priority is given to articles that were relevant to/in Canada.

## 4.1    The Role of Testing

One of the factors found to increase sexual risk-taking are unknown infections, since MSM who are unaware of their HIV status, or assume that they are negative, are more likely to engage in sexual risk-taking (Marks et al, 2005). This is problematic given the relatively high proportion of MSM who are unaware of their status, as reflected in the most current surveillance studies on MSM in Canada. The M-Track Survey is a 'second-generation' surveillance system lead by the Public Health Agency of Canada, that is designed to track the prevalence of HIV, Hepatitis C, and other sexually transmitted infections and their associated risk behaviours, in sentinel sites across the country. The survey, which is organized and implemented by local study teams in each city, involves anonymous collection of dried blood specimens and self-administered questionnaires. The Argus study (Lambert et al, 2006), which was the name of Montreal's M-Track site,  determined that 23.0% of HIV-positive MSM were unaware of their infection, and while the Toronto and Ottawa-based study concluded that 17.0% of those surveyed were HIV positive, but not aware of their infection (Remis et al, 2008). Of those MSM who participated in the British Columbia based *2007 Sex Now Survey*, 30.5% had not tested in the

previous 12 months and 13.6% had never tested. It is predicted that persons unaware of their HIV positive status account for 55.0% of new HIV infections (Brenner et al, 2007). Since HIV positive MSM have been found to reduce their sexual risk-taking after being diagnosed with HIV (Marks et al, 2005), testing and diagnosis is crucial for prevention efforts.

Other research has found that there is a period of hyper-infectiousness that occurs shortly after contracting HIV. MSM with acute HIV infection have a higher viral load than those who have had the virus longer (Pilcher et al, 2005). This further complicates sexual risk-taking among MSM, since during this period of very high concentrated viral load, people are the most contagious, resulting in potentially half of onward transmissions in the North American setting (Brenner et al, 2007). Again, this is the result of persons engaging in sexual risk-taking because they believe they are HIV-negative, but in fact, are HIV-positive and hyper-infectious, and do not know it.

Unknown infections and the hyper-infectiousness that follows a new infection are made more problematic as incidence of sexual risk-taking increases. Currently, most testing guidelines encourage MSM to wait three to six months after an exposure before being tested. This is counterintuitive to the discovery of the hyper-infectious period, as it does not last three months (Pilcher et al, 2005). By the time the window period is over, the infected individual would have already gone through a phase of very high viral load, with a high probability of transmitting the virus to anyone who is exposed.

The Enzyme-Linked Immunosorbent Assay (ELISA) is the most widely used HIV test in Canada. It does not detect the HIV virus, instead it identifies HIV antibodies in the blood which are produced by the body's immune system. All HIV tests have some sort of window period. For the ELISA test, the window period is the time it takes for a person who has been infected with HIV to react to the virus by creating antibodies. The disadvantage to ELISA is that it can take up to three months for antibodies to reach detectible levels (Public Health Agency of Canada, 2006).

Recently infected individuals are highly infectious, with millions of copies of the virus in their blood, yet ELISA would test negative for HIV antibodies.

Earlier detections allow for earlier partner notification, counseling and treatment, which is argued, would reduce sexual risk-taking and the number of new infections (Public Health Agency of Canada, 2006). Researchers point to Nucleic Acid Amplification Test (NAAT), which detects ribonucleic acid, part of the HIV virus, as a possible solution to the lengthy window period. NAAT is able to detect HIV within the first week of exposure. NAAT is not a new technology. In Canada, it has been used for newborns since 1993 and the Canadian Blood Services have used NAAT to screen every unit of blood since 2001. Yet, ELISA is still the standard test used in Canada and around the world. The reason for using the ELISA over the NAAT appears to be cost. ELISA costs about $10.00 to administer, but NAAT costs about $60.00 (Boyce, 2007).

## 4.2   The Role of Treatment

Vancouver-based Dr. Julio Montaner, Director of the BC Centre for Excellence, was recently appointed President of the International AIDS Society for his research on antiretroviral (ARV) medications as a prevention tool. His research has shown that ARVs can be used to reduce the risk of HIV transmission by reducing the viral load of those infected with HIV, making them virtually non-infectious. When the overall 'community viral load' is reduced, the risk of new infections is also reduced. Proponents of this initiative point to the dramatic decrease of new HIV infections reported from 1996 – 1999, the years that ARVs were first introduced as treatment options (Cohen et al, 2007). During these years, the International AIDS Society recommended that patients with a CD4[3] count of 350 - 500 may be considered for a deferral of treatment, given the risk of adverse effects and potential for drug resistance. Therapy was

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[3] CD4 cells are lymphocytes found in the white blood cells that the body uses to fight viral infections. The HIV virus kills CD4 cells. The lower the CD4 count, the higher probability of opportunistic infections and AIDS mortality.

recommended for those with a CD4 count below 350, in order to increase survival and reduce morbidity (Carpenter et al., 1998). By 2002, the same panel which made recommendations in 1998 concluded that there was no proof that starting ARVs before the CD4 count reached 200 would increase survival benefit (Yeni et al., 2002). These same recommendations were made again in 2004 (Yeni et al., 2004). It is during this time period that doctors began recommending that patients start therapy later in order to avoid toxicity and adverse affects of medications. It is during this time that sexual risk-taking began to increase among MSM (Stall et al, 2000) and so did the number of new HIV infections (Haag et al, 2008).

In 2008, a shift in protocol occurred. Studies in Switzerland, Spain, Thailand, Taiwan and Uganda demonstrated the effectiveness of ARVs in reducing viral load and chances of infection (Cohen et al, 2007). The Swiss National AIDS Commission put forth a statement suggesting that people with HIV who adhere to ARVs, who have undetectable viral loads and who have no sexually transmitted infections are not infectious (Anema et al, 2008). The idea of using ARVs as a prevention tool soon became highly publicized.

There are several limitations to using treatment as a prevention tool. Firstly, in order to receive HIV treatment, an MSM must know they are HIV-positive. As discussed, the literature suggests that 17.0% of MSM in Toronto (Remis et al, 2008) and 23% of those in Montreal (Lambert et al, 2006) are unaware of their HIV-positive status. Secondly, there is a period between the time of HIV infection and the need for HIV treatment that can last years. During that time, MSM will not qualify for ARV treatment because they are too healthy (a CD4 count above 350), meaning they will remain infectious. It should also be noted that using ARVs as a prevention tool is not an option for those unaware or newly diagnosed.

Another concern around using treatment for prevention is its effect on community norms around sexual risk-taking. Critics of the 'treatment as prevention' approach point to a study in San Francisco (Katz et al, 2002) that found the preventive impact of expanded ARV treatment

may be overridden by increases in HIV associated risk behaviours. The study found that widespread access to ARVs among MSM did not reduce HIV incidence and was associated with elevated risk-taking (Katz et al, 2002). Treatment is an important component of HIV prevention, but it must be accompanied with adequate education in order to offset the potential for increased risk-taking.

## 4.3    The Role of Mental Health

Researchers in the US have started to study the syndemic nature of HIV and other illnesses. Syndemic refers to the concentration of two or more health conditions in a population where there is some level of biological interaction among the conditions that magnifies the consequences of one or both. In the case of MSM, one of these relationships is between mental health and HIV. According to Dr. Ron Stall at the University of Pittsburgh, "the connection among these epidemic health problems and HIV/AIDS is far more complex than a 1-to-1 relationship; rather it is the addictive interplay of these health problems that magnifies the vulnerability of a population to serious health conditions such as HIV/AIDS" (Stall et al, 2003). His research has shown that mental health issues are endemic and often undiagnosed in the MSM community (Stall et al, 2003). Mental illness can translate into low self-esteem and a higher number of sexual partners and transient sexual relationships, resulting in an increased likelihood of sexual risk-taking (Weber et al, 2002).

There is still a great deal of stigma associated with mental illness (Russell et al, 2004) which prevents many people from accessing services such as counselling. Many MSM are suspicious of the medical system as they have had negative experiences in the past (Kubicek, 2008). There needs to be more work done in terms of mental health outreach within the MSM community. Before outreach can be initiated, treatment should be available once a diagnosis has been made. There is no point diagnosing MSM with mental illness if there are no clinical or therapeutic services available to them. Given the high rate of chronic mental illness within the

MSM community, it would seem reasonable for there to be a variety of accessible mental health services and resources for MSM, especially in an urban setting such as Vancouver.

## 4.4   The Role of Community

In the early 1980s, North American community organizations were the first to respond to the AIDS crisis (Stall et al, 2000). Organizations such as AIDS Vancouver were founded primarily by gay men and their allies, to address the growing crisis affecting MSM. These charities and community organizations raised funds and awareness for HIV/AIDS through education and prevention campaigns and were the first to offer services to people with AIDS (Canadian Strategy on HIV/AIDS, 2000). As the epidemic continued to disproportionately affect the MSM population, HIV dominated many discussions around gay men's health.

Recent literature points to an emerging paradigm and practice shift occurring in Canada, the US, Australia and the UK, in terms of HIV prevention among MSM. The shift is focusing on gay men's health as a holistic approach, not just situated in the context of HIV/AIDS (Canadian Strategy on HIV/AIDS, 2000). The new paradigm looks at why MSM are so vulnerable to HIV infection. It is a shift to pre-existing services that started to form in the 1970s, before gay men's health initiatives focused on the AIDS crisis.

As new models of health provision were adopted by Health Canada and the provincial health ministries, there has been an increased focus on the social determinants of health (Canadian Strategy on HIV/AIDS, 2000a). It is now commonly accepted that there are certain social factors that influence one's health – income, education, physical and social environments to name a few. The social determinants of health have been used to explain the high incidence of HIV among MSM (Canadian Strategy on HIV/AIDS, 2000a). Since MSM have fewer social support networks, fewer physical environments to congregate, poor working conditions due to homophobia and limited access to health services, it seems only logical that their health status as

a population is reduced. Qualitative research has shown there to be a need to address HIV in the larger context of gay men's health (Stall et al, 2003), since HIV transmission and infection are closely linked to a person's health conditions.

Currently HIV/AIDS prevention is primarily delivered by AIDS service organizations. In Canada, there are two organizations that are dedicated to gay men's health: Sero Zero in Montreal and the Health Initiative for Men (HIM) in Vancouver. Funding for HIM is provided by Vancouver Coastal Health, as part of their HIV/AIDS community programming, but in most jurisdictions, including Vancouver until recently, funding for community-based projects focusing on gay men's health, rather than HIV prevention, has not been easy to obtain (Sero Zero, 2000c).

## 4.5  Summary

The rise in sexual risk-taking among MSM is the result of many converging factors, including endemic mental health issues and a change in sexual norms within the community. The increased sexual risk-taking is made more problematic by unknown infections, particularly the acutely infected who are believed to account for 55% of new infections. The good news is that advances in bio-medical technologies offer new choices for public health officials wanting to address the HIV epidemic. These interventions seek to contain the epidemic, but may be having an inverse effect on sexual risk-taking, offsetting prevention efforts and contributing to an increase in risk. There is a need to address the health concerns of MSM in a greater context than just HIV, since other illnesses may be having a positive impact on sexual risk-taking and HIV transmission. To better understand the issue of sexual risk-taking among MSM in Vancouver, five key informant interviews were conducted to further understanding of the factors influencing risk and HIV transmission locally.

# 5: Key Informant Interviews

This section summarizes the major themes discussed during five key informant interviews. While the interviews are referenced in other sections, this section focuses on the factors associated with increased sexual risk-taking and HIV transmission in Vancouver. The informants were selected based on their expertise in HIV/AIDS: Dr. Robert Hogg, researcher at Simon Fraser University and the BC Centre for Excellence in HIV/AIDS, Dr. Mark Gilbert, a physician and epidemiologist at the University of British Columbia and the BC Centre for Disease Control, Dr. Reka Gustafason, Medical Health Officer with Vancouver Coastal Health, Dr. Terry Trussler, Research Director of the Community Based Research Centre and Phillip Banks, the Executive Director for the Health Initiative for Men. Informants were asked four open-ended questions. Interviews lasted between 30 – 60 minutes, depending on the availability of the informant, and took place between March 17th and March 25th, 2009.

## 5.1 'The End of an Era'

When asked about the dramatic decrease in new HIV diagnoses between 1996 – 1999, all five informants discussed the impact of antiretroviral therapy on the 'community viral load' and the reduced infectiousness associated with treatment. Both Dr. Gilbert and Dr. Gustafson were quick to point out that the number of new diagnoses does not necessarily indicate the number of new infections, only those that actually tested HIV positive. Dr. Trussler discussed the 'end of an era' of gay community and connectedness. According to him, the MSM community was more solidified in the late-90s, but with the advent of the internet, MSM, like the rest of the population started to become more individualised and segregated into pockets and niches, reducing the sense of community (Trussler, 2009).

As supported by the literature, the informants found the reduced number of new diagnoses was the result of a convergence of factors. According to Dr. Trussler and Dr. Gilbert, sexual safety was still rooted in community norms in the late-1990s and ARVs were widespread, "everyone was on them, 1998 saw the largest number of new ARV patients" (Trussler, 2009). Several of the informants discussed the impact of death within the community and its relationship to sexual risk-taking and new diagnoses. Since MSM were dying from AIDS, they were less likely to infect others, but their deaths also created a fear within the community that has decreased with the introduction of ARVs (Gilbert, Gustafson, Banks, 2009). In 1996, MSM were still very much aware of the consequences of HIV, which at the time, was a premature death.

## 5.2    Increase in New Diagnoses

Informants mentioned the effect of taking people off their HIV medications as a potential explanation for the increase in new diagnoses. In the late-1990s there was an aggressive push to get people on ARVs (Trussler, 2009), but it soon became clear that treatment was too expensive and too toxic to sustain for as long as people would live. "A lifetime of toxicity was not an option" (Banks, 2009). At the same time people were being taken off their medications by doctors, there was an increase in risk-taking among MSM in the community (Gilbert, Gustafson, Trussler, Banks, 2009). The popularity of the internet had an impact as well, as it was changing the way MSM had sex. In 2002, only 17.0% of MSM surveyed in the Sex Now Survey indicated finding their most recent sexual partner on the internet, by 2008 that number had increased to 61.0% (Trussler, 2009).

Another explanation is the changing attitudes of gay men toward HIV infection. In the 1980s and 1990s, people with HIV were considered unknowing victims of an epidemic. By 2000, there was a sense of 'you should have known better' (Banks, 2009). As stigma around HIV increased, HIV-positive MSM became less likely to disclose. Younger MSM now have the impression that they do not know someone with HIV, and that it is not possible for someone like

them to contract it, which could mean that younger men have a sense of false security when it comes to HIV (Banks, 2009). This notion is supported by the regression analysis in section seven which finds young MSM have a higher probability of engaging in risk-taking.

To effectively reduce sexual risk-taking and consequently the transmission of HIV, the factors contributing to sexual risk-taking will need to be studied more closely. In the next two sections, a quantitative analysis of the *2007 Sex Now Survey* will be conducted to determine why some MSM engage in sexual risk-taking and others do not.

# 6: Quantitative Analysis: Sexual Risk-taking in Vancouver

Building on the findings from the literature review, sections six and seven employ quantitative data analysis to investigate sexual risk-taking in Vancouver. The quantitative portion includes empirical estimations using data from Vancouver's *2007 Sex Now Survey*, an online, cross-sectional survey of men who have sex with men (MSM). The purpose of the econometric analysis is to identify the factors that influence sexual risk-taking among MSM in Vancouver.

## 6.1 Sample

The data used in this study were collected by the Community Based Research Centre (CBRC), a non-profit organization located in Vancouver. The CBRC first conducted their *Sex Now Survey* of MSM in British Columbia in 2002. The survey was offered again in 2004, 2006, 2007 and 2008. The analysis in this study is based on the results of the 2007 survey. Data were collected between the months of August and December 2007, using an online survey that was promoted in gay media, a float in Vancouver's Pride parade, and a booth at a community festival with thousands of promotional items. Online recruitment was done through banner ads, email networks and an advisory committee of professional networks (Trussler, 2008). A total of 1550 respondents answered the questionnaire (see Appendix A for a copy of the questionnaire). Respondents who identified as women, those living outside of Vancouver and those who reported no sexual activity over the past 12 months were removed from the sample. Four cases had missing responses and were removed from the sample. Hence, the remaining 958 respondents are male Vancouver-residents who have had sex with a man in the past 12 months.

## 6.2 Basic Model

The following model is used to estimate the impact of variables on sexual risk-taking among MSM in Vancouver:

$$Risk = f[Demography, Behaviour, Social Stress, Knowlege, ARVAssumption]$$

where risk is a function of groups of variables concerning demography, behaviour, social stress, knowledge and ARV assumptions, identified in previous studies on sexual risk-taking among MSM.

## 6.3 Dependant Variable, RISK

For men who have sex with men, HIV is primarily transmitted through sexual acts, specifically unprotected anal intercourse. While oral sex that does not involve ejaculate is considered to be a negligible risk for HIV transmission, the existence of pre-ejaculate or semen increases the risk of HIV transmission, further increased if wounds or sores exist in the mouth, creating a point of entry for the virus. Transmission of HIV through oral sex is difficult to measure, as most sexual experiences that involve anal sex also involve oral sex (Public Health Agency of Canada, 2007).

The physiological nature of anal intercourse makes it more risky for HIV transmission. Since the rectal lining is easily damaged, anal intercourse often results in small tears in the lining that increase the risk of HIV transmission. HIV infected blood can enter the urethra infecting the insertive partner, but it is much more likely that HIV infected semen will enter the blood stream of the receptive partner (Weber et al, 2002). Since research has found both insertive and receptive anal intercourse to be high-risk for HIV transmission (Buchbinder et al, 2005), anal intercourse, regardless of position, will be considered in this study.

The proper use of latex condoms reduces the risk of HIV transmission by 90.0 - 95.0% (Pinkerton & Abramson, 1998). That number drops to 85.0% when condom failure (slippage and breakage) is taken into consideration (Stone et al, 1999). Since condom use reduces the risk of HIV transmission by 85.0 – 95.0%, unprotected anal intercourse would be considered high-risk sex. However, that risk is reduced to nil if both partners know the other is HIV-negative. Therefore, that risk is increased if it involves a partner whose HIV status is not known. For the purposes of this study, the dependant variable, RISK, is defined as having unprotected anal intercourse with a partner whose HIV status is unknown.

In order to measure RISK, several questions on the survey had to be collapsed and recoded. Question # 34 - "In the last 12 months, how many guys have you fucked WITHOUT a condom whose HIV status you did NOT KNOW?" and question # 36 - "In the last 12 months, how many guys have fucked you WITHOUT a condom whose HIV status you did NOT KNOW?" were collapsed to remove the distinction between insertive and receptive anal sex. The data was then recoded so that responses were organized into 'None' and '1 or more'. For the purpose of this study, MSM who engaged in unprotected anal intercourse with '1 or more' partner of unknown HIV status in the previous 12 months is defined as a risk-taker. Since some of the MSM reported both insertive and receptive anal intercourse, the total was adjusted to prevent any duplication. The final binary total of MSM who engaged in unprotected anal intercourse with a partner of unknown HIV status is 375, or 39.1% of the total sample.

Although it is not used as the measure for risk-taking in this study, question # 16 on the survey asks, "Have you had sex that risked HIV transmission in the last 12 months?" It is worth noting that 414 men, or 43% of the sample, answered 'Yes' to this question. The 4% difference is a consequence of self-reporting. It would appear that when self-reporting, some MSM use a broader definition of what constitutes risk than simply unprotected anal intercourse with a partner

of unknown HIV status. This could be the result of conflicting health information regarding the risks associated with oral sex and other sexual activities.

## 6.4 Explanatory Variables

Outlined in this subsection are the twenty-one explanatory variables considered in this study, the rationale for choosing each variable, how it was measured in the *2007 Sex Now Survey*, the variable name used in the estimation equation and the expected impact (positive or negative) on risk-taking. Table 7, located at the end of this section, summarizes the expected impact of each variable using a positive or negative sign.

Variables are divided into five categories: demographic variables, behavioural variables, social stress indicators, knowledge indicators and ARV assumptions. To simplify the analysis, all variables were recoded into binary variables. I appreciate that this may reduce the explanatory power of the model, therefore a more complex analysis may be needed to fully capture the complexities of sexual risk-taking.

### 6.4.1 Demographic Variables

This set of five variables tests whether there is a relationship between certain demographic characteristics and sexual risk-taking. According to the literature, age, ethnicity, education, income and HIV status have an impact on risk-taking. A summary of the frequencies is given in Table 2.

Older men are less likely to engage in risky sexual behaviour than younger men (Strathdee et al, 2000). Older men are more likely to have witnessed the most devastating years of the epidemic, more likely to know someone living with HIV, and more likely to have been exposed to education and awareness campaigns. Furthermore, young gay men are less likely to have the skills to properly negotiate condom usage, especially when having sex with more experienced men (Kubicek et al, 2008). Question # 5 of the survey asks the year respondents were

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born. The responses are recoded into those born in or before 1978, making them 30 years of age or older, and those born after 1978, making them less than 30 years of age. A total of 29.5 % of respondents were under the age of 30. Since the literature yielded evidence that younger men engage in more risk, it is expected that the variable called AGE will have a negative impact on risk-taking.

There has been little Canadian research into the impact of ethnicity on sexual risk-taking, however in the United States, where the impact of race is more widely studied, they have found that ethnicity does have an impact. Non-Caucasian MSM, specifically African and Latin Americans have been found to engage in more sexual risk-taking than their Caucasian peers (Kubicek et al, 2008). The Vancouver-based Vanguard Study found that aboriginal MSM were more likely to become infected with HIV than other ethnic groups (Weber et al, 2002). Question # 8 of the survey asks, "How do you describe yourself to other guys?" followed by a list of ethnicities. Since there were too few responses to test each ethnicity for its impact, responses are recoded into two categories: Caucasian (0) and Other (1). A total of 75.9 % of the respondents to this survey identified as Caucasian, with 24.1 % identifying as a race other than Caucasian. Based on previous studies of ethnicity and risk-taking it is expected that the variable called ETHNIC will have a positive impact on risk-taking.

Men who attain higher levels of education are less likely to seroconvert (Weber et al, 2001). Men with higher levels of education are more likely to have access to accurate information on HIV prevention, access to safer-sex materials through higher incomes and a tendency to take better care of their bodies. Question # 7 of the survey asks, "What level of education have you completed?" followed by a list of options. Responses are recoded into those who have not completed some form of post-secondary ("Some High School" and "High School") as "0" and those who have pursued a form of post-secondary ("College/Technical" and "University") as "1".

MSM who have not attained post-secondary are more likely to engage in risk-taking. It is expected that the variable called EDUC will have a negative impact on risk-taking.

In developing nations income has a large impact on HIV prevalence. Many African and some South East Asian nations with very high rates of poverty, civil war and political instability also have the highest rates of HIV infection. "HIV infection is mostly confined to the poorest, who constitute most of those infected in Africa" (Mbirimtengerenji, 2007). The poor lack access to information, education, counselling activities and safer sex materials. MSM living in low-to middle-income countries have a greater risk of HIV infection, but a subgroup analysis has shown that HIV prevalence among MSM is not limited to any one region or income level (Baral et al, 2007). Question # 9 of the survey asks, "What was your income last year?" with a list of possible income levels. According to Census Canada the 'poverty line' or 'low income cut off' in Canada was $21,666 in 2007. The categories offered on the survey did not allow for a precise measure of the poverty line, so responses are recoded so that those earning $0 - $29,000 are "0" and those making more than $30,000 are coded as "1". It would normally be expected that the variable called INCOME would have a negative impact on risk-taking. In this circumstance, it should be noted that the survey question did not specify types of 'income', leaving the definition up to the interpretation of the respondent.

Since HIV is transmitted through unprotected anal intercourse with a sero-discordant partner, MSM who are infected with HIV are less likely to engage in sexual risk-taking (UAI) with men who are not (Marks et al, 2005). The majority of HIV-positive MSM reduce high-risk behaviours after receiving their diagnosis (Stein et al, 2005). Not only is there a moral obligation to protect others from infection, there is a legal obligation as defined by the Canadian Criminal Code. Knowingly exposing an individual to HIV can result in charges of assault, attempted murder and manslaughter (Canadian AIDS Society, 2004). Question # 17 of the survey asks, "What was your last HIV test result?" In this sample, 15.1% of respondents identified as being

HIV-positive and 84.9% as negative or do not know their status. Those identifying as HIV-negative or unknown are coded as "0" and those identifying as HIV-positive are coded as "1". It is expected that the variable called POZ will have a negative impact on sexual risk-taking.

*Table 2:    Frequencies, Demographic Variables*

| Variable Name | % | N |
|---|---|---|
| *AGE* | | |
| Under 30 | 29.5 | 283 |
| 30 and above | 70.5 | 675 |
| | | |
| *ETHNIC* | | |
| Caucasian | 75.9 | 727 |
| Other | 24.1 | 231 |
| | | |
| *EDUC* | | |
| No Post Secondary | 22.5 | 216 |
| Post Secondary | 77.5 | 742 |
| | | |
| *INCOME* | | |
| <30,000 | 33.1 | 317 |
| >30,000 | 66.9 | 641 |
| | | |
| *POZ* | | |
| HIV-Negative or Unknown | 84.9 | 813 |
| HIV- Positive | 15.1 | 145 |

## 6.4.2    Behavioural Variables

This set of two variables tests whether there is a relationship between certain behavioural characteristics and sexual risk-taking. As determined in the literature review, high partner volume and regular substance use have been found to have an impact on sexual risk-taking. A summary of the frequencies is given in Table 3. Studies of MSM have shown that high partner volume can be used as an indicator of sexual risk-taking (Trussler et al, 2006). MSM with a high volume of partners have been found to be the less diligent about condom usage and are more likely to be exposed to HIV. One American study finds that HIV sero-conversion (becoming infected with

HIV) increased by 14.0% with every HIV-negative partner in the previous 6 months (Buchbinder et al, 2005). This indicates that men who have a higher volume of partners are more likely to engage in sexual risk-taking. Question # 10 of the survey asks, "In total, how many men have you had sex with in the last 12 months?" Since it is difficult to define 'high' partner volume, frequencies were used to determine 'high' and 'low' partner volume. Almost half (48.0%) of respondents had five partners or less, the other half (52.0%) had more than five partners, creating an almost even split in the sample. For this study, five partners or less is considered a low partner volume, and having more than five partners is considered high partner volume. This is not a value judgement, simply a way of dividing the sample that is based on a number (the equal division of frequencies), albeit arbitrary. Responses are recoded into 5 partners or less and more than 5 partners. Based on the literature it is expected that the variable called PARVOL will have a positive impact on sexual risk-taking.

Substance use is linked to risk-taking in both youth (Kubicek et al, 2008) and adult MSM (Stall et al, 2003). Research in Vancouver finds a relationship between risk-taking and the use of amyl nitrates (poppers), cocaine, crystal methamphetamine and alcohol (Rusch et al, 2004). Drug-use lowers inhibitions, increasing the potential for risk-taking. Many regular methamphetamine users and those addicted to the drug report being diagnosed with depression, bipolar disorder and adult attention-deficit disorder (Lampinen et al, 2006). Self-medication can turn into addiction, reckless behaviour and risk-taking. Since methamphetamine and other party drugs are often associated with euphoria and sexuality, unprotected anal intercourse is much more likely to occur while using substances. Question # 31 of the Sex Now Survey lists a variety of drugs and then asks respondents to identify "how often are (they) use the following…." Respondents can choose between "Daily", "Weekly", "Sometimes" and "Never" for the following substances (variable titles in parentheses): alcohol (ALCOHL), crystal meth (METH), cocaine (COKE), ecstasy, GHB (GHB), ketamine (KETA), marijuana, poppers (POPPER) and Viagra/Cialis/Levitra (VIAGRA).

Ecstasy is removed from this study because it was coded incorrectly. As the data stands, one person responded that they 'sometimes' use ecstasy, while 160 people responded 'daily'. Marijuana was also dropped from the study as there was no evidence found in the literature to prove that there is a relationship between marijuana use and sexual risk-taking. For the remaining substances (i.e. ALCOHL, METH, COKE) , those who answered "Daily" or "Weekly" are recoded into "Regularly" and those who answered "Sometimes" or "Never" are recoded into "Rarely". Not surprisingly, alcohol is the substance most regularly used by MSM with 78.0% reporting regular use, followed by amyl nitrate (poppers) with 36.8% reporting regular use. With much recent attention given to crystal meth addiction in Vancouver, it is worth noting that 6.4% of those surveyed use crystal meth on a regular basis. Regular substance use is expected to have a positive impact on risk-taking.

*Table 3:    Frequencies, Behavioural Variables*

| Variable Name | % | N |
|---|---|---|
| *PARVOL* | | |
| Less than 5 | 48.0 | 460 |
| More than 5 | 52.0 | 498 |
| | | |
| Regular Use | | |
| *ALCOHL* | 78 | 747 |
| *METH* | 6.4 | 61 |
| *COKE* | 13.4 | 128 |
| *GHB* | 9.2 | 88 |
| *KETA* | 7.9 | 76 |
| *POPPER* | 36.8 | 353 |
| *VIAGRA* | 26.8 | 257 |

### 6.4.3 Social Stress Indicators

Research has shown that MSM are more likely to have been abused as children than their heterosexual peers (Stall et al, 2000). Men who have sex with men, particularly openly gay men, report experiencing high levels of discrimination, violence and homophobia. Those who choose not to identify as gay are more likely to experience social isolation. As a result, clinical depression is very common among MSM (Stall et al, 2003). Social stress has been found to impact mental health, which has been found to impact the likelihood of sexual risk-taking and HIV incidence. Two variables are used as indicators of social stress and frequencies are given in Table 4.

MSM who experience higher amounts of stigma and homophobia are more likely to feel shame around their sexuality, have lower self-esteem, experience depression and have a reduced capacity to negotiate condoms (Stall et al, 2003). They value their bodies less and do not treat them well as a result. Question # 41 of the Sex Now Survey reads, "Have you had any anti-gay encounters in the last 12 months?" Possible responses include "yes, verbal (threats, insults)", "yes, physical (hit, beaten-up)", "yes, BOTH verbal and physical" and "no". Data are recoded into "Yes" and "No". Given that the question asks only about the previous 12 months, there may be problems with measuring the relationship between homophobia and sexual risk-taking. It is possible that an MSM might experience homophobia 14 months ago which might have impacted his behaviour in the previous 12 months and thus the measure is likely to underestimate that actual frequency of experiences. According to the survey, almost 30.0% of MSM report some form of assault, verbal or physical, in the previous year. Despite the difficulties with measuring this variable, it is expected that the variable called HOMPHO will have a positive impact on sexual risk-taking.

Research has shown that MSM report a high incidence of childhood sexual abuse. Forced sex at any age can have a profound impact on self-esteem, confidence and overall mental health,

all of which are necessary for condom negotiation (Stall et al., 2000). Question # 40 of the survey asks, "Have you ever had unwanted (forced) sex?" Possible responses are "yes, when I was younger than 18", "yes, when I was 18 or older", "yes, when I was both younger than 18 and older" and "no". The data are recoded into "Yes" and "No", with 23.3% of MSM reporting forced sex at some point. It is expected that the variable called FORCED will have a positive impact on sexual risk-taking.

Table 4:    Frequencies, Social Stress Indicators

| Variable Name | % | N |
|---|---|---|
| *HOMPHO* | | |
| None | 72.0 | 690 |
| Verbal &/or Physical | 28.0 | 268 |
| | | |
| *FORCED* | | |
| Never | 76.6 | 734 |
| Yes | 23.4 | 224 |

## 6.4.4    Knowledge Indicators

There is evidence that knowledge, including the ability to acquire and retain certain facts about HIV transmission reduces the likelihood of sexual risk-taking. There is also evidence that young MSM lack adequate knowledge of testing practices, which may be contributing to the level of risk in which they engage (Kubicek et al, 2008). Questions # 43 – 47 of the survey ask respondents "Were you aware of the following?" followed by a list of facts about HIV. The first fact listed is "Since 2000, at least 1200 BC gay guys have been infected with HIV" (EPIKNO). Respondents are asked to choose between "Yes" and "No". A second HIV fact deals with test timing (TIMING) and the third asks about hyper-infectiousness associated with acute conversion (HYPER). It is expected that the 3 variables EPIKNO, TIMING and HYPER will have a negative impact on sexual risk-taking. Table 5 lists the frequencies of knowledge indicators.

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*Table 5:*    *Frequencies, Knowledge Indicators*

| Variable Name | Yes % | No % |
|---|---|---|
| *EPIKNO* | 51.9 | 497 |
| *TIMING* | 85.8 | 822 |
| *HYPER* | 43.4 | 416 |

Based on frequencies, it appears that a large majority of MSM in Vancouver understand the complexities of test timing (85.8%). A smaller majority knew the scale of the epidemic in Vancouver (51.9%) and less than half of those surveyed were aware that newly positive individuals are hyper-infectious the first 8 weeks after sero-converting (43.4%).

## 6.4.5    Antiretroviral Therapy Assumptions

Research has also shown that MSM have started to use non-conventional prevention techniques that resulted from an increased understanding of HIV infection and transmission (Stall et al., 2000). Questions # 48 - 50 ask respondents if they 'Agree' or 'Disagree' with a variety of statements about antiretroviral therapy. For example the question reads "Do you agree or disagree with the following statements…?" The first statement reads "HIV positive men on antiretroviral medications are less infectious that positive men who are not" (LESINF). Respondents can choose between "Strongly Agree", "Agree", "Disagree" or "Strongly Disagree." Other assumptions include "Sex is less of a worry because HIV treatments are effective"(LESWOR) and "Sex is less of a worry with a low viral load" (LOWVIR). It is expected the 3 variables will have a positive impact on sexual risk-taking. Table 6 shows their frequencies.

*Table 6:*    *Frequencies, ARV Assumptions*

| Variable Name | Agree (%) | N |
|---|---|---|
| *LESINF* | 28.3 | 271 |
| *LESWOR* | 8.5 | 81 |
| *LOWVIR* | 17.3 | 166 |

In terms of HIV treatments and reduced viral loads making individuals less contagious, only a small percentage of MSM agreed with such statements (8.5 % and 17.3 %). An analysis of studies of sexual risk behaviour and antiretrovirals found that individuals who believe that ARVs reduce HIV transmission and those who are less concerned about engaging in unsafe sex if such treatment is available, are significantly more likely to engage in unsafe sex (Crepaz et al, 2006). Concluding this section, Table 7 shows the twenty-one explanatory variables, including their expected coefficient signs, which indicate the variable's impact (positive or negative) on sexual risk-taking.

*Table 7:    Expected Signs of Explanatory Variables*

| Variable Name | Measure | Expected Sign |
|---|---|---|
| AGE | Those 30 and over compared to those under 30 | - |
| ETHNIC | Caucasians compared to non-Caucasians | + |
| EDUC | Post secondary compared to those with no post secondary | - |
| INCOME | Incomes of $0 – 29,999, compared to those who make 30,000 + | - |
| POZ | HIV negative and unknown compared to those who are HIV positive | - |
| PARVOL | Those with >5 partners compared to those with <5 partners | + |
| ALCOHL | Regular alcohol use compared to rare alcohol use | + |
| METH | Regular meth use compared to rare meth use | + |
| COKE | Regular cocaine use compared to rare cocaine use | + |
| GHB | Regular GHB use compared to rare GHB use | + |
| KETA | Regular ketamine use compared to rare ketamine use | + |
| POPPER | Regular popper use compared to rare popper use | + |
| VIAGRA | Regular Viagra use compared rare Viagra use | + |
| HOMPHO | Experience of homophobia compared to no homophobic experiences | + |
| FORCED | Having been forced to have sex compared to those who were not | + |
| EPIKNO | Having epidemic knowledge compared to those who do not | - |
| TIMING | Having test timing knowledge compared to those who do not | - |
| HYPER | Having knowledge about acute infectiousness compared to those who do not | - |
| LESINF | Agreeing that medications make people less infectious, compared to those who do not agree | + |
| LESWOR | Agreeing that sex is less risky because medications are effective compared to those who do not agree | + |
| LOWVIR | Agreeing that a low viral load makes sex less of a worry compared to those who do not agree | + |

## 6.5    Cross-Tabulations

Not all variables can be included in the regression analysis. For instance, HIV testing has been identified as an important part of HIV prevention, however, its impact on sexual risk-taking cannot be measured due to potential reverse causality. In other words, it is not possible to measure whether testing impacts risk, or risk-taking impacts testing. Individuals who engage in sexual risk test more regularly for HIV than those who do not and those surveyed identified potential exposure to HIV as a primary reason for testing (Kellerman et al, 2002). Table 8 summarizes the cross-tabulations of HIV testing with RISK and four demographic variables (i.e. AGE, ETHNIC, EDUC, INCOME).

*Table 8:*    *HIV-Testing Cross-tabulations*

| **Variable** | **% never tested** | **% tested < 1 year ago** | **% tested > 1 year ago** |
|---|---|---|---|
| RISK (YES) | 9.9 | 56.5 | 33.6 |
| RISK (NO) | 16.0 | 55.4 | 28.6 |
| AGE (<30) | 26.9 | 57.6 | 15.5 |
| AGE (>30) | 8.0 | 55.1 | 36.9 |
| ETHNIC (Caucasian) | 12.0 | 55.5 | 32.5 |
| ETHNIC (Non-Caucasian) | 18.6 | 56.7 | 24.7 |
| EDUC (No-Post Secondary) | 25.5 | 51.8 | 22.7 |
| EDUC (Post-Secondary) | 10.1 | 57.0 | 32.9 |
| INCOME (<30,000) | 20.8 | 55.2 | 24.0 |
| INCOME (>30,000) | 10.0 | 56.1 | 33.9 |

In this sample, the majority of MSM who engaged in risk had an HIV test in the previous year (56.5 %), while 33.6 % had not tested for HIV in the previous 12 months and 9.9 % had never tested. For each cross-tabulation, a small majority of MSM had tested in the previous 12 months. The surprising results came from the 'never tested' column, where 26.9 % of MSM under 30 indicated never having been tested for HIV, compared to 8.8 % of those 30 and above. In terms of ethnicity, 18.6 % of non-Caucasian MSM had never tested, compared to only 12.0 % of those who identified as Caucasian. Of those MSM without post-secondary education, 25.5 % indicated never having tested, compared to 10.1 % of those with post-secondary. When income is considered, 20.8 % of those who earned less than $30,000 indicated never having tested, compared to 10.0 % of those earning more than $30,000. Those participants who had never tested were more frequently MSM under 30, non-Caucasian, without a post-secondary education and earning less than $30,000 per year. Policy instruments intended to increase HIV testing should consider targeting these demographics.

MSM under 30 have been found to engage in higher amounts of sexual risk-taking (Strathdee et al, 2000) and lower rates of HIV testing (see above). A possible explanation might be a knowledge gap that exists. MSM under 30 have been found to have had less exposure to HIV prevention campaigns and messaging (Strathdee et al, 2000), creating a knowledge gap that does appear in MSM 30 and above. In Table 9, the knowledge indicators (i.e. EPIKNO, TIMING, HYPER) will be cross-tabulated with AGE to determine whether age increases the frequency of HIV-related knowledge.

*Table 9:*   *Cross-tabulation of Age and Knowledge Indicators*

| Variable Name | MSM under 30 | MSM 30 and above |
|---|---|---|
| EPIKNO | 44.5 % | 55.0 % |
| TIMING | 80.9 % | 87.9 % |
| HYPER | 32.5 % | 48.0 % |

In this sample, MSM 30 years and older demonstrated more knowledge than those under 30 for each of the indicators. Percentages varied between variables, with the vast majority of MSM understanding the implications of test-timing (80.9 – 87.9%), but fewer than half indicating an understanding of the hyper-infectiousness associated with acute HIV infection (32.5 - 48.0%). Policy instruments aimed at increasing prevention and risk-reduction should target all MSM regardless of age. Efforts aimed at increasing HIV testing should underscore the importance of testing by educating MSM about the hyper-infectiousness associated with acute HIV infection.

Since HIV-positive MSM have been found to reduce their sexual risk-taking after being diagnosed (Rotherham-Borus et al, 2004), frequent testing is an important part of HIV prevention. As discussed in the literature review, research in the US has found that widespread ARV use and assumptions about its effectiveness in reducing viral load, may increase risk-taking (Katz et al, 2002). Table 10 will cross-tabulate the ARV assumption variables (LESINF, LESWOR, LOWVIR) with the demographic variables AGE and POZ for a more in-depth study of these explanatory variables.

*Table 10:  ARV Assumption Cross-Tabulations*

| Variable | LESINF | LESWOR | LOWVIR |
|----------|--------|--------|--------|
| AGE (<30) | 27.6 % | 4.6 % | 11.3 % |
| AGE (>30) | 28.6 % | 10.1 % | 19.9 % |
| POZ (HIV-positive) | 46.2 % | 21.4% | 47.6 % |
| POZ (Negative/Unknowns) | 25.1 % | 6.2 % | 11.9 % |

In this sample, when age is considered, MSM under 30 agreed less frequently with ARV assumptions than those over 30, so ARV assumptions do not appear to be a variable influencing risk among that population. Where ARV assumptions are most agreed with is among HIV-positive MSM. In the case of sex being less worrisome because of treatments (LESWOR) the difference in frequencies is as much as three times those who identified as HIV-negative or unknown status (21.4 % compared to 6.2 %). Four times as many HIV-positive MSM (47.6 % compared to 11.9%) agreed that a low viral load makes sex less worrisome. Policy instruments aimed at reducing risk should look at the role ARV medications play in sexual risk-taking, specifically among HIV-positive MSM. Based on the cross-tabulation findings, there are large differences in sexual risk-taking and epidemic knowledge between younger and older men. Also, there are large differences in ARV assumptions between those who identify as HIV-positive and those who do not. These are important differences to consider when developing policy.

# 7: Estimation and Analysis

A binary logistical regression is performed to determine the impact of explanatory variables on sexual risk-taking. The total number of observations is N=958. I estimate five models consecutively and the results are given in Table 12. Model A includes the four demographic variables and the two social stress indicators. Model B consists of the same variables as Model A, with a recoded income variable. Model C builds on Model B by adding POZ to determine the impact of HIV-status on the estimation. Model D adds the behavioural variables including PARVOL and the substance use variables (i.e. ALCOHL, METH, GHB, etc.). Model E removes the substance use variables, but adds knowledge and assumption variables (i.e. EPIKNO, TIMING, LESINF, LOWVIR) to allow for comparison with Model D.

*Table 11: Estimation Models Applied in the Statistical Estimation*

| Model A | $Risk = f[AGE, ETHNIC, EDUC, INCOME, HOMPHO, FORCED]$ |
|---|---|
| Model B | $Risk = f[AGE, ETHNIC, EDUC, INCOME*, HOMPHO, FORCED]$ |
| Model C | $Risk = f[AGE, ETHNIC, EDUC, INCOME, HOMPHO, FORCED, POZ]$ |
| Model D | $Risk = f[AGE, ETHNIC, EDUC, INCOME, HOMPHO, FORCED, POZ,$ $PARVOL, ALCOHL, METH, COKE, GHB, KETA, POPPER, VIAGRA]$ |
| Model E | $Risk = f[AGE, ETHNIC, EDUC, INCOME, HOMPHO, FORCED, POZ,$ $PARVOL, EPIKNO, TIMING, HYPER, LESINF, LESWOR, LOWVIR]$ |

Many of the variables being analysed are similar in nature, for example, a person who regularly consumes a 'party drug' such as GHB, is likely to do other 'party drugs' such as ketamine or meth. Similarly, it is likely that people who know the answer to one knowledge

indicator would know the answer to many. Multicollinearity is thus a potential problem. Simple correlation is an indicator of potential collinearity. Among my explanatory variables none are correlated at a rate higher than 0.682 (regular use of GHB and KETA). The highest correlation coefficient among knowledge indicators is 0.465 (see Appendix B for the Pearson Correlation Coefficients). So, despite many similar variables I conclude that multicollinearity is unlikely to be a problem for this data set. Another potential limitation pertains to the use of binary variables. All of the explanatory variables are 0, 1 dummies. While this simplifies the regression, it also limits its explanatory ability. Since many of the variables included more than two possible responses, the recoding of variables may affect the analysis outcomes (such as the INCOME variable in Model A). Table 12 presents the empirical results for the five models (see Appendix C for the SPSS outputs).

## 7.1 Analysis of the Results

Model A is a specification of sexual risk-taking with only the demographic and social stress variables. In column 1 there is only one statistically significant variable, i.e., income. The coefficient sign is unexpected as it implies that MSM with a higher income are more likely to engage in risk, which contradicts the literature (Mbirimtengerenji, 2007). Given there is a possible problem with measurement (the survey question did not specify types of 'income', leaving the definition up to the interpretation of the respondent), it was expected that the variable called INCOME would be found to be insignificant. The INCOME variable was recoded in an attempt to better capture poverty. Rather than using $30,000 as a measurement for poverty, the INCOME variable was recoded so that $10,000 and less is used as poverty threshold. All those respondents who made less than $10,000 have been coded as "0" and those making $10,000 and more were recoded as "1".

Model B is the same specification as Model A, only with the recoded INCOME variable. In the results, only age appears significantly. The coefficient sign is expected, implying that age

has a negative impact on sexual-risk-taking. Although both Model A and B have only one significant variable in each equation, Model B, which includes the recoded INCOME variable, is selected over Model A, since the significant variable AGE, has the expected coefficient sign.

Model C builds on Model B by adding HIV status (POZ) to the estimation. The coefficient sign is unexpected, as it implies a positive relationship between risk and being HIV-positive, contradicting the literature (Marks et al, 2005). This variable has the potential for endogeneity, since it is possible that risk-taking resulted in the HIV-positive status, rather than the status impacting the risk. This could occur if a respondent engaged in risk-taking 11 months ago, but became HIV-positive ten months ago. This would only impact a small fraction of the sample, so the variable is maintained in the model. I recognize endogeneity as a possible problem, however it is beyond the scope of this study to address it thoroughly as a much more complex econometric analysis would be required.

Model D adds the behavioural variables (i.e. PARVOL, ALCOHL, METH, COKE, etc.) to the estimation. None of the substance use variables were found to be significant, only the partner volume variable. The PARVOL variable has the expected sign, implying a positive relationship to risk-taking. When the behavioural values are added, the explanatory power increases from an adjusted $R^2$ of .043 to .123, the largest jump among the models.

Since none of the substance use variables (i.e. ALCOHL, METH, COKE, GHB, etc.) were found to be statistically significant, they are removed from Model E and replaced with three knowledge indicators (EPIKNO, TIMING and HYPER) and three ARV assumptions (LESINF, LESWOR, LOWVIR). One of the knowledge indicators (EPIKNO) and one of the ARV assumptions (LOWVIR) were found to have a statistically significant relationship to risk. Both have expected signs, with the knowledge indicator (EPIKNO) negatively impacting risk and the ARV assumption (LOWVIR) positively impacting risk. The adjusted $R^2$ is .132, which indicates that the model explains about 13% of sexual risk-taking.

*Table 12: Logistical Regression, Five Models*

| Variable Name | Model A | Model B | Model C | Model D | Model E | Probability Change |
|---|---|---|---|---|---|---|
| **AGE** | .150 (.167) | **-.375 (.164)\*\*** | **-.516 (.168)\*\*\*** | **-.473 (.181)\*\*\*** | **-.571 (.176)\*\*\*** | -14.3 % |
| ETHNIC | .029 (.160) | .011 (.160) | -.014 (.161) | .077 (.170) | .071 (.169) | |
| EDUC | -.031 (.165) | -.081 (.166) | -.060 (.168) | -.160 (.176) | -.195 (.176) | |
| **INCOME** | **-.385 (.159)\*\*** | .303 (.240) | .287 (.241) | .083 (.252) | .088 (.250) | |
| HOMPHO | -.016 (.153) | .037 (.152) | .074 (.154) | .062 (.159) | .053 (.160) | |
| FORCED | -.210 (.157) | .234 (.157) | .187 (.159) | .210 (.165) | .231 (.166) | |
| **POZ** | | | **.882 (.188)\*\*\*** | **.715 (205)\*\*\*** | **.612 (.208)\*\*\*** | 15.3% |
| **PARVOL** | | | | **.991 (.150)\*\*\*** | **.959 (.147)\*\*\*** | 24.0% |
| ALCOHL | | | | .168 (.173) | | |
| METH | | | | .022 (.341) | | |
| COKE | | | | .367 (.230) | | |
| GHB | | | | -.233 (.340) | | |
| KETA | | | | .545 (.372) | | |
| POPPER | | | | -.037 (.158) | | |
| VIAGRA | | | | -.064 (.175) | | |
| **EPIKNO** | | | | | **-.339 (.150)\*\*** | -8.5% |
| TIMING | | | | | .332 (.216) | |
| HYPER | | | | | -.017 (.154) | |
| LESINF | | | | | -.097 (.179) | |
| LESWOR | | | | | .280 (.275) | |
| **LOWVIR** | | | | | **.517 (.226)\*\*** | 12.9% |
| **(N)** | 958 | 958 | 958 | 958 | 958 | |
| **Adjusted $R^2$** | .018 | .012 | .043 | .123 | .132 | |

**\*\*\* Significant at <0.01, \*\* Significant at 0.01 - 0.05, \* Significant at 0.05 - 0.10**

Between Model C, D and E, the latter, Model E was selected as the final model. The overall explanatory capacity of the model rises from a pseudo-$R^2$ of .043 in Model C, to .132 in the Final Model (E).

Fourteen of the twenty-one explanatory variables are included in the Final Model. Of those fourteen, five variables have a statistically significant relationship to risk-taking. Four of the five significant variables have expected signs, only the HIV-status variable, POZ, has an unexpected sign. This could be the result of endogeneity, as it is expected that HIV-positive MSM will take less risk, but people who take risk are more likely to be HIV positive. For the POZ variable, I rely on cross-tabulations, which find that 55.2% of MSM who identify as HIV-positive engaged in sexual risk-taking, compared to only 36.3% of negative and unknowns.

Explanatory variables found to be significant in the Final Model include: AGE, PARVOL, EPIKNO and VIRLOW. Each of these variables is found to impact the probability of sexual risk-taking. Probabilities, which are listed in the last column of Table 12, are derived by dividing the coefficients for significant variables by four and multiplying by 100, in order to determine the change in probability of risk-taking (Studenmund, A.H., 2006).

As expected the variable AGE decreases the probability of sexual risk-taking. The transformed coefficient shows that the probability of engaging in sexual risk-taking is 14.0% less for MSM over 30, on average. This is consistent with the literature and cross-tab findings. As such, policy initiatives intended to reduce sexual risk-taking should target MSM under 30 and ensure adequate resources are allotted for education and prevention within this demographic.

As expected, MSM who had more than five sexual partners in the previous 12 months (PARVOL) have a higher probability of engaging in sexual risk. This is consistent with the literature and cross-tabulation analysis which found partner volume to increase the probability of sexual risk-taking. In the Final Model, the PARVOL transformed coefficient shows that the probability to engage in sexual risk-taking is 24.0% higher for MSM with more than five sexual

partners, on average. Policy alternatives aimed at reducing risk should target those who have more than five sexual partners and potentially seek to reduce the overall volume of sexual partners.

The variable EPIKNO decreases the probability of sexual risk-taking, indicating that knowledge of the HIV epidemic can reduce the probability of risk. The EPIKNO transformed coefficient shows a probability change of -8.5% for those who know the scale of the HIV epidemic in BC (1200 MSM have become HIV-positive since 2000). Policy alternatives aimed at reducing risk should seek to increase HIV-related knowledge among MSM in order to be most effective.

Finally, the LOWVIR variable increased the probability of sexual risk-taking. MSM who believe that a low viral load makes sex less of a worry, have a 12.9% greater probability of engaging in sexual risk-taking. Policy alternatives aimed at reducing risk must address assumptions about ARVs and provide accurate information and prevention education for those who use them.

## 7.2    Summary of Findings

The statistical analysis of the *2007 Sex Now Survey,* provides several important findings for policy-makers wanting to reduce sexual risk-taking among MSM in Vancouver. As far as testing is concerned, the cross-tabulations show that testing varies depending on the demographic being studied. MSM who engaged in risk, those 30 and over, Caucasians, post-secondary graduates and those making more than $30,000 per year, were all found to engage in higher rates of testing than those they were compared with (e.g. non-risk takers, those under 30, non-Caucasians, etc). As demonstrated by the literature review, testing is an important part of reducing sexual risk-taking. These findings should be used to inform any policies around HIV testing.

When examining the regression analysis, it confirms the importance of age on sexual health as MSM under 30 are found to have a higher probability of sexual risk-taking, on average. Age is a reoccurring factor that influences several other explanatory variables, including HIV testing and epidemic knowledge. Policy alternatives must address the gap in risk-taking, testing and epidemic knowledge between MSM under 30 and those 30 and over.

While the POZ variable is not a good fit for the regression model, the cross-tabulations show that 55.2% of MSM who identify as HIV-positive engaged in sexual risk-taking, compared to only 36.3% of negative and unknowns. When cross-tabulated with ARV assumptions, MSM who are HIV-positive report higher percentages of ARV assumptions than those who indentify as negative or unknown. ARV assumptions are found to be statistically significant in the regression, positively impacting the probability of sexual risk-taking. Policy alternatives should consider the role of ARV treatment on prevention efforts and look for ways to reduce its impact on sexual risk-taking, particularly among HIV-positive MSM.

Another variable found to be significant is partner volume which increases the probability of risk-taking. Further research needs to be done to determine the reason for high partner volume, but prevention strategies should seek to reduce the number of partners, in order to reduce sexual risk-taking. Those MSM with epidemic knowledge are found to have a decreased probability of risk, compared to those who do not. Increasing HIV-related knowledge among MSM should be considered a method for reducing sexual risk-taking. Of the ARV assumptions, those who agree that a low viral load has made HIV less worrisome are found to have a higher probability for risk than those who did not agree. Information campaigns should seek to increase MSM knowledge around ARVs in an attempt to counter any risk that may result from these assumptions. The next section will outline four policy alternatives intended to decrease sexual risk-taking, based on the findings of the literature review, key informant interviews and quantitative analysis.

# 8:    Policy Alternatives

As established in section two, the reduction of sexual risk-taking was an important part of HIV prevention and the decrease in new HIV infections, which occurred in the late 1990s. This section provides an overview of the status quo of HIV/AIDS infrastructure that focuses on prevention for MSM in Vancouver and proposes four alternatives for improving that infrastructure: an MSM Testing Service, a Treatment Support Centre, an MSM Mental Health Program and a Research and Health Promotion Centre. All four alternatives seek to reduce sexual risk-taking among MSM in the short-term and consequently, the number of new HIV infections in the long-term.

## 8.1    Status Quo

Currently, there is no provincial strategic plan or policy directive for addressing the rising number of new infections among MSM. A provincial Strategic Plan was published in 1998, *British Columbia's Framework for Action on HIV/AIDS* (Ministry of Health and Ministry Responsible for Seniors, 1998) then in 2003 the Ministry of Health Planning released *Priorities for Action in Managing Epidemics* (Ministry of Health, 2003). One of the key objectives of the latter was to reduce the incidence of HIV infection by 50% among the most vulnerable groups, including MSM and aboriginals. It set a goal of reducing the number of persons testing newly positive from 440 to 220 by 2007. It failed, since the number of newly infected persons was in fact 395, which is only a 10 percent reduction. During that time, the PHSA commissioned an *HIV Service Plan for Women and Children* (Legare, 2003) in December 2003 and held a *Strategic Planning Forum on HIV/AIDS* (Provincial Health Service Authority, 2004) in 2004. MSM were not mentioned in either report. In 2005, the Provincial Health Services Authority held a

*Provincial Aboriginal HIV/AIDS Forum* (Varley, 2005) and an *HIV/AIDS Roundtable* (Provincial Health Service Authority, 2005), MSM were not mentioned. In 2007, the Vancouver Coastal Health Authority stated that MSM are a priority in their *Vancouver Community HIV/AIDS Strategic Plan* (Vancouver Coastal Health, 2007).

Currently Vancouver Coastal Health funds the following community organizations to offer prevention services to MSM: the Health Initiative for Men, Settlement Orientation Services, the Asian Society for the Intervention of AIDS and AIDS Vancouver. The four organizations share less than $500,000 of the $100 million BC spends each year in HIV-related services (Public Health Agency of Canada website, 2009). Testing is offered free of charge provincially, at various health clinics and medical centers in the city. The ELISA test is standard. Only one clinic, Spectrum Health offers Point of Care or Rapid Testing for a charge of $30.00 and you must be a registered patient at their clinic. Other health services, including mental health services are provided based on priority, starting with the most ill. MSM who do not suffer from addiction or severe mental illness are put on six to ten month long wait list for counseling and other clinical services. In terms of HIV treatment, antiretroviral medication is available to most MSM with a CD4 count of less than 200, either through private health insurance or the BC Medical Services Plan.

Despite these efforts, the number of new HIV infections among MSM is on the rise, as is the level of reported sexual risk-taking. In 2007, there were 171 new HIV infections among MSM in BC, making up 43% of the total number of infections. That same year, 39.1% of MSM surveyed in the *Sex Now Survey* reported having unprotected anal sex with a partner whose HIV status is unknown.

## 8.2    Alternative One: MSM Testing Service

The *Vancouver Community HIV/AIDS Strategic Plan for 2007 – 2012* (Vancouver

Coastal Health, 2007) lists greater accessibility to HIV testing as one of five priorities. Since

Canadian studies have shown a large proportion of MSM do not know they are HIV positive

(Lambert et al, 2006 & Remis et al, 2008), Vancouver Coastal Health plans to increase access to

regular HIV testing through 'low-threshold, culturally appropriate testing points' (Vancouver

Coastal Health, 2007). This is part of a growing consensus that early detection may be a key

component to prevention. Currently, the BCCDC, in collaboration with the Canadian Institute of

Health Research (CIHR) is conducting a study of acutely infected MSM to determine if early

detection through NAAT, complemented by free counseling services would reduce the spread of

HIV infection, by reducing the sexual risk-taking among this highly contagious population.

Point of Care (rapid testing) has been available since the late 1990's, with the exception

of being briefly removed in 2002 for quality control concerns (Gilbert, 2007). Point of Care

testing provides a test result within minutes to hours, as opposed to weeks, reducing the need to

return for test results. Point of Care has been used in outreach to minority populations. The test is

not currently covered by the Medical Services Plan, so only one clinic offers the service. Point of

Care testing has been found to increase testing volume and uptake (Gilbert, 2007) and therefore

should be considered as part of an MSM Testing Service.

As discussed in the literature review, the Nucleic Acid Amplification Test (NAAT)

reduces the window period between infection and detection (Pilcher et al, 2005). Both Point of

Care and NAAT testing technologies increase public health's ability to provide earlier partner

notification, counseling and treatment, reducing the number of new infections. An MSM Testing

Service should make available both Point of Care and NAAT testing technologies at venues and

locations that are easily accessible to MSM. A facility dedicated specifically to MSM testing

should be set up in Vancouver's Davie Village, the area most frequented by gay men in

Vancouver, as well as mobile clinics that do outreach periodically during gay events. All services must be offered in a non-judgmental manner, regardless of venue. Staff will need to be trained on MSM sensitivity in order to understand the complexities of MSM sexual health. The MSM Testing Service should be complemented by a health communication or social marketing campaign aimed at promoting new technologies and increasing awareness around window periods in order to stimulate testing rates.

## 8.3 Alternative Two: Treatment Support Centre

The *Vancouver Community HIV/AIDS Strategic Plan for 2007 – 2012* (Vancouver Coastal Health, 2007) lists greater accessibility to HIV treatment as one of five priorities. They plan to develop a 'decentralized network of access points for a supported antiretroviral therapy assistance program' (Vancouver Coastal Health, 2007). One of the reasons for this policy directive is because proper use of antiretroviral therapy has been found to reduce HIV viral load in the body to undetectable levels (Cohen et al, 2007). Research shows that a reduced viral load reduces transmission, by making patients less contagious (Anema et al, 2008). However, research in San Francisco has shown that widespread ARV use can have a positive impact on sexual risk-taking (Katz et al, 2002) as MSM with HIV believe they are no longer contagious and those without HIV believe they are at a lower risk, as a result of ARVs (Trussler, 2009). The problem is that ARVs are not fool proof. MSM who are on ARVs may not be adhering to their treatment protocol or may have an STI or other illness, all of which could result in a spike in viral load (Vernazza et al, 2008). Since HIV-positive MSM have their viral load counted every few months, there is potential for an unknowing spike in viral load, and possibly HIV transmission, if the person is engaging in sexual risk-taking. Also, ARVs only impact those who are being treated. Many HIV positive MSM are unaware of their infection (Lambert et al, 2006 & Remis et al, 2008). Those that are aware may not be ready to commence treatment, in which case, they remain contagious.

In order to maximize the potential of ARVs, health policy must address any increase in sexual risk-taking which may result. A Treatment Support Centre would implement a two part strategy that includes educating both HIV-positive and negative MSM on the benefits and limitations of ARV use, while supporting HIV-positive MSM before and after the commencement of treatment with adherence issues and harm reduction techniques to reduce the transmission of HIV.

The Treatment Support Centre could serve as an 'access point' for treatment, situated in or near the Davie Village in Vancouver. To avoid issues with privacy, the location would need to be discreet, possibly part of another community organization or provincial agency. The Treatment Support Centre would be expected to use health communication techniques to enhance awareness and understanding of HIV treatment among MSM. For HIV-positive MSM, the Treatment Support Centre would offer the latest research and developments on HIV treatment and offer support with adherence and treatment protocols. The centre would educate HIV-positive MSM on harm reduction and sexual safety guidelines in order to directly impact sexual risk-taking.

## 8.4    Alternative Three: MSM Mental Health Program

Since mental health issues are endemic and often undiagnosed in the MSM community (Stall et al, 2003), and since mental illness can translate into low self-esteem and a higher number of sexual partners and transient sexual relationships (Weber et al, 2002), policymakers should aim to increase diagnosis and treatment of mental illness through mental health outreach to the MSM community. This would create opportunities to intervene and empower MSM to make better sexual health decisions, consequently reducing risky sexual behaviours and the transmission of HIV.

Vancouver Coastal Health could develop a team of mental health counsellors with experience in MSM and gay men's health. This team of five (four counsellors, one coordinator)

would target MSM for mental health interventions using a combination of professional and peer counselling. The team would be responsible for creating health communication campaigns aimed at promoting the importance of mental health and recruiting MSM in need of clinical support or counselling.

### 8.4.1    Accessing Mental Health Services in Vancouver

Before commenting on the state of mental health services in Vancouver, I conducted an anecdotal experiment to determine the accessibility of said services. I presented myself as "Jody, a mid-20s gay man living in Vancouver's West End, looking for clinical counselling services." When asked about my situation, I simply said that I did not feel it was an emergency, but that I had feelings of depression for several months. I spoke to the Vancouver Coastal Health 'Primary Care Clinic' at Three Bridges on Hornby Street where they referred me to their counselling intake. A clinician at intake referred me to a private counselling service that offered a sliding scale payment system. Treatment at Three Bridges is reserved for the most severe cases and for highly marginalized individuals, such as street-level populations and those with serious problems around addictions. I then called St-Paul's Hospital, another psychiatry service in Vancouver's West End. I was informed that patients who were not experiencing an emergency were being put on an 8 to 10 month wait list, before appointments were even assigned. When I asked about other services, I was again referred to a private clinic.

After visiting Three Bridges, I went to the Bute Street Clinic, another service often accessed by MSM and other sexual minorities. I was offered a choice of 'coming out groups' or student counsellors who were doing their co-op placement at the Centre. Neither were the medium to long term counselling option I was seeking. While trying to access a counsellor I was asked several times if I had issues with addiction, homelessness and/or being transgendered. Being gay and depressed, there were few publicly provided services available to me.

Based on this anecdotal experience and my previous knowledge of Vancouver mental health services, it appears there is a lack of services for someone who is not homeless, drug addicted, or in an emergency. For those MSM seeking mental health services, there are few options unless you are willing and able to pay. I encountered this much difficulty as a high functioning MSM who is comfortable dealing with bureaucrats and health care providers; I can only imagine the difficulty for someone who is not comfortable with their sexuality, who may suffer from depression or anxiety.

## 8.5 Alternative Four: Research and Health Promotion Centre

The literature points to a shift in focus from traditional HIV/AIDS prevention to a broader scope of gay men's health, as a holistic approach. It is necessary to strengthen gay men's health, in order to reduce HIV transmission (Canadian Strategy on HIV/AIDS, 2000). The *Vancouver Community HIV/AIDS Strategic Plan for 2007 – 2012* (Vancouver Coastal Health, 2007) has prioritized 'gay men and other men who have sex with men' as a population in need of an increase in prevention activities. Public health officials recognize the need for sustained, multi-faceted prevention within the gay community (Gustafason, 2009). Many MSM are receiving conflicting information about ARVs, viral loads, window periods and the possible use of medications to prevent HIV. In order to best address and communicate these health issues that pertain to MSM, a Research and Health Promotion Centre should be created. The office would be responsible for communicating health information to MSM in a relevant and timely manner.

The Centre would be responsible for researching issues pertaining to gay men's health, as a whole, and then disseminating this information to a variety of stakeholders, using various forms of media, to ensure that gay men are made aware of important information regarding their health. Communication channels could be utilized to help promote any testing, treatment or mental health programs for gay men, as well as other factors affecting sexual risk-taking.

Unlike government led health communication and social marketing, a Research and Health Promotion Centre would use a community-based perspective when developing information campaigns. A team of two researchers and two communications officers would be responsible for promoting gay men's health via the internet, traditional forms of media and through community-driven projects. Their mandate would be to increase access to relevant health information with the goal of reducing sexual risk-taking and the transmission of HIV (and other sexually transmitted infections).

# 9:    Policy Analysis

The policy alternatives outlined for reducing sexual risk among MSM are assessed and compared using a set of four criteria: (i) effectiveness in reducing sexual risk-taking, (ii) cost per intervention, (iii) equitable demands on HIV positive and negative MSM and (iv) ease of implementation. Each criterion is assigned a measure, which is then ranked on the following scale: high (score = 3), moderate (score = 2) and low (score = 1). For measures that are qualitative, such as effectiveness and equity, a high score means it ranked well against the criterion and a low score indicates that the alternative ranked poorly against the criterion.

## 9.1    Criteria and Measures

**Effectiveness** – In order for a policy alternative to be effective, it must reduce the sexual risk-taking of MSM in Vancouver. The quantitative analysis identified a number of factors which increased or decreased the probability of sexual risk-taking, on average. In order to be effective, a policy alternative should aim to reverse or reduce the impact of that variable on sexual risk-taking. For example, age was found to have a negative impact on sexual risk-taking, meaning that younger MSM had a higher probability of engaging in sexual-risk. Alternatives that create educational opportunities which engage youth or provide interventions that address sexual risk-taking among MSM under 30, would therefore be considered effective policy alternatives. Having more than five sexual partners in 12 months was found to increase the probability of risk. Effective alternatives should create interventions for reducing partner volume, by looking at the social factors that contribute to a high partner volume and targeting MSM who frequent venues, internet sites and chat-rooms that facilitate sexual encounters. Epidemic knowledge was found to decrease risk-taking, therefore an effective alternative should promote sexual education and

communicate relevant, accurate health information to MSM. Assumptions about the impact of ARVs on viral load were found to increase sexual risk-taking, therefore effective alternatives should aim to create a better understanding of the complexities of viral load and how it affects sexual risk-taking. As determined by the cross-tabulations, HIV positive MSM reported higher percentages of sexual risk-taking. Effective alternatives must look at ways to reduce sexual risk-taking among HIV positive MSM, again, focusing on the impact of viral load on risk.

All four alternatives in this study have the potential to reduce sexual risk-taking, however, some of the alternatives are more effective than others. The MSM Testing Service is effective in reaching MSM under 30, and provides for intervention opportunities for nurses or practitioners to increase epidemic knowledge and promote safer sexual activities. The Testing Service is not highly effective in decreasing assumptions about ARVs, since the newly diagnosed are not recommended to begin ARVs (assuming they are tested regularly and have only recently became HIV-positive). In terms of HIV status, the Testing Service could actually increase risk in this category, since the cross-tabulations found that HIV-positive MSM are engaging in higher percentages of sexual risk than the negative and unknowns. The Testing Service addresses 3 of 5 effectiveness measures.

The Treatment Support Centre is more effective than the Testing Service, as it provides opportunities to increase epidemic knowledge, educate MSM who are HIV positive and decrease ARV assumptions, while providing opportunities for interventions aimed at decreasing partner volume. The alternative does little to influence risk-taking among youth, as the overwhelming majority of HIV-positive MSM are over 30 years old. The Treatment Support Centre addresses 4 of 5 measures used for effectiveness.

The Mental Health Program creates intervention opportunities for MSM under 30, those with a high partner volume and those who are HIV-positive. While some epidemic education might take place in a counselling or therapy session, it is not designed to increase epidemic

knowledge or decrease assumptions about ARVs. The Mental Health Program addresses only 3 of 5 effectiveness measures.

Finally, a Research and Health Promotion Centre would be the most effective policy alternative as it allows for a number of community interventions which can be tailored for any message, targeting any demographic. MSM under 30 and those who are HIV-positive can be targeted as priority populations and interventions can be designed to lower partner volume within the community at large. The Research and Health Promotion Centre could create community driven projects and communication campaigns seeking to increase epidemic knowledge and decrease ARV assumptions. The Research and Health Promotion Centre addresses all 5 of the effectiveness measures, making it the most effective. Table 13 outlines the effectiveness measures.

*Table 13: Effectiveness, Measured by Risk Reduction*

| Measure of Effectiveness | MSM Testing Service | Treatment Support Centre | An MSM Mental Health Program | A Research and Health Promotion Centre |
|---|---|---|---|---|
| Reduces Risk of MSM under 30 | Yes | No | Yes | Yes |
| Decreases partner volume | Yes | Yes | Yes | Yes |
| Increases epidemic knowledge | Yes | Yes | No | Yes |
| Addresses ARV assumptions | No | Yes | No | Yes |
| Reduces Risk of HIV Positive MSM | No | Yes | Yes | Yes |
| Risk Reduction Ranking | 3/5 = Moderate | 4/5 = Moderate | 3/5 = Moderate | 5/5 = High |

**\* Highly effective = 5/5, Moderately effective = 3 or 4 of 5, least effective = 1 or 2 of 5**

**Cost** – A total and per intervention cost has been determined for each of the four policy alternatives in this study. In order to determine the per intervention cost of a policy alternative, population estimates must be made. In 2006, the *Canadian Community Health Survey* (Statistics Canada website, 2009), found that 1.3 % of the population identified as homosexual and 0.6 % of the population are bisexual males. Together, homosexual and bisexual men, also known as men who have sex with men (MSM), make up 1.9 % of the population. While this study will employ that estimate, I recognize that it is probably an underestimate, as many MSM would not want to identify as such on a survey. According to Statistics Canada, the population of the Metropolitan Area of Vancouver is about 2.1 million people (Census, 2006), translating to almost 40,000 MSM (1.9 % of 2,100,000 = 39,900). Since there are 40,000 gay men in the Vancouver area, and this study found that 15.1 % of MSM identify as HIV positive, it can be assumed there are 6040 MSM who identify as HIV positive in Vancouver.

The MSM Testing Service is the least costly of the policy alternatives, with a total annual budget estimated at $361,400. There are three sites in Vancouver where gay men test frequently: Three Bridges, the Bute Street Clinic and Spectrum Health. The BC CDC expects approximately 6000 tests from these sites per year. By implementing the additional testing site(s) and increasing health communication around testing, it is reasonable to believe this number could jump by ten percent, bringing the number of HIV tests to 6600. By adding a pooled NAAT to the current ELISA test, it increases testing costs by about $4.00 per test, for a cost of $26,400. Point of Care tests costs about $15.00 per kit. It would cost $15,000 to provide 1000 Point of Care tests to mobile clinics to be used during outreach with the nurses and testing staff. Staffing costs include one full time and one part time staff person, (preferably public health nurses) at $120,000, an operating budget of $100,000 for materials, space rental, community relations and project specific activities, plus $100,000 for a social marketing/health information campaign. The total cost for

the MSM Testing Strategy would be $361,400, with a per intervention cost of $54.75 ($361,400/6600 tests).

The Treatment Support Centre is estimated to cost $730,000 per year, making it the second most expensive. This cost estimate includes two nurses ($80,000 each according to Vancouver Coastal pay guidelines), one administrator ($80,000), two support workers ($45,000 each), office space ($100,000) and a communications budget ($300,000), totaling $730,000. When considering per intervention costs, ($730,000/6040 HIV positive MSM) the Centre would cost $120.86 per HIV positive MSM. This assumes the program is able to reach 100% of those who identify as HIV positive, which is probably not possible, resulting in fewer interventions, and increasing the per intervention costs.

It is estimated the Mental Health Program would cost $497,000 per year to operate, which means it is one of the least costly alternatives, but has the highest per intervention cost ($776.56). This estimate includes the salary of four mental health counselors (with an average salary of $58,000 each, according to Vancouver Coastal Health pay guidelines)[4] and an additional $75,000 for a coordinator. Operating costs would include $100,000 for health communications, $40,000 for space rental and $50,000 for a peer counseling program. It is reasonable to expect four counselors to maintain 40 clients each, totaling 160 clients. With a turn-over rate of twice per year, mental health counselors could expect to impact 320 MSM. The peer counseling program, run all year long, is expected to impact an equal number of clients, resulting in 640 MSM receiving some form of mental health counseling. Based on these numbers, the Mental Health Program would have the highest per intervention cost, at approximately $776.56 per MSM affected by the program.

The Research and Health Promotion Centre has the highest total cost ($775,000) but the second lowest per intervention cost ($67.50). Adequate staffing for a Research and Health

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[4] In June 2009, quote from Workopolis.com $26.39 – $38.05

Promotion Centre would require two community researchers ($140,000) and two communications consultants ($140,000), and an office administrator ($45,000), totaling $325,000. It costs between $5,000 and $10,000 to produce one pamphlet and $75,000 per health campaign (Banks, 2009). If the organization put out ten pamphlets per year and two health communication campaigns, it would cost $250,000 in communications. Rental space and an operating budget for five staff is estimated at $200,000 for a total budget of $775,000 annually. If each pamphlet was read by 1.0% of the population, it would mean 4,000 MSM would be affected. If the health communication campaigns each reached 10.0% of the population, it would mean that 8,000 more MSM would be affected, totaling 12,000 interventions, for a per intervention cost of $64.58.

*Table 14: Total & Per Intervention Cost of Alternatives*

| | MSM Testing Service | Treatment Support Centre | An MSM Mental Health Program | A Research and Health Promotion Centre |
|---|---|---|---|---|
| **Total Cost** | $361,400 | $730,000 | $497,000 | $775,000 |
| **Per Intervention Cost** | $54.75 (Low) | $120.86 (Moderate) | $776.56 (High) | $64.58 (Low) |

**\*Per intervention costs > $500.00 = High, $100.00 - $500.00 = Moderate, < $100.00 = Low**

As shown in Table 14, the MSM Testing Service and the Research and Health Promotion Centre are the least costly alternatives, both costing less than $100.00 per intervention, therefore they have been ranked as Low. The Mental Health Program was the only alternative that cost more than $500.00 per intervention, so it has been ranked as High.

When provincial health care budgets are already strained, $775,000 in new funding may seem expensive. However, the BC Centre for Excellence estimates the cost of treating one person with HIV to be $250,000 to $750,000 (Hansen, 2008). By preventing only two or three infections a year, a policy alternative could save taxpayers more than one million dollars in future treatment costs, not including related social and economic costs.

**Equity** – Policies that impose differential demands on sub-populations are inequitable and should be avoided when possible. In the context of HIV/AIDS prevention, equitable policies will hold both HIV-negative and HIV-positive MSM to the same expectations. In a population where HIV incidence is reported to be 15.1% or higher, it is important that policies do not further stigmatise those who are infected. The onus to prevent HIV transmission should fall on both HIV-negative and positive MSM. Policies that punish or have high expectations for HIV-positive persons may have a negative impact on HIV testing rates as knowing your HIV status becomes a liability.

The first alternative, the MSM Testing Service, is considered an equitable alternative as it encourages all MSM to know their HIV status. It could be argued that the alternative targets HIV-negative MSM, but in fact, MSM are not HIV- negative or positive until they have a test, therefore the planned expansion would be aimed at reducing the number of unknown infections, which plays an equitable role in prevention.

The Treatment Support Centre is a moderately equitable alternative, comparatively, as it is targets predominantly HIV-positive MSM. By creating the expectation that HIV- positive MSM will manage their infection with medications, it also gives a false sense of security for HIV-negative MSM. The policy alternative is less equitable than the Mental Health Program and the Research and Health Promotion Centre, because it places the bulk of onus on the HIV-positive individual.

Since the Mental Health Program is designed for all MSM, regardless of HIV status, the third alternative is an equitable option. In fact, given the serious under-funding of mental health services, it could be argued that this alternative responds to an existing equity gap. Since HIV-positive MSM are more likely to have contact and integration into social services, by providing counselling services to MSM regardless of HIV status, HIV- negative MSM are more able to access mental health services that may aid in prevention.

The fourth alternative is also designed to give MSM, regardless of HIV status, a place where they can access and share health related information and resources, making it an equitable alternative. Health communication campaigns and project related activities aimed at strengthening the health status of the MSM community would benefit both HIV- positive and negative men.

**Ease of Implementation** – Some of the alternatives are more easily implemented, as they are 'expansions' of existing programs, where infrastructure already exists. For policy-makers, this may be taken into consideration when deciding where resources are to be allocated. The more agencies involved in the implementation of an alternative, the more difficult it will be to implement, as competing interests exist.

Implementing new testing technologies would require training on the part of both lab technicians and testing staff. Increasing access to testing would require a significant amount of logistical planning, as well as strategies for recruitment. Most of this work would be done by one agency, the BC Centre for Disease Control (BCCDC), in collaboration with the various testing facilities. Since most of the change in protocol would happen solely within the BCCDC, it is considered only moderately difficult to implement and therefore ranked as Moderate.

The Treatment Service Centre could be easily implemented as the BC Centre for Excellence in HIV/AIDS currently houses a treatment program and is aware of who is on treatment and how to reach them. The only administrative implications are around outreach and the need to identify new patients, which is done through protocols distributed to medical professionals. Once patients are identified (with the help of the BCCDC), the existing structures of the BC Centre for Excellence in HIV/AIDS are utilised, making it moderately easy to implement, so it has been ranked as Moderate.

Increasing access to mental health services would pose many of the same obstacles as the testing alternative, however, it would be more difficult to implement, as mental health is not an

area that is currently the responsibility of one organization or agency. Many mental health services are delivered through private counsellors, so an agency would need to be created, or the program would have to be attached to another agency which is currently not in the business of delivering mental health services, making this alternative the most difficult to implement, and ranked as Low for this criterion.

In Vancouver there are several organizations that could collaborate on a Research and Health Promotion Centre: the Community Based Research Centre (research), the Health Initiative for Men (health promotion), and the STI division of the BCCDC (surveillance), among a few. Since several agencies are required, implementation of the fourth alternative is moderately difficult. Given the current infrastructure in Vancouver, it would appear that the Mental Health Program would pose the most administrative difficulties in the implementation process.

## 9.2   Comparative Rankings Matrix

This subsection provides an overview of how each policy alternative ranked for each of the criterion measured. Given the criteria measured, the Research and Health Promotion Centre is the most desirable alternative, as it is the most effective, has one of the lowest per intervention costs, is equitable and moderately easy to implement. Table 15 outlines each of the alternatives and how they ranked in their respective categories.

*Table 15: Comparative Rankings Matrix*

| Criteria | MSM Testing Service | Treatment Support Centre | MSM Mental Health Program | The Research and Health Promotion Centre |
|---|---|---|---|---|
| **Effectiveness** | Moderate (2) | Moderate (2) | Moderate (2) | High (3) |
| **Cost** | Low (3) | Moderate (2) | High (1) | Low (3) |
| **Equity** | Moderate (2) | Moderate (2) | High (3) | High (3) |
| **Ease of Implementation** | Moderate (2) | Moderate (2) | Low (1) | Moderate (2) |
| **Cumulative Score*** | 9 | 8 | 7 | 11 |
| **Ranking** | 2 | 3 | 4 | 1 |

**\* Cumulative score is determined by assigning a numeric value to Low (1), Moderate (2) and High (3), with the exception of Cost, which is inverse. Those alternatives with higher numbers are the most desirable options, given the criteria measured.**

The Research and Health Promotion Centre ranks first of the four suggested policy alternatives, as a result of its cumulative score of 11. The Testing Service has the second highest score at 9, followed by the Treatment Support Centre at 8. The mental health program was least desirable because it is costly and difficult to implement.

# 10: Policy Recommendations

HIV is a complex disease that requires many approaches to prevention. Each of the alternatives evaluated in this study have the potential to reduce sexual risk-taking, and consequently, HIV transmission.

Given the criteria assessed in the previous section, a Research and Health Promotion Centre is the recommended policy alternative. Not only did it rank the highest in the comparative ranking matrix, this alternative has the potential to influence other prevention and risk-reducing alternatives by informing and educating the community on issues surrounding testing, mental health and treatment, as well as the broad scope of gay men's health.

The MSM Testing Service was also highly ranked in the previous section. It is worth noting that testing for MSM is being expanded and strategically prioritized by Vancouver Coastal Health (Vancouver Coastal Health, 2007). The Canadian Institute of Health Research, in collaboration with the BC Centre for Disease Control is currently conducting a study that includes a trial of Nucleic Acid Amplification Tests being used on testing sites frequented by gay men and MSM. The results of the study will most likely influence any future policy directives related to testing of MSM.

The Treatment Support Centre does not exist and to my knowledge, no plans are being made to create one. Currently the Immunodeficiency Clinic (IDC) at St. Paul's is the de facto Treatment Support Centre, but mainly provides support around adherence. Despite this, there is evidence that gay men and MSM have started to use the perceived or real viral loads of their partners to determine safer sex practices (Prestage et al, 2009). ARV use and its effect on viral load should be addressed by some public health or community sponsored campaign.

The Mental Health Program was the least desirable according to the criterion assessed in this study, however, there continues to be evidence that mental health is impacting sexual risk-taking (Trussler, 2009). For that reason a mental health program is being pursued by a community organization in Vancouver. Whether or not the program is successful or effective, is yet to be determined, however, if it proves to be the case, it may be worthwhile investing further prevention funding into this program.

In summary, the Research and Health Promotion Centre is the most desirable policy alternative, however, each of these alternatives has merit, and if budget constraints were not an issue, all four should be considered

## 10.1 Further Recommendation

Throughout my research and personal experience working in HIV prevention for MSM, one obstacle is commonly mentioned across the field: there is a lack of communication and collaboration between researchers, medical and treatment centres, public health officials and community activists. For that reason I have included this fifth policy alternative, although it was not evaluated with the previous four, I thought it worth mentioning, as it is a low cost alternative which is often discussed and easily implemented: an MSM working group.

Currently there is no strategy for HIV among MSM, locally, provincially or nationally. A local strategy could be created by an MSM working group. The group could have a similar structure to that of the Gay Men's Methamphetamine working group (GaMMa). The GaMMa working group brought together representatives from various organizations that worked with MSM to address the crystal meth problem in 2004. The working group was co-facilitated by a Vancouver Coastal Health community developer and a member of the AIDS Vancouver prevention team. A similar working group could meet regularly to discuss the individual programs and approaches for preventing HIV among MSM. Greater collaboration would increase

the effectiveness of existing prevention services, while highlighting gaps that may exist. The working group would be responsible creating and contributing to a local HIV strategy for MSM.

Once a strategy is created by the working group, benchmarks would need to be created to evaluate and measure the success of prevention efforts. Members of the working group could include the BC Centre for Disease Control, Vancouver Coastal Health, the BC Centre for Excellence in HIV/AIDS and community groups that work with MSM, including AIDS Vancouver and the Health Initiative for Men.

# Appendices

# Appendix A: 2007 Sex Now Survey Questions

TEASER

## 1. What do you think is hottest?
- ❑ Natural
- ❑ Underwear
- ❑ Tattoos
- ❑ Leather
- ❑ Rubber
- ❑ Piercings.

DEMOGRAPHICS

## 2. Sex partners *in the last 12 months...*
- ❑ No sex at all
- ❑ Sex with men only
- ❑ Sex with women only
- ❑ Sex with both men and women

## 3. Are you currently... ?
- ❑ Single
- ❑ Married to a man
- ❑ Partnered with a man but not married
- ❑ Married to a woman
- ❑ Partnered with a woman but not married
- ❑ None of these: say what _____

## 4. Do you know your current partner/boyfriend's HIV status?
- ❑ Yes, HIV-positive
- ❑ Yes, HIV-negative
- ❑ Don't know
- ❑ No boyfriend / not partnered

## 5. Year of your birth. _____

## 6. What city do you live in (or closest to)?
- ❑ Vancouver
- ❑ Victoria
- ❑ Prince George
- ❑ Kelowna
- ❑ Nanaimo
- ❑ Nelson
- ❑ Other BC
- ❑ Outside BC

**7. What education have you completed?**
- ❑ Some high school
- ❑ High school
- ❑ College / Technical
- ❑ University

**8. How do you describe yourself to other guys?**
- ❑ African
- ❑ Asian
- ❑ Caribbean
- ❑ Caucasian
- ❑ First Nation/Aboriginal
- ❑ Latino/Hispanic
- ❑ Middle Eastern
- ❑ Pacific Islander
- ❑ South Asian
- ❑ Mixed
- ❑ Other: _____

**9. What was your income *in the last year*?**
- ❑ Under $10,000
- ❑ $10,000 - $29,999
- ❑ $30,000 - $49,999
- ❑ $50,000 - $69,999
- ❑ $70,000 - $99,999
- ❑ $100,000 +

**SEXUAL EXPERIENCE**
**10. In total, how many men have you had sex with *in the last 12 months*?**
- ❑ None
- ❑ One
- ❑ 2-5
- ❑ 6-9
- ❑ 10-19
- ❑ 20+

**11. What are you into at the moment?**
- ❑ Not sexually active at the moment
- ❑ Hooking-up
- ❑ Dating
- ❑ Sex with my partner/boyfriend only
- ❑ Sex with my primary partner plus other guys
- ❑ 2 or more sex buddies
- ❑ Other, say where: _____

**12. Where was the LAST PLACE you looked for sex with a man?**
- ❑ Haven't looked for sex in the last 12 months
- ❑ Internet
- ❑ Community group
- ❑ Print/phone-line ad
- ❑ Baths/sauna/play-space
- ❑ Bar/pub/club
- ❑ Cruising ground/park
- ❑ Private party
- ❑ Other:_____

**13. Where was the LAST PLACE you had sex with a man?**
- ❑ Never had sex with a man
- ❑ My place
- ❑ His place
- ❑ Baths/sauna/play-space
- ❑ Cruising ground/park
- ❑ Private party
- ❑ Public washroom
- ❑ Hotel room
- ❑ Other, say where_____

**14. In the last 12 months, how often have YOU ASKED (probed for info etc.) about the HIV status of your CASUAL sex partners?**
- ❑ Always
- ❑ Sometimes
- ❑ Never
- ❑ I've had no casual partners in the last 12 months

**15. In the last 12 months, how often have you BEEN ASKED (probed for info etc.) about your HIV status by your CASUAL sex partners?**
- ❑ Always
- ❑ Sometimes
- ❑ Never
- ❑ I've had no casual partners in the last 12 months

**SEXUAL HEALTH**

**16. Have you had sex that risked HIV transmission in the last 12 months?**
- ❑ Yes
- ❑ No

**17. What was your last HIV test result?**
- ❑ HIV-Positive
- ❑ HIV-Negative
- ❑ I've never had an HIV test result

**18. How recent was your last HIV test?**
- ❑ Never tested
- ❑ Within six months
- ❑ 6 months—1 year
- ❑ Over a year ago

**19. What was the MAIN reason for your last HIV test?**
- ❑ I've never tested for HIV
- ❑ My regular routine
- ❑ Flu-like symptoms
- ❑ For my partner's information
- ❑ Prompted by an ad campaign
- ❑ Condom problems: broke, slipped, leaked
- ❑ Pressured for sex without condoms
- ❑ Risky sex with someone who was HIV positive
- ❑ Risky sex with an unknown status partner
- ❑ Other, say what:_____

### 20. Where did you get your last HIV test?
- ❑ I've never tested for HIV
- ❑ Through my personal physician
- ❑ Walk-in medical clinic
- ❑ Visited an STI clinic
- ❑ Other: say where_____

### 21. How often do you usually take an HIV test?
- ❑ Every 3 months
- ❑ Every 6 months
- ❑ Every year
- ❑ No specific time period
- ❑ I've never tested for HIV
- ❑ I'm already HIV positive

### 22. In the last 12 months, have you agreed to take an HIV test with a guy you were dating?
- ❑ Yes
- ❑ No
- ❑ I'm already HIV positive

### 23. If made available, which of the following HIV test options would be MOST effective for you?
- ❑ A rapid test with a same-day result
- ❑ A shorter window period of only one week following a risk event
- ❑ An in-home test
- ❑ I'm already HIV positive

### 24. How often do you usually test for sexually transmitted infections other than HIV?
- ❑ Every 3 months
- ❑ Every 6 months
- ❑ Every year
- ❑ No specific time period

### 25. In the last 12 months, have you picked up a sexually transmitted infection other than HIV?
yes  no
- ❑   ❑ Syphilis
- ❑   ❑ Gonorrhea
- ❑   ❑ Chlamydia
- ❑   ❑ Herpes
- ❑   ❑ Genital Warts
- ❑   ❑ Other: say what_____

### 26. How do you usually get your condoms?
- ❑ I buy them
- ❑ My partners have them
- ❑ I get them free
- ❑ I don't use condoms

### 27. How important are FREE condoms in gay venues?
- ❑ Very important
- ❑ Important
- ❑ Not very important
- ❑ Not at all important

### 28. "I have erection problems when using condoms."
- ❏ Strongly agree
- ❏ Agree
- ❏ Disagree
- ❏ Strongly disagree

### 29. "I have trouble climaxing when using condoms."
- ❏ Strongly agree
- ❏ Agree
- ❏ Disagree
- ❏ Strongly disagree

### 30. "Sometimes I would rather risk HIV transmission than use a condom."
- ❏ Strongly agree
- ❏ Agree
- ❏ Disagree
- ❏ Strongly disagree

## PARTY N PLAY
### 31. How often are you using the following ...

| Never 1 | | Daily 2 | Weekly 3 | Sometimes 4 |
|---|---|---|---|---|
| ❏ | Alcohol | ❏ | ❏ | ❏ |
| ❏ | Crystal | ❏ | ❏ | ❏ |
| ❏ | Cocaine | ❏ | ❏ | ❏ |
| ❏ | "E" ecstasy | ❏ | ❏ | ❏ |
| ❏ | "G" GHB | ❏ | ❏ | ❏ |
| ❏ | "K" ketamine | ❏ | ❏ | ❏ |
| ❏ | Marijuana | ❏ | ❏ | ❏ |
| ❏ | Poppers | ❏ | ❏ | ❏ |
| ❏ | Viagra/Cialis/Levitra | ❏ | ❏ | ❏ |

### 32. How long has it been since you had anal sex with a CASUAL partner WITHOUT a CONDOM?
- ❏ Within the last week
- ❏ More than a week but within the last month
- ❏ More than a month but within a year
- ❏ More than a year ago
- ❏ Never

**Active anal Intercourse FUCKING (top)** *in the last 12 months...*

### 33. How many guys have you fucked WITHOUT a condom whose HIV status was KNOWN to you?
❏ None  ❏ 1  ❏ 2-5  ❏ 6-9  ❏ 10-19  ❏ 20+

### 34. How many guys have you fucked WITHOUT a condom whose HIV status you did NOT KNOW?
❏ None  ❏ 1  ❏ 2-5  ❏ 6-9  ❏ 10-19  ❏ 20+

**Passive anal intercourse GETTING FUCKED (bottom)** *in the last 12 months...*

### 35. How many guys have fucked you WITHOUT a condom whose HIV status was KNOWN to you?
❏ None  ❏ 1  ❏ 2-5  ❏ 6-9  ❏ 10-19  ❏ 20+

**36. How many guys have fucked you WITHOUT a condom whose HIV status you did NOT KNOW?**
❑ None   ❑ 1   ❑ 2-5   ❑ 6-9   ❑ 10-19   ❑ 20+

**37. How often do you look for casual partners to have sex without condoms?**
❑   All the time
❑   Sometimes
❑   Never

**38. How often have you felt pressured to have anal sex without a condom *in the last 12 months?***
❑ Never   ❑ 1   ❑ 2-5   ❑ 6-9   ❑ 10-19   ❑ 20+

**39. Where was pressure for sex without condoms coming from *in the last 12 months?***
❑   Other guy(s) (Not into condoms, dissuaded me etc.)
❑   Me (Felt I had to, caved-in etc.)
❑   Other guy(s) and me
❑   Not pressured in the last 12 months

**ISSUES**

**40. Have you ever had unwanted (forced) sex?**
❑   yes, when I was younger than 18
❑   yes, when I was 18 or older
❑   yes, when I was BOTH younger than 18 and older
❑   no

**41. Have you had any anti-gay encounters in the last 12 months?**
❑   yes, verbal (threats, insults)
❑   yes, physical (hit, beaten-up)
❑   yes, BOTH verbal and physical
❑   no

**42. Has being gay affected your employment /career in the last 12 months?**
i.e., turned down, not promoted, fired, singled out, harassed, ignored
❑   Significantly
❑   Somewhat
❑   Not at all

**KNOWLEDGE**
**43–47 Were you aware of the following...?**
**Yes  No**
❑   ❑   Since 2000, at least 1,200 BC gay guys have been infected with HIV.
❑   ❑   Depending on the timing of an HIV test, some men may actually be positive despite a negative result.
❑   ❑   Most HIV tests can only show results after a window period of at least 4-6 weeks following infection.
❑   ❑   A test exists, but is not currently available, which can detect HIV in only 7 days after infection.
❑   ❑   People are highly infectious during the first 8 weeks after they get HIV.

**Do you AGREE or DISAGREE with the following statements...?**

**48. "HIV positive men on anti-retroviral medications are less infectious than positive men who are not."**
- ❑ Strongly agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly disagree

**49. "Sex is less a worry because HIV treatments are effective."**
- ❑ Strongly agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly disagree

**50. "Sex is less a worry with low viral load."**
- ❑ Strongly agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly disagree

**51. "I can deal with pressure for sex without condoms."**
- ❑ Strongly agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly disagree

**52. "I know where to get sexual health information when I need it."**
- ❑ Strongly agree
- ❑ Agree
- ❑ Disagree
- ❑ Strongly disagree

## PARTICIPATION

**At least one gay man is infected with HIV every other day in BC ...**

**53. How satisfied are you with what is being done to help gay men prevent new HIV infections?**
- ❑ Very satisfied
- ❑ Satisfied
- ❑ Unsatisfied
- ❑ Very unsatisfied

**54. When was the last time you saw an AD on a POSTER or BILLBOARD about gay men's health?**
- ❑ In the last month
- ❑ In the last year
- ❑ Over a year ago
- ❑ Never

**55. When was the last time you took away a CARD, PAMPHLET or MAGAZINE for information about gay men's health?**
- ❏  In the last month
- ❏  In the last year
- ❏  Over a year ago
- ❏  Never

**56. When was the last time you read information on the INTERNET about gay men's health?**
- ❏  In the last month
- ❏  In the last year
- ❏  Over a year ago
- ❏  Never

**57. When was the last time you visited a COMMUNITY ORGANIZATION for information about gay men's health?**
- ❏  In the last month
- ❏  In the last year
- ❏  Over a year ago
- ❏  Never

**58–67. How would you RATE these organizations on their efforts to support gay men's health?**

| Don't know | Low 1 | 2 | 3 | High 4 | |
|---|---|---|---|---|---|
| ❏ | ❏ | ❏ | ❏ | ❏ | AIDS Vancouver |
| ❏ | ❏ | ❏ | ❏ | ❏ | ASIA |
| ❏ | ❏ | ❏ | ❏ | ❏ | BC Persons with AIDS Society |
| ❏ | ❏ | ❏ | ❏ | ❏ | Bute Street Clinic |
| ❏ | ❏ | ❏ | ❏ | ❏ | Community Based Research Centre |
| ❏ | ❏ | ❏ | ❏ | ❏ | AIDS Vancouver Island |
| ❏ | ❏ | ❏ | ❏ | ❏ | Living Positive Resource Centre |
| ❏ | ❏ | ❏ | ❏ | ❏ | Gayway |
| ❏ | ❏ | ❏ | ❏ | ❏ | The Centre |
| ❏ | ❏ | ❏ | ❏ | ❏ | YouthCO |

**68. How likely are you to SUPPORT the idea of a community service organization dedicated to gay men's health?**
- ❏  Very likely
- ❏  Likely
- ❏  Unlikely
- ❏  Very unlikely

**69. How likely would you be to DONATE to a service organization dedicated to gay men's health?**
- ❏  Very likely
- ❏  Likely
- ❏  Unlikely
- ❏  Very unlikely

**70. How likely would you be to PARTICIPATE in community action to improve funding for gay men's health?**
- ❏  Very likely
- ❏  Likely
- ❏  Unlikely
- ❏  Very unlikely

**71. How likely would you be to VOLUNTEER to help run gay men's health programs?**
❑ Very likely
❑ Likely
❑ Unlikely
❑ Very unlikely

**72 – 74 Included a hand-out that showed pictures of different campaigns.**

**75-81. Do you have a profile on any of the following...**
**yes no**
❑ ❑ www.facebook.com
❑ ❑ www.gay.com
❑ ❑ www.manhunt.net
❑ ❑ www.m4m-world.com
❑ ❑ www.myspace.com
❑ ❑ www.squirt.org
❑ ❑ Other:_____

**82. How much of your free time do you spend with other gay men?**
❑ very little  ❑ 25% ❑ 50% ❑ 75% ❑ most

**83–84. I did the Sex Now survey in...**
**yes no**
❑ ❑ 2004
❑ ❑ 2006

# Appendix B: Correlation Table

| | AGE | ETHNIC | EDUC | INCOME | POZ | PARVOL | ALCOHL | METH | COKE | GHB | KETA | POPPER | VIAGRA | FORCED | HOMPHO | EPIKNO | TIMING | HYPER | LESINF | LESWOR | LOWVIR |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AGE | 1 | | | | | | | | | | | | | | | | | | | | |
| ETHNIC | -.229 | 1 | | | | | | | | | | | | | | | | | | | |
| EDUC | .209 | .003 | 1 | | | | | | | | | | | | | | | | | | |
| INCOME | .385 | -.114 | .265 | 1 | | | | | | | | | | | | | | | | | |
| POZ | .190 | -.015 | .014 | .080 | 1 | | | | | | | | | | | | | | | | |
| PARVOL | .110 | -.080 | .120 | .155 | .146 | 1 | | | | | | | | | | | | | | | |
| ALCOHL | -.102 | .042 | .006 | .012 | -.034 | -.078 | 1 | | | | | | | | | | | | | | |
| METH | .037 | -.017 | -.022 | -.021 | .235 | .122 | -.098 | 1 | | | | | | | | | | | | | |
| COKE | -.055 | -.058 | -.073 | .026 | .099 | .132 | .002 | .338 | 1 | | | | | | | | | | | | |
| GHB | -.032 | .015 | -.026 | .039 | .177 | .139 | -.040 | .494 | .385 | 1 | | | | | | | | | | | |
| KETA | -.064 | -.003 | .011 | .001 | .102 | .135 | -.021 | .493 | .453 | .682 | 1 | | | | | | | | | | |
| POPPER | .195 | -.048 | .100 | .068 | .229 | .270 | -.056 | .163 | .189 | .183 | .215 | 1 | | | | | | | | | |
| VIAGRA | .262 | -.187 | .119 | .147 | .229 | .167 | -.104 | .200 | .158 | .216 | .206 | .191 | 1 | | | | | | | | |
| FORCED | .006 | .034 | -.013 | -.042 | .062 | -.002 | -.039 | .048 | .001 | .013 | .003 | -.019 | .040 | 1 | | | | | | | |
| HOMPHO | -.198 | .049 | -.072 | -.064 | -.070 | -.031 | .002 | -.001 | .042 | .027 | .049 | -.049 | -.005 | .134 | 1 | | | | | | |
| EPIKNO | .096 | -.055 | .055 | .033 | .158 | .031 | -.075 | .012 | -.039 | .010 | -.019 | .034 | .088 | .068 | -.021 | 1 | | | | | |
| TIMING | .091 | -.036 | .151 | .103 | .072 | .135 | -.021 | -.041 | .054 | -.016 | .019 | .032 | .103 | -.009 | .040 | .194 | 1 | | | | |
| HYPER | .143 | -.039 | .110 | .071 | .201 | .092 | -.024 | .116 | .014 | .078 | .077 | .102 | .109 | -.003 | -.010 | .309 | .230 | 1 | | | |
| LESINF | .010 | .040 | .081 | .036 | .165 | .091 | -.050 | .054 | .046 | .121 | .116 | .075 | .132 | -.018 | .041 | .120 | .076 | .161 | 1 | | |
| LESWOR | .090 | -.031 | .012 | .056 | .195 | .120 | -.028 | -.002 | .024 | .034 | .078 | .102 | .105 | -.008 | -.047 | .045 | .016 | .104 | .283 | 1 | |
| LOWVIR | .103 | -.045 | .057 | .068 | .336 | .153 | -.016 | .039 | .080 | .132 | .162 | .107 | .197 | .015 | -.003 | .104 | .083 | .181 | .465 | .436 | 1 |

# Appendix C: SPSS Regression Model Outputs

## Output 1 – Model A

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|-------------------|----------------------|---------------------|
| 1 | 1269.614[a] | .013 | .018 |

a. Estimation terminated at iteration number 3 because
parameter estimates changed by less than .001.

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|------|------|----|------|--------|
| Step 1[a] | birthyr(1) | .150 | .167 | .807 | 1 | .369 | 1.162 |
| | ethnic(1) | .029 | .160 | .032 | 1 | .858 | 1.029 |
| | educat(1) | -.031 | .165 | .035 | 1 | .851 | .969 |
| | Poverty(1) | -.385 | .159 | 5.826 | 1 | .016 | .680 |
| | antigay(1) | -.016 | .153 | .011 | 1 | .917 | .984 |
| | forced(1) | -.210 | .157 | 1.787 | 1 | .181 | .810 |
| | Constant | -.076 | .244 | .097 | 1 | .756 | .927 |

a. Variable(s) entered on step 1: birthyr, ethnic, educat, Poverty, antigay, forced.

## Output 2 – Model B

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|-------------------|----------------------|---------------------|
| 1 | 1274.680[a] | .009 | .012 |

a. Estimation terminated at iteration number 3 because
parameter estimates changed by less than .001.

**Variables in the Equation**

|  |  | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1[a] | birthyr | -.375 | .164 | 5.248 | 1 | .022 | .687 |
|  | ethnic | .011 | .160 | .005 | 1 | .945 | 1.011 |
|  | educat | -.081 | .166 | .238 | 1 | .626 | .922 |
|  | Poverty | .303 | .240 | 1.596 | 1 | .206 | 1.354 |
|  | antigay | .037 | .152 | .059 | 1 | .808 | 1.038 |
|  | forced | .234 | .157 | 2.216 | 1 | .137 | 1.264 |
|  | Constant | -.459 | .238 | 3.711 | 1 | .054 | .632 |

a. Variable(s) entered on step 1: birthyr, ethnic, educat, Poverty, antigay, forced.

# Output 3 – Model C

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|---|---|---|---|
| 1 | 1252.523[a] | .032 | .043 |

a. Estimation terminated at iteration number 3 because
parameter estimates changed by less than .001.

**Variables in the Equation**

|  |  | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1[a] | birthyr | -.516 | .168 | 9.430 | 1 | .002 | .597 |
|  | ethnic | -.014 | .161 | .007 | 1 | .933 | .986 |
|  | educat | -.060 | .168 | .127 | 1 | .722 | .942 |
|  | Poverty | .287 | .241 | 1.413 | 1 | .235 | 1.332 |
|  | antigay | .074 | .154 | .235 | 1 | .628 | 1.077 |
|  | forced | .187 | .159 | 1.383 | 1 | .240 | 1.206 |
|  | poz | .882 | .188 | 21.970 | 1 | .000 | 2.415 |
|  | Constant | -.496 | .240 | 4.268 | 1 | .039 | .609 |

a. Variable(s) entered on step 1: birthyr, ethnic, educat, Poverty, antigay, forced, poz.

# Output 4 – Model D

## Model Summary

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|-------------------|----------------------|---------------------|
| 1 | 1191.502[a] | .091 | .123 |

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

## Variables in the Equation

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|-----|------|------|-----|------|--------|
| Step 1[a] | birthyr | -.473 | .181 | 6.829 | 1 | .009 | .623 |
| | ethnic | .077 | .170 | .205 | 1 | .651 | 1.080 |
| | educat | -.160 | .176 | .830 | 1 | .362 | .852 |
| | Poverty | .083 | .252 | .108 | 1 | .742 | 1.086 |
| | antigay | .062 | .159 | .150 | 1 | .699 | 1.064 |
| | forced | .210 | .165 | 1.622 | 1 | .203 | 1.234 |
| | poz | .715 | .205 | 12.190 | 1 | .000 | 2.044 |
| | partvol | .991 | .150 | 43.459 | 1 | .000 | 2.694 |
| | alcohol | .168 | .173 | .949 | 1 | .330 | 1.183 |
| | crystal | .022 | .341 | .004 | 1 | .948 | 1.023 |
| | cocaine | .367 | .230 | 2.538 | 1 | .111 | 1.443 |
| | GHB | -.233 | .340 | .469 | 1 | .494 | .792 |
| | ketamine | .545 | .372 | 2.143 | 1 | .143 | 1.724 |
| | poppers | -.037 | .158 | .054 | 1 | .816 | .964 |
| | viagra | -.064 | .175 | .133 | 1 | .716 | .938 |
| | Constant | -.979 | .289 | 11.441 | 1 | .001 | .376 |

a. Variable(s) entered on step 1: birthyr, ethnic, educat, Poverty, antigay, forced, poz, partvol, alcohol, crystal, cocaine, GHB, ketamine, poppers, viagra.

# Output 5 – Model E

**Model Summary**

| Step | -2 Log likelihood | Cox & Snell R Square | Nagelkerke R Square |
|------|-------------------|----------------------|---------------------|
| 1 | 1184.287[a] | .097 | .132 |

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

**Variables in the Equation**

| | | B | S.E. | Wald | df | Sig. | Exp(B) |
|---|---|---|---|---|---|---|---|
| Step 1[a] | birthyr | -.571 | .176 | 10.473 | 1 | .001 | .565 |
| | ethnic | .071 | .169 | .174 | 1 | .677 | 1.073 |
| | educat | -.195 | .176 | 1.233 | 1 | .267 | .822 |
| | Poverty | .088 | .250 | .123 | 1 | .726 | 1.092 |
| | antigay | .053 | .160 | .111 | 1 | .739 | 1.055 |
| | forced | .231 | .166 | 1.933 | 1 | .164 | 1.260 |
| | poz | .612 | .208 | 8.629 | 1 | .003 | 1.844 |
| | partvol | .959 | .147 | 42.725 | 1 | .000 | 2.608 |
| | knowepi | -.339 | .150 | 5.074 | 1 | .024 | .713 |
| | TestTiming1 | .332 | .216 | 2.351 | 1 | .125 | 1.393 |
| | hyperinfc | -.017 | .154 | .013 | 1 | .911 | .983 |
| | arvless | -.097 | .179 | .294 | 1 | .588 | .908 |
| | arveffect | .280 | .275 | 1.038 | 1 | .308 | 1.324 |
| | virload | .517 | .226 | 5.248 | 1 | .022 | 1.677 |
| | Constant | -.875 | .292 | 8.971 | 1 | .003 | .417 |

a. Variable(s) entered on step 1: birthyr, ethnic, educat, Poverty, antigay, forced, poz, partvol, knowepi, TestTiming1, hyperinfc, arvless, arveffect, virload.

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